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Human Capital and Collective Political Events

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By

Luca Mantegazza

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The dissertation of Luca Mantegazza is approved.

Program Coordinator:
Prof. Dr. Pietro Pietrini, IMT School for Advanced Studies Lucca

Supervisor:
Dr. Alessandro Belmonte, IMT School for Advanced Studies Lucca

The dissertation of Luca Mantegazza has been reviewed by:

Dr. Jessica Di Salvatore, University of Warwick
Dr. Roberto Nisticò, University of Naples Federico II

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Contents

List of Figures

List of Tables

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Vita

ACADEMIC EXPERIENCE

Adjunct Lecturer Fall 2017 – Spring 2020
Department of Economics, University of Florida, US

- ECO6409 – Game Theory Applied (*Fall 2019*)
- ECO4400 - Game Theory (*Fall 2017, Spring 2018, Fall 2018, Fall 2019*)
- ECO3101 - Intermediate Microeconomics (*Fall 2017, Spring 2018, Fall 2018*)

PhD. Economics (Thesis submitted) 11/2014 – 12/2019
IMT School for Advanced Studies Lucca, Italy

Visiting Scholar 01/2016 – 05/2017
Center for African Studies, University of Florida, US

- Teacher Assistant to Prof. Renata Serra in the following courses:
  - AFS6307 - Foundations of Economics for Sustainable Development *(Spring 2016)*
  - AFS 4935 - African Economic Development *(Fall 2016)*
- Member of the Sahel Research Group

Summer School June-July 2017
Paris School of Economics, France

- Concentration in Development Economics
- Concentration in Behavioral Economics

MSc. Economics (research) 09/2011 – 06/2012
London School of Economics and Political Science, UK

- Awarded with Merit

Erasmus project 07/2010 – 02/2011
Athens University of Economics and Business, Greece

BSc. European Economics 09/2008 – 07/2011
Università di Roma "Tor Vergata", Italy

- Graduated with 110/110 *summa cum laude*

CONFERENCES, SEMINARS, AND PRESENTATIONS

WATE Conference – Florida 10/25/2020

"Higher Education in Developing Countries: a Political and Economic Tradeoff"
Presentation at UF Department of Economics Seminars 03/30/2018

"Trends and Structures of the Sahelian Economies"
Presentation at UF Sahel Research Group Meeting 05/08/2017

Carter Conference in African Studies 02/23/2017

WINIR conference on Institutions and Human Behaviour 09/02/2016

"Higher Education and Organized Political Violence: a focus on sub-Saharan Africa" 04/13/2016
Presentation at the Students in African Studies Association Seminars

WORK EXPERIENCE

Project Coordinator 06/2013 – 07/2014
2Seeds Network, Korogwe, Tanzania

- Working in a team of two to organize, coordinate and empower farmers in a rural village in Tanzania through the creation of a farmers' cooperative
- Researching about market access and financial issues for farmers in developing countries, agricultural extension activities and agricultural supply chains

Internship 12/2012 - 06/2013
Cassa Conguagli per il settore elettrico, Rome, Italy

Abstract

This dissertation explores the relationship between human capital, employment, and political activity. The first chapter studies the subject from a theoretical point of view, describing how underemployment of educated agents can lead to inefficient economic policies and political conflict due to increasing political instability. The second chapter presents empirical evidence of the positive relationship between human capital and the number of political mass events. The analysis is performed using a new dataset that covers the first-level administrative subdivision of several African countries and includes data on political activity, employment status, political and economic perceptions and expectations, and economic performance from sources such as ACLED, Afrobarometer, PRIO-grid project, Penn-Tables, and ILO. The identification strategy uses national level shocks to address endogeneity issues at the regional level. The last chapter investigates the relationship between higher education and political violence, focusing on the intensity of civil conflicts and the number and effectiveness of terrorist groups at the country level. The statistical analysis supports the hypothesis that, everything else equal, countries with larger stocks of human capital suffer from more intense civil conflicts and the presence of more numerous and effective terrorist groups.

Presentation of the Dissertation

This thesis analyzes the relationship between the human capital, particularly in the case of tertiary education, and political dynamics. The main hypothesis explored is that, under certain conditions, increasing levels of tertiary educated people, in particular youths, increases the intensity of political opposition, both peaceful and violent. In particular, organized political opposition, mainly resulting in those events that are the result of an explicit coordinating and organizing process that takes place before the event itself. Organized protests and terrorism are examples of peaceful and violent types of these events. This approach expands on the current economic literature on political conflict that focuses on the less educated and wealthy strata of society as the most probable supporters of political violence and members of opposition political organizations without exploring in detail how these organizations are created and developed. My thesis is that, like every other organization, political organizations need human capital to emerge and function, and therefore it is important to look at possible sources of human capital when studying political organizations. The primary source of human capital in most economies is educated workers, and when some of these workers are underemployed, their human capital becomes available for employment in the political sphere.

Since the influence of education on political conflict, via human capital accumulation, and its economic effect is a complex dynamic, I first present the issue from a theoretical point of view to describe and analyze the general relationship between underemployment and political activity and then I empirically test and explore particular links in the system. In the theoretical section of the thesis I present a model describing several causal paths from human capital to political activity, describing in depths how education and underemployment can interact to generate political opposition. In the empirical sections,

due to a lack of suitable data to test every aspects of the theoretical model, I use different sources of secondary data to explore specific hypotheses, in particular the existence of a positive correlation between human capital and collective political events, both peaceful and violent.

Chapter 1 presents a model where agents can use their human capital either in the economic sphere or in the political sphere. When the technologically advanced economic sector, where human capital can be fruitfully employed, is underdeveloped, some educated agents are underemployed. This generates grievances and can lead some of these underemployed workers to employ their human capital in the political sphere. This will lead to increasing levels of political activity that can affect economic productivity and political institutions. Depending on the characteristics of the economy, the political institutions, and the preferences of the agents in control of the government, this overabundance of human capital can lead to three possible results: the expansion of the ruling class via co-optation, the enlargement of the civil service to absorb the excess human capital, or political conflict. In the last two cases the performance of the economy is negatively affected, in one case by the creation of a large and inefficient bureaucracy and in the second case by political strife: strikes, riots and, potentially, open civil war depending on the specific contingencies. This unintended effect of human capital accumulation mitigates the positive relationship between education and economic growth identified in the literature. In future works, I plan to further explore this line of research by developing a structural equation model to empirically analyze this possible negative indirect effect of human capital on economic performance.

Evidence supporting the theoretical relationships between human capital and political activity, and therefore, indirectly, economic growth described in the first chapter, is provided in the two empirical sections of the thesis. In chapter 2, I pursued a micro-level approach, using specialized data sources to analyze the relationship between

human capital and political protests at the individual and sub-national level on a subsection of sub-Saharan African countries. In chapter 3, I adopted a wider macro approach, using data at the country level to analyze the relationship between human capital and violent political events at a global level.

In Chapter 2, I was able to perform my analysis at the sub-country level, rather than the usual country level, using the data collected by the Afrobarometer project in several Africa countries over multiple dimensions, including information about educational levels and political activity. I then assigned to each administrative subdivision the corresponding political events collected by the Armed Conflict Location & Event Data Project (ACLED). In this way, I could analyze how regions with different levels of human capital, proxied by the local share of tertiary educated people, were differently affected by country level political and economic shocks associated to increased levels of political turmoil in the literature. These shocks were computed from data obtained from the Penn Tables, for economic shocks, and the International Institute for Democracy and Electoral Assistance (IDEA), for political shocks. Additional robustness checks were run using data from the Social Conflict Analysis Database (SCAD) that records data similar, but not identical, to those collected by ACLED. During this research I also used the geographic information system software QGIS, to aggregate data from the PRIO-GRID dataset at the required level of analysis.

While the regional level analysis supports the hypothesis that abundance of human capital increases the probability that part of it is employed in organizing political protests, it does not provide evidence that educated agents are more likely to engage in political protests. For this reason, in the concluding part of chapter 2, I exploited the individual level data provided by Afrobarometer to analyze the influence of human capital on protest participation at the individual level. In particular, after having found that tertiary educated agents are more likely to engage in political protests, I

examined possible causal paths from education to protesting, analyzing whether education has an amplification effect on motives and opportunities. In the first case, the hypothesis, supported by the statistical evidence, is that human capital provides a tool to acquire, filter, and analyze political information to identify reasons to protest the current political system. In the second case, the hypothesis, less clearly supported by the statistical evidence, is that human capital provides coordination and organizational skills that reduces the cost of participating in protest thus amplifying the influence of opportunities on the probability of protesting.

In the third chapter, I provide statistical evidence supporting the hypotheses of a positive relationship between human capital and small-scale and large-scale events of political violence. In particular, building on the literature about youth bulges and the impact of young people on the events collectively described as the Arab Springs together with my theoretical model, I focused on tertiary educated youth. I was able to create a dataset with a large geographical and temporal coverage thanks to the data collected by Barro and Lee for educational attainment for age cohort and by merging them with data on political violence. Large-scale political events are proxied using data on civil conflict published by the Integrated Network for Societal Conflict Research (INSCR), formerly known as the Center for Systemic Peace, in the Major Events of Political Violence dataset. Small-scale violent political events were proxied using a new dataset on terrorist groups and their activities, the Extended Data on Terrorist Groups presented in Hou, Gaibulloev, and Sandler (2019).

Chapter 1 - Political and Economic Effects of Human Capital

1.1 – Introducing the Theoretical Model

The analysis of the positive relationship between human capital accumulation and economic growth is at the center of the macroeconomic literature. On the contrary, the role of human capital in shaping political dynamics has not received similar attention, at least in the economic literature. In this chapter, I present a theoretical model describing how, under certain conditions, overabundance of human capital may lead to higher political instability and violence, thus reducing the economic benefits of human capital accumulation. Moreover, the possibility of political instability can induce policymakers to pursue public policies that would be inefficient in the traditional macroeconomic framework, mainly expanding the size of public bureaucracies by adding unnecessary civil servants. Finally, the model allows for institutional equilibria different from the standard dictatorship-democracy dichotomy, allowing for other forms of power sharing.

Human capital accumulation, since the early works of (Solow, 1957) and of (Mincer, 1970)[1], has been perceived to have a positive absolute impact on economic development, independently of country specific characteristics. Moreover, other social scientists, for example Dee (2004), Lloyd et al. (2000) and Bynner and Ashford (1994), identified additional virtuous relationships between education and desirable

[1] It is important to highlight that not all the students of the topic agree on the positive causal relationship between higher education and economic growth or between the positive correlation between education and human capital. For example, see the work of professor Eric A. Hanusheck distinguishing between quantity and quality of education and the role of cognitive skills, rather than education, in economic growth (Hanusheck and Woessmann 2008)

socio-political behaviors. For these reasons, policymakers of every type[2] have pursued public policies to provide public education and to encourage human capital accumulation in order to foster stronger economic growth[3]. On the other hand, young educated people have played an important social and political role throughout history, from support to Martin Luther in the fifteenth century to the Arab Springs in the last decade[4], providing the organization, leadership, inspiration, in other words, the human capital, needed by disruptive political organizations. For this reason, governments have adopted over the centuries different policies, especially in periods of crisis, to co-opt the energy of this section of the population, to support their aspirations, to repress their challenges, or to control access to tertiary education in the first place.

This first chapter presents a theoretical model to describe and analyze the impact of human capital on political dynamics and the associated public choices starting from a mismatch in the labor market that determines a positive level of underemployed educated workers. Under certain conditions, this excess of human capital is employed into political activities that challenge political institutions and disrupt economic processes. The main propagation channel is the use of human capital to create and support organized political activities that lead to more intense and protracted political confrontation than spontaneous political protests.

This model expands the economic literature on violence that focuses mostly on the poor, lower educated and unemployed members of the

[2] It is important to stress how from an economic point of view both benevolent policymakers and rent seeking ones have incentive to encourage human capital accumulation. Either for the greater good of the population or to increase the size of the economy and therefore the absolute value of the rent extracted.

[3] For example, see Krieger (1988) for an analysis of early attempts to increased education provision in sub-Saharan countries as a mean of development, their shortfalls and potential success.

[4] See Boren (2019) for an overview of students' activism from medieval periods to contemporary events.

society, since it is commonly believed that these people have lower opportunity costs and therefore higher incentives to engage in violence in general. This is particularly true for the economic approach to violence, as defined by Backer (1968) and Hirshleifer (2001), that focuses mostly on the costs and benefits for people to engage in political violence. However, additional contributions, for example Collier and Hoeffler (2004), highlight the importance of relative deprivation and grievance in leading people to political violence. This, together with the studies of Davies (1962, 1974) and other authors theorizing the importance of the gap between expectations and gratifications in generating collective violence, particularly with under-employed workers (workers that are over-qualified for their jobs) and the more recent work by Passarelli and Tabellini (2017), support the idea that educated workers might suffer from higher relative deprivation when they are underemployed[5], thus more likely engaging in political confrontations. Intuitively, while working in college to acquire human capital, students also build expectations about their future position in the workforce, usually a highly respected and well-paid position.

At the same time, different studies analyzing the relationship between education and political behavior observe how higher education is usually associated with more intense political activity, both violent and peaceful. For example, Huntington (1991) argues that higher levels of education played a key role in the "Third Wave of Democratization", while Krueger and Maleckova (2003) and Berrebi (2003) theorized and empirically tested that, on average, terrorists are better educated than their reference groups. Other studies found positive correlations between cognitive skills and individual political knowledge, Mattes and Bratton (2007), between education and dissatisfaction with existing institutions, Weakliem (2002), and

[5] For a review of the literature on underemployment and its main negative outcome on the effected employees see McKee-Ryan and Harvey (2011) and Maynard and Feldman (2011).

between education and political participation and awareness, Egerton (2002)[6]. This support the idea that political confrontations supported or initiated by more educated strata of society are more threatening for the current political institutions and more disruptive for the economy.

The model developed in this chapter represents the trade-off that the economic and political elite faces when the supply of human capital, embedded in educated workers, exceeds the demand of the economy. The resulting equilibria are inefficient from a strictly economic point of view but are perfectly rational when considering the political consequences of economic efficiency. In particular, a first model describes the tradeoff of the owners of capital deciding how many educated workers to hire given the capital stock in the economy. The educated workers that are not hired by the capitalists become self-employed in a less productive market, being de facto underemployed. This generate relative deprivation, since the workers are now earning less than what they expected, and grievance, since they feel tricked by the system. In turn, this will lead to social conflict and output loss. Knowing this, the elite can decide to employ an economically inefficient number of educated workers in order to reduce the intensity of social conflict.

A second model introduces political institutions: government and bureaucracy. In this case as well, when there is an oversupply of human capital the elite has to choose between the economic efficient allocation and other inefficient allocations that reduces political tensions. In particular, the elite can decide to expand the bureaucracy as a form of patronage to satisfy the social expectations, if not the economic ones, of educated workers. In fact, this leads to a further trade-off for the elite: public servants know that they would be better off if they could gain access to the capital controlled by the elite. Therefore, under certain circumstances, they might be tempted to

[6] See Persson (2013) for a review on the state of the debate on the causal link between education and political engagement.

challenge the elite to achieve this control. The elite, in turn, must decide whether to compromise, diluting its political and economic prominence, or resist the challenge risking to lose their prominent position.

Even though the economic literature on political violence describes how uneducated, poor and unemployed people are more likely to join violent organizations[7], it rarely tries to explain how this organizations are generated and operated[8] and why educated workers and students have been at the forefront of political conflict for centuries. This work contributes to the literature developing the idea that educated underemployed workers provide the human capital necessary to create those political organizations that channel and organize grievances and resentments into political action.

Another contribution is to present a political institution model that allows for equilibria beyond the dichotomy autocracy democracy. In particular, it regards oligarchies, the government of the minority, as a stable and possible alternative both to the dictatorship of a restricted elite and to perfect democracy. While this paper does not examine the government choice in the provision of higher education, as for example in Testa (2018), it still contributes to the debate on the use of schooling for political goals[9] by analyzing the consequences of educational policies disjointed from policies aiming at supporting employment and growth in those sectors that benefit the most from human capital.

The chapter is organized as follows. Section 2 describes the main trade-off generated in the labor market when there is overabundance of human capital and describes the main causal links between

[7] See for example Cramer (2011) for a critique of this economic approach about the link between unemployment and violence.
[8] For example, Blattman and Miguel (2010) explicitly lament the little progress made in explaining "why armed groups form and cohere".
[9] For example, Alesina and Reich (2019) and Bandiera et al. (2018) on the use of schooling in the process of nation-building,

education, economic growth, and political turmoil. Section 3 introduces the political sphere, adding the public sector to the labor market. Section 4 expands the model to include political institutions and allowing for political transitions. The last section concludes, summarizing the main results, addressing ulterior paths of analysis and possible ways to empirically test the model predictions.

1.2 – Base Model

This model analyzes the interactions between capital owners and educated workers in a two-sector economy. The capital owners choose how many workers to hire and the educated workers decide whether to engage in political protests. The equilibrium is, under certain conditions, economically inefficient but still rational when considering the political aspects.

The active population is composed by the elite, E, that owns all the capital in the economy, K, and the workers that own one unit of labor each. The workers are divided between educated workers, H, that own human capital as well, and the uneducated workers, N, that owns only labor. The economy has two sectors: a traditional sector and an advanced sector. The traditional sector employs only labor and workers are self-employed. In the advanced sector human capital is combined with physical capital and therefore educated workers and capital owners have to match in order to generate output. Both educated and uneducated workers can operate in the traditional sector, but since human capital cannot be used in this sector, all workers have the same productivity, β. Given the possibility for educated workers to operate in both sectors, they will match with the elite only if the productivity of human capital in the advanced sector is higher than the productivity of labor in the traditional sector. When this is the case, I describe the educated workers operating in the traditional sector as "underemployed", H^U, in order to highlight how they are not achieving their full potential productivity. Similarly, the

educated workers employed in the advanced sector are defined as, H^A.

The productivity of the advanced sector is concave and it is maximum when one unit of human capital is matched to one unit of physical capital. Therefore, in an efficient economy, the number of educated workers employed in the advanced sector is equal to the amount of physical capital, K, owned by the elite. However, the elite can decide to "fractionalize" their capital by a factor κ in order to allow for more educated workers to operate in the advanced sector at a lower productivity. Since in this model I assume that human capital cannot be divided, the analysis focuses on the equilibrium amount of physical capital per unit of human capital, κ. This value determines both the productivity of each match in the advanced sector and the number of educated workers hired in the advanced sector for a given amount of physical capital. Mathematically, the output of the advanced sector and the number of educated workers employed in the advanced sector are shown in the equations below:

(1) $$Y^A(K, H^A) = 2 * \alpha(\kappa) H^A \quad s.t. \quad \kappa \in [0,1]$$

(2) $$\frac{1}{\kappa} K = H^A$$

Equation (1) describes the production function of the advanced sector where educated workers (H^A) are matched to capital (K) to produce output and the productivity of each worker, $\alpha(\kappa)$, depends on the amount of capital, κ, assigned to them. The capital productivity function, $\alpha(.)$, is concave with an absolute maximum at 1. For simplicity I assume that human and physical capital have the same productivity and that all units of physical capital are fractionalized in the same measure. Equation (2) describes the number of educated workers hired in the advanced sector as a function of the stock of physical capital, K, and capital fractionalization, κ. The more the physical capital is fractionalized, the larger is the number of educated

workers that can be hired given the stock of physical capital (i.e. if each unit of physical capital is divided in half, twice as many educated workers can find a match in the advanced sector).

The difference between sector productivities, $\alpha(.)$ and β, determines the net benefit of being an educated worker employed in the advanced sector instead of a worker in the traditional sector. I assume that there is a value $\kappa^{\circ} \in [0,1)$ such that $\alpha(\kappa) > \beta$ for every $\kappa > \kappa^{\circ}$. This value constrains the ability of the elite to fractionalize their capital since, if the return to human capital in the advanced sector falls below the labor productivity of the traditional sector, they will not be able to find educated workers willing to work with their physical capital.

In this model I assume that a mismatch between expectations and reality, namely the impossibility of employing human capital on the job, generates grievances while levels of relative deprivation are determined by the difference between the salary in the traditional sector and the salary in the advanced sector. At the same time, employing human capital to organize political activities and engaging in political protests provides psychological benefits. These political events, not necessarily violent, disrupt economic activities, whether as strikes, demonstrations, and so on[10], and reduces the overall productivity of the economy[11]. The level of disruption is monotonic increasing and convex in the number of underemployed workers: if few people engage in political turmoil damages are limited but if a lot of people engage in political turmoil the disruption is exponentially higher (for example a strike of few people compared to a well participated national strike). On the contrary, I expect the psychological rewards to be increasing but concave in the number of

[10] This is an oversimplification of the literature on resentment, terrorism and political turmoil since it excludes any constructive effect of the political action of the underemployed educated workers.

[11] Underemployment can disrupt economic process also in non-political forms. For example, Raphael and Winter-Ebmer (2001) describe a significant positive link between unemployment and property crime.

underemployed workers: engaging in political activities of protest can have a high cost, especially in the case of undemocratic institutions, but as the number of participants increases the probability of being punished decreases thus increasing the net benefits of engaging in protests. However, the impact of additional participants on the net benefit decreases in the number of participants. The interplay between the reward function, R(.), and the disruption function, δ(.), as a function of underemployed workers is shown in Figure 1.

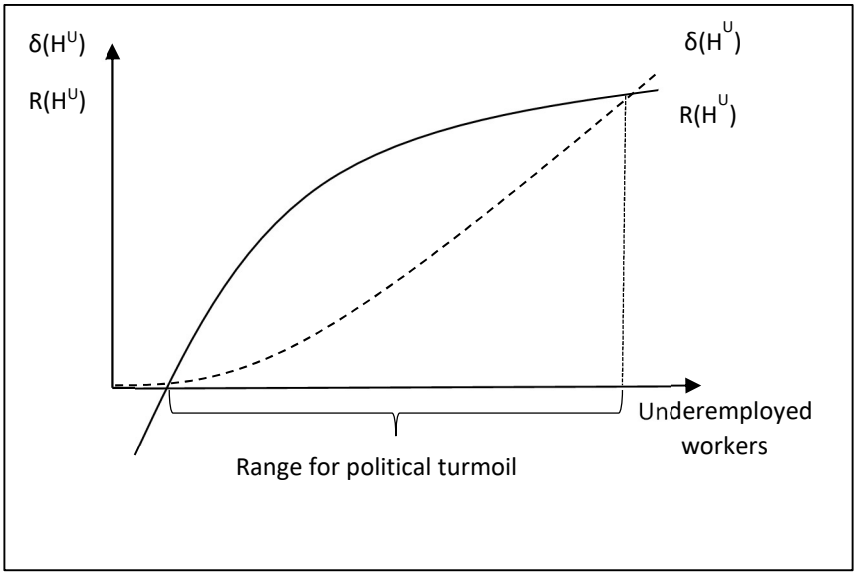

Figure 1: Reward and disruption functions for underemployed agents

1.2.1 Description of the payoffs to the agents in the model

Agents' utilities are determined by their level of consumption and, for the underemployed workers, psychological components. Consumption is determined by economic returns: for workers these are equal to their productivity, β and α(K) in the traditional and advanced sector respectively, and for the elite by capital's productivity, α(K). However, it is important to stress how political

protests reduces productivity by a factor, $\delta(H^U)$, proportional to the number of workers engaging in political protests. Skilled workers' utility is affected also by a grievance component, θ, determined by the difference between their expected wage, what they feel they should earn as educated workers, and their actual wage[12]. In particular, the payoff function of the elite and of the underemployed educated workers can be mathematically represented as follows:

(3) $$U^E = \frac{K}{E}\left(\alpha(\kappa) - \delta(H^U)\right)$$

(4) $$U^U = (\beta - \delta(H^U)) - \theta(\alpha(\kappa) - \beta) + R(H^U)$$

It is important to note how the political disruption function has to be bounded, since it is not possible to have negative productivity. The function should be closer to zero when H^U is small and closer to the upper bound when H^U is relatively large.

1.2.2 - Timing of the game

a. The capital owners select the level of skilled workers to be hired in the advanced sector by choosing the value of κ
b. All remaining workers are employed in the traditional sector
c. Underemployed workers decide whether to engage in political protests
    - if they decide so, productivity is reduced by a factor $\delta(.)$
d. Utilities are calculated and output is distributed

1.2.3 - Solution of the model

The share of the population that controls capital sets the level of fractionalization of capital and therefore the hiring rate for the

[12] The analysis would remain similar when using a negative psychological factor to summarize the negative effects of underemployment described for example in Wilkins (2007) and Feldman *et al.* (2002).

advanced sector. If the elite maximizes their economic returns, they face the problem presented in equation (5), whose solution is $\kappa = 1$.

(5) $$\max_{\kappa} U^E = \frac{K}{E}\alpha(\kappa)$$

Given the constraints in the labor market, the number of educated workers hired in the advanced sector will be equal to K, as described in equation (6):

(6) $$\frac{1}{\kappa}K = H^A \rightarrow H^A = K$$

Therefore, in a standard economic setting, the efficient number of educated workers, H^A=K, would be hired in the advanced sector and all the additional educated workers would work in the traditional sector. Clearly, higher capital availability determines a higher demand for skilled workers in the advanced sector. However, from the description of the model, owners might have to choose between economic efficiency and political stability when deciding how many skilled workers to hire.

In fact, underemployed workers engage in political protests when the psychological benefits are higher than the economic loss. According to the shape of the disruption function and the psychological return function, the value of H^U should range between two extremes for political protest to take place. If there are not enough participants, the reward is too low or the risk is too high in autocratic regimes, if there are too many participants, the economic damage outweighs the psychological benefits.

Below a tree-diagram representing the model:

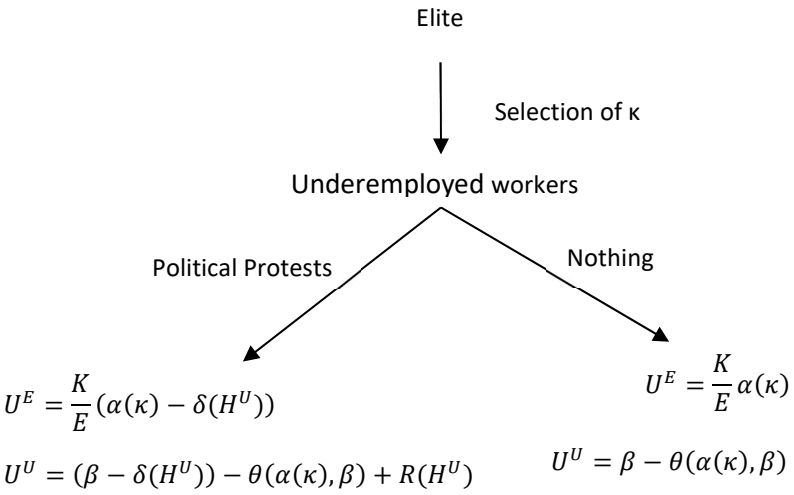

Figure 2: Agents choice in the base model

Using backward induction to predict the possible results of this model the general functions $\delta(H^U)$ and $R(H^U)$ determine the choice of action of the underemployed workers. If $\delta(H^U)$ is larger than $R(H^U)$, the underemployed workers will do nothing, while they engage in political protests when $\delta(H^U)$ is smaller than $R(H^U)$. Depending on the functional form of $\delta(H^U)$ and $R(H^U)$, there is a threshold value of H^U, defined by H^*, above which underemployed workers engage in political protests[13].

Knowing this, the elite chooses the level of κ, thus indirectly determining the value of H^U, that maximizes their utility.

[13] As described above, there might also be an upper bound for the value of H^U above which political protests stop. However, I think that is unrealistic and not worth considering.

Proposition 1: there is only one value of fractionalization of capital, κ*, that maximizes the elite's utility. This value is different from the efficient level whenever H > K, and the productivity function, $\alpha(.)$, does not dominate the political impact function, δ(.).

Proof: In order to maximizes their utilities, the elite has to solve the maximization problem described in equation (7a) keeping into consideration the economic constraints on capital fractionalization (7b), the relationship between capital fractionalization and employment of human capital (7c), and the amount of human capital available (7d):

(7a) $\max_{\kappa, H^U} \; U^E = \frac{K}{E}\left(\alpha(\kappa) - \delta(H^U)\right)$

(7b) $s.t. \;\; \kappa > \kappa^{\circ}$

(7c) $s.t. \; H^U = H - \frac{1}{\kappa} K$

(7d) $s.t. H - \frac{1}{\kappa} K \geq 0$

Substituting the constraint in (7c) in the maximization problem, this now depends only on the level of capital fractionalization as described in equation (8) below:

(8) $\max_{\kappa} \; U^E = \frac{K}{E}\left(\alpha(\kappa) - \delta\left(H - \frac{1}{\kappa} K\right)\right) \;\; s.t. \;\; \kappa \in [\kappa^{\circ}, 1]$

For $\kappa \in [\kappa^{\circ}, 1]$, the productivity function, $\alpha(.)$, and the political impact function, δ(.), are monotonic increasing in the fractionalization of capital, κ, and enter with opposite signs in the utility function. When H=K, there is not any underemployed worker for κ=1, therefore, κ*=1. When H>K, there are three possible situations depending on the shape of the two functions. The productivity function dominates the political disruption function, $\alpha(.) > \delta(.)$ for every κ, the political impact function dominates the productivity function, $\alpha(.) < \delta(.)$ for every κ, the two functions intersects at a feasible value of κ. In the first case, increasing

capital fractionalization determines a loss in economic efficiency that is always larger than the loss from political turmoil for any value of κ; therefore, the elite prefers to incur in political disturbances rather than reducing the economic efficiency. In this situation there will never be fractionalization, κ=1. In the second case, reducing the number of underemployed workers by increasing fractionalization reduces the disruption generated by political turmoil more than it is lost due to reduced efficiency for any value of κ; therefore, the elite has an incentive to minimize the number of underemployed workers setting κ such that $H - \frac{1}{\kappa}K = H^U = 0$ or κ= κ* depending which one is higher. In both cases economic efficiency is lost. In the third case, the marginal increase in utility for reducing political turmoil is lower than the marginal cost in terms of lost efficiency for relatively small values of κ, but for larger levels of underemployment the marginal benefit increases above the marginal cost. In this case, the optimal level of κ is such that marginal benefit and marginal cost are equalized. Given the monotonic characteristic of the two functions, there can be only a single value κ* that maximizes the elite's utility and this will be different from κ=1. Equation (9a) through (9c) present the first order conditions of the optimization problem:

(9a) FOC: $\frac{\partial U^E}{\partial \kappa} = 0 \;\rightarrow\; \frac{\mathrm{K}}{\mathrm{E}}\alpha'(\kappa) - \frac{\mathrm{K}}{\mathrm{E}}\frac{\partial \delta(H^U(\kappa))}{\partial H^U}\frac{\partial H^U(\kappa)}{\partial \kappa} = 0 \quad s.t. \;\; \kappa \in [\kappa^{\circ}, 1]$

(9b) FOC: $\alpha'(\kappa) = \frac{\partial \delta(H^U(\kappa))}{\partial H^U}\frac{\partial H^U(\kappa)}{\partial \kappa}$

(9c) $FOC: \alpha'(\kappa) = \frac{1}{\kappa^2}\delta'\left(H^U(\kappa)\right) \;\; with \;\; \delta'\left(H^U(\kappa)\right) > 0$

Therefore, whenever H > K and the productivity function, $\alpha(.)$, does not dominate the political impact function, δ(.), there is only one value κ*<1 that maximizes the elite's utility QED.

1.3 Human Capital Accumulation

A possible critique to the model could be that human capital is exogenously generated and therefore that there might not be an excess of human capital when agents take into consideration the limitations of the advanced sector before deciding to accumulate human capital. In this section I describe how overprovision of human capital can be achieved even when modelling the accumulation process using rational agents motivated only by economic incentives. Moreover, this also helps to explain how the grievances fueling political engagement are generated.

Before being hired, every agent has the possibility to acquire human capital by attending college. This choice depends on the individual level of schooling propensity, s_i, a function of personal skills and family characteristics[14] that determines the cost of acquiring human capital through education, and the expected returns on human capital. The expected returns on human capital depend on the characteristics of the labor market, described in the previous section, that determines the probability of being hired in the advanced sector or in the traditional sector. However, the agent does not know in which sector she will work until after the decision of acquiring human capital. Therefore, their decision to acquire education depends on the net benefit from accumulating human capital, taking into consideration the cost of schooling and the expected returns, not the actual returns, on human capital. Since schooling propensity is individual specific, only those agents with a schooling propensity above a certain threshold, $\bar{s}$, will acquire human capital. Assuming that schooling propensity is distributed uniformly between 0 and 1, $\bar{s}$ is the value that satisfy the equality described in equation (10a).

(10a) $$\left[\left(\frac{J^A}{(1-\bar{s})J}\right)\alpha + \left(1 - \frac{J^A}{(1-\bar{s})J}\right)\beta\right] - c(\bar{s}) = \beta$$

[14] For the influence of family on educational attainments see for example: Checchi *et al.* (2013), Scherger and Savage (2010), Attanasio and Kufmann (2009).

The expected payoff from accumulating human capital is represented in square brackets as a function of the probability of finding a job in the advanced sector, jobs supplied, $(1-\bar{s})J$, over jobs demanded, J^A, and the payoffs in the advanced and traditional sectors, α and β respectively. The second element on the LHS represents the cost of pursuing higher education, and it is a function of schooling propensity and other exogenous factors. Rearranging the terms as it is presented in equation (10b), it is possible to show how the above condition is respected when the expected gains are equal to the costs:

(10b) $$\frac{J^A}{(1-\bar{s})J}(\alpha-\beta)=c(\bar{s})$$

Assuming a simple cost function c(s)=c/s, it is possible to calculate the value of $\bar{s}$ as a function of salaries and job availability as described in equation (10c).

(10c) $$\bar{s}=1-\frac{J^A(\alpha-\beta)}{J^A(\alpha-\beta)+c}$$

The share of agents that acquires human capital is inversely related to the cost of acquiring education, c, and the size of the potential competition, J. On the contrary, the number of available jobs in the advanced sector, J^A, positively affects the share of future educated agents as well as the inequality between compensations in the two sectors, (α-β). Allowing for socio-cultural factors should increase the share of agents accumulating human capital: cultural norms or social pressures can lead to the accumulation of capital even when the cost is higher than the expected benefit or because the agent does not look for monetary benefits but more immaterial rewards as status, prestige, or the possibility of engaging into political activity.

However, even allowing only for economic incentives, as long as the productivity in the advanced sector is higher than the productivity in the traditional sector, the number of agents acquiring human capital is higher than the number of jobs available in the advanced sector due to the fact that agents use expected returns on capital when making their decision. For this reason, a number of educated agents has to

work in the traditional sector where the economic reward is lower and it is not possible to employ their human capital.

At this point, it is interesting to observe that even though the agents were perfectly rational in making their choice of acquiring education, this can still lead to grievances and relative deprivation. In fact, an agent deciding to acquire human capital expects to receive a payoff of $p_A\alpha+(1-p_A)\beta$, where p_A is the probability of being employed in the advanced sector, but they might have to be employed in the traditional sector where they receive a return of β. This leads to a difference between expected and actual payoff equal to $p_A(\alpha-\beta)$. This difference can be broken down into a grievance component and into a relative deprivation component. A higher probability of being hired in the advanced sector means that those not hired are a smaller number and therefore they can feel it as more unfair (i.e. I feel less bad for not finding a job in the advanced sector, if half of my classmates cannot find a job than if I am the only one) thus leading to stronger grievances. At the same time, larger difference between the levels of compensation in the two sectors increase the relative deprivation with respect to both those educated agents that found a job in the advanced sector and what the agents expected to earn after acquiring education. In addition to the economic aspects, underemployment has a negative impact on the utility of the agent due to the impossibility of applying the human capital on the job. All these aspects were summarized in the previous section by the coefficient θ.

This expansion of the base model explains how overprovision of human capital can happen with fully rational agents and describes more in detail the origin of the grievances that can lead some agents to engage in political activity. In order to address the general problem of excess human capital, the elite could operate at this earlier stage, trying to curb the amount of human capital accumulated, but this goes beyond the scope of this work and it is also not observed in reality.

1.4 Adding the Public Sector

The base model introduced the issue of underemployment of human capital and its effect on the economy via political activity. However, it is rare to observe inefficient management of private enterprises due to political concerns, unless there are particular legislative provisions, especially given the collective action problem that arises when the number of capital owner is relatively large. What is more commonly observed, especially in developing countries, is patronage for educated workers in the form of public offices: growing bureaucracies might be due to the increase in government's need to manage a more complex environment but also to political reasons[15].

Building on the previous model, I now introduce the public sector, and in particular the possibility to hire public servants and to levy taxes to pay them. In order to keep the focus of the model on the educated workers and the use of public offices to reduce political confrontations, I assume that the government has no direct effect on the economy and does not provide any public good or direct transfer, it only provides unproductive but prestigious positions to educated workers. The choice to allow the government to provide indirect transfers through public employment, but not direct transfers has two rationales: first underemployed workers' expectations are not necessarily monetary, and second the elite still need public servants to run the economy. Direct transfers to underemployed workers could potentially worsen the situation, stressing the distance between the employment status expected and the one obtained, without resolving the monetary side of the resentment. Also, hiring more public employees than required does not generate tensions with the unskilled workers, especially under the assumption that they do not know what the optimal number of public employees is, as directly transferring resources only to certain workers would. The economy's

[15] An example of political reasons behind growing bureaucracies is provided in Acemoglu, Ticchi, Vindigni (2011)

structure remains the same: a traditional sector where workers are self-employed and labor is the only input, and an advanced sector, where capital and educated workers are matched, that can be taxed to finance government spending[16]. The main difference with the previous model is that in the advanced sector only the optimal ratio of physical to human capital is feasible, H^A=K, and therefore productivity is fixed, allowing to focus the analysis on the use of the public sector as a political tool to reduce political unrest without reducing the efficiency of the private sector.

As in the previous model, I assume that a mismatch between expectations and gratifications can generate resentment and political turmoil. For this reason, the elite might decide to hire unproductive public servants to compensate the educated youth with status if not with income.

1.3.1 Description of the payoffs to the agents in the model

Equation (11) describes the utility functions for the elite, E, equation (12) describes the utility function for the public servants, G, and equation (13) describes the utility function of the underemployed workers, H^U. The utility functions of not-educated workers and educated workers employed in the advanced sector are not characterized under the assumption that they do not participate in any political dynamic[17].

(11) $$U^E = \frac{(\alpha - \delta(G))K}{E}(1-\tau)$$

(12) $$U^U = (\beta - \delta(H^U)) - \theta(\alpha, \beta) + R(H^U)$$

[16] Levying taxes in both sectors would not affect the qualitative results of the model but, making public employees cheaper for the elite, it will make the size of the government larger.

[17] Relaxing this assumption would make the model more complicate without providing further insight.

(13) $U^G = \omega + \sigma$

The payoff of the elite (E) depends on the level of political turmoil, $\delta(.)$, and the taxation rate, τ, required to pay the salaries of the public servants. The underemployed workers receive the same payoff as in the previous model: an economic part, their respective productivity, and a psychological part, a grievance function, $\theta(\alpha,\beta)$, and a reward function from engaging in political activities, $R(H^U)$. Public servants' payoffs depend on their salary, ω, and the status benefit derived from their office, σ. Given the positive value of the status benefit, setting the public servants' wages, ω, equal to β, would make the public sector more attractive than the traditional sector. For simplicity, I assume that the status benefit, σ, is large enough to compensate for the lower wage and prevent public servants from engaging in political demonstrations[18].

The government budget is always balanced. Therefore, the tax rate, τ, is always the lowest possible that still covers the salary of the public employees and it is determined by equation (14).

(14) $\tau(G) = \frac{\beta G}{K\left(\alpha - \delta(H^U)\right)}$

1.3.2 Timing of the game

a. Educated workers are hired in the advanced sector in the efficient amount.
b. The level of public servants to be hired is decided[19]
c. All remaining workers are employed in the traditional sector

[18] We can imagine that under non-democratic institutions public servants engaging in political protests are fired and more easily prosecuted and harassed.
[19] In the rest of the model I assume that the elite controls the government and therefore selects the number of public employees to be hired. However, in a democratic context, similar choices can be achieved by the majority. Especially considering that economic disruption affects all workers, but in this particular case, workers in the traditional sector do not pay taxes.

d. The level of taxation τ that allows to pay all the public servants is set

e. Underemployed workers engage in political turmoil given their number and productivity is reduced accordingly

f. Payoffs are calculated and output is distributed

1.3.3 Solution of the model

The share of the population that controls the political institutions sets the hiring rate for the public sector determining the size of the government, G. Since the public servants are unproductive, economic optimization by the elite would require that none should be hired, G=0. However, from the description of the model, the elite might have political incentives to hire public servants to reduce the job market mismatch and the ensuing potential political instability.

Below a tree-diagram representing the model:

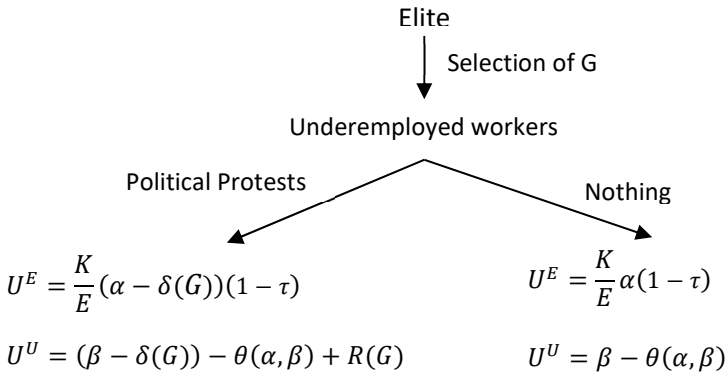

Figure 3: Agents choice in model with public sector

The preferred outcome for the elite is always the status quo, with no taxes and no political protests. However, under certain parametric conditions, this is not possible and the elite has to choose between hiring an inefficient number of public servants, and paying their

salaries, or leaving too many unsatisfied workers. The trade-off is only one: when deciding how many public servants to hire, the elite indirectly decides how many educated workers will remain underemployed.

Given the deterministic nature of the model, it is possible to solve it using backward induction as in the previous section. However, in this case, the choice is between political turmoil and taxes instead of economic efficiency.

As in the previous section, depending on the functional form of $\delta(H^U)$ and $R(H^U)$, there is a threshold value of H^U, defined by φ, above which underemployed workers engage in political protests. The elite, knowing this threshold and the political turmoil function, can compare the outcome from hiring extra public servants, and paying taxes, with the outcome of having more unsatisfied educated workers and then choose the size of the government that maximizes their payoff. The political turmoil damage function, $\delta(H^U)$, and the tax function, $\tau(G)$, that provides the minimum level of taxation required to pay the salaries of the public servants, are linked by the identity $H^U + G = H - H^A$. In fact, H is given and the number of educated workers employed in the advanced sector is determined by the amount of capital in the economy. For these reasons the elite can face three situations:

- the number of underemployed workers is already below the threshold for political turmoil;
- the number of underemployed workers is above the critical threshold but hiring public servants to reduce H^U is too expensive given the required level of taxation;
- the number of underemployed workers is above the critical threshold but hiring public servants to reduce H^U is relatively inexpensive at least for some levels of G.

The first two situations are trivial. In both case there is not any incentive for the elite to hire public employees: either because there is

not any need or because the costs dominate the benefits for every size of the government. The latter case is the most interesting and leads to the following preposition.

Proposition 2: When the number of underemployed workers is above the threshold φ and the tax function does not dominate the political turmoil function, an inefficient number of public servants, G > 0, is hired.

Proof:

The elite maximizes their utility according to equation (15a) keeping in to consideration constraints about the tax rate, equation (15b), about the number of educated workers available, equation (15c), and the minimum number of public employees that can be hired, equation (15d).

(15a) $$\max_{G,H^U,\tau} \; U^E = \frac{K}{E}\big(\alpha - \delta(H^U)\big)\big(1 - \tau(G)\big)$$

(15b) $$s.t. \quad \tau(G) = \frac{\beta G}{K\big(\alpha - \delta\big(H^U\big)\big)} \; and \; \tau(G) \in [0,1]$$

(15c) $$s.t \;\; H^U = H - G - H^A \; and \; H^A = K$$

(15d) $$s.t. G \geq 0$$

Substituting equations (15b) and (15c) in the maximization problem, the result depends only on the value of G selected as it is described in equation (16).

(16) $$\max_{G} \; U^E = \frac{K}{E}\big(\alpha - \delta(G)\big)\left(1 - \frac{\beta G}{K(\alpha - \delta(G))}\right)$$

The optimal level of G can then be calculated using the first order condition described in equation (17):

(17) $$\frac{\partial \delta(H^U)}{\partial \mathrm{G}}(1-\tau(G)) = \frac{\partial \tau(G)}{\partial G}(\alpha - \delta(\mathrm{G}))$$

Since the LHS is monotonically decreasing in the size of government because τ increases in G and $\delta'(G) < 0$, and the RHS side is monotonically increasing in the size of government since $\tau'(G) > 0$ and δ is decreasing in G, there can only be one interior solution to the optimization problem. Since the RHS is equal to zero for G = 0, and the LHS is positive when G = 0, any interior solution has to be at a value of G larger than zero QED.

The elite has incentives to hire public servants until either the underemployed workers have not any incentive to protest or the marginal reduction in political damage becomes smaller than the marginal cost of hiring an additional public servant.

The results of the analysis are mainly determined by the parameters affecting the general functions $\delta(H^U)$ and $R(H^U)$. These functions determine not only the choice of the underemployed workers, but also the elite's trade-off between taxation and political turmoil. The more damaging is the political turmoil, the more willing is the elite to pay taxes to hire educated workers from the traditional sector. When the threat of political turmoil is particularly intense, an extreme situation can happen: the number of bureaucrats, and the associated taxes to pay their salary, required to contain the political turmoil is so high that the elite is better off relinquishing all economic and political power. This extreme situation is further analyzed in the next section when political transitions are introduced.

1.5 Adding Political Institutions

While external political opposition plays an important role in constraining the elite of non-democratic polities and encouraging institutional changes, internal struggles are causes at least as important of political transitions. In this last model I expand the role of public employees allowing them to challenge the elite in power from within the government.

As in the previous model, I assume that a mismatch between expectations and gratifications can generate resentment and political turmoil. For this reason, the elite might decide to hire unproductive public servants to compensate the educated youth with status if not with income. However, public servants, once in the government, can try to change the political institutions in order to wrestle control of the returns on physical capital from the elite. Being educated about government and state management they have the possibility to challenge the political supremacy of the elite in order to gain access to more wealth.

For this reason, I introduce an additional function to the political reward, $R(H^U)$, and the political disruption functions, $\delta(H^U)$, described in the previous model. This function, $\pi(G, E)$, identifies the probability that public servants will be successful in a coup attempt against the elite if the elite does not share returns on capital with them. It is a positive function of the number of public servants, and a negative function of the number of the elite[20]. To simplify the math, I assume that the losers of this political struggle can only work in the traditional sector. Given this risk of losing every access to returns on capital, the elite can decide to share them with public servants when it is challenged, preventing the internal conflict by expanding the access to the economic rents. In theory, the elite could transfer a share of the returns to capital to the public servants instead of co-opting them. However, this mechanism presents credibility issues, since the elite cannot promise the public servants that some of them will be fired in the future thus reducing their probability of successfully challenging the elite. Granting access to physical capital by co-opting the public servants overcomes the credibility problem and guarantees the

[20] The dynamics of the intra-government conflict are extremely simplified but realistic enough to allow a meaningful analysis of the political risks of expanding the government for politicians and top government administrators. In fact, the described process could represent the army seizing power once it is strong enough, but also young politicians taking the place of older ones after having been introduced in the political arena, top government bureaucrats losing internal fights, and so on.

acceptance of the public servants. This result is similar to what is described in Acemoglu and Robinson (2000).

1.4.1 Description of the payoffs to the agents in the model

Given the new function introduced and defining the net returns of capital as $Y = (\alpha - \delta(H^U))K$, equations (18) through (20) describe the utility functions for the elite, public servants and underemployed workers, respectively, under different scenarios.

$$(18)\ U^E = \begin{cases} \frac{Y}{E+G} & if\ public\ servants\ are\ co-opted \\ \pi(G)\beta + (1-\pi(G))\frac{Y}{E} & if\ a\ coup\ is\ attempted \\ \frac{Y}{E}(1-\tau) & if\ the\ elite\ is\ not\ challenged \end{cases}$$

$$(19)\ U^U = (\beta - \delta(H^U)) - \theta(\alpha,\beta) + R(H^U)$$

$$(20)\ U^G = \begin{cases} \frac{Y}{E+G} & if\ public\ servants\ are\ co-opted \\ (1-\pi(G))\beta + \pi(G)\frac{Y}{G} & if\ a\ coup\ is\ attempted \\ \omega + \sigma & if\ public\ servants\ do\ not\ challenge\ the\ elite \end{cases}$$

The payoff of the elite (E) depends on the choice of the public servants: if they do not challenge the elite, the payoff is determined by the capital's productivity adjusted for the tax rate under the assumption that capital is equally distributed among all the members of the elite. If the elite is challenged, taxes are not levied and the elite decides whether to co-opt the public servants or resist them. In the first case, the returns to capital are shared among the elite and the public servants. In the second case, the intra-government conflict is resolved with probability π against the elite, that loses its capital and works in the traditional sector, and with probability (1-π) in favor of the elite that retains control of the capital. The underemployed workers receive the same payoff as in the previous model: an economic part, their respective productivity, and a psychological part, a grievance

function, $\theta(\alpha-\beta)$, and a reward function from engaging in political protests, $R(H^U)$. Public servants' payoffs depend on the choices of the elite and themselves: if public servants decide not to challenge the elite, their payoff consist of a wage, ω, and a status parameter, σ, that describe the psychological benefit incurred by the educated worker occupying a relevant public job. This status factor is sufficient to make working for the government more attractive to educated workers than working in the traditional sector. Thus, setting the public servants' wages, ω, equal to β, would make the public sector more attractive than the traditional sector but not as attractive as working in the advanced sector. For simplicity, I assume that the status benefit, σ, is large enough to compensate for the lower wage between the advanced sector and the public sector[21]. If the public servants decide to challenge the power of the elite, the elite can decide to co-opt them or to fight them. In the first case, public servants receive a proportional share of the returns on capital, in the second case, the conflict is resolved using the function $\pi(.)$.

1.4.2 Timing of the game

a. Educated workers are hired in the advanced sector until all the units of capital are matched

b. The elite selects the level of public servants to be hired

c. All remaining workers are employed in the traditional sector

d. Public servants decide whether to challenge the elite or not

d1. If they do not challenge the elite, taxes are levied to balance the government budget.

d2. If they challenge the elite, the elite can decide to co-opt them or try to resist.

[21] Another reason for the lower wage in the public sector to be acceptable is the assumption that, in a two-period model, public employees cannot be fired while private sector employees can be fired with probability p at the beginning of the second period. If this were the case, σ had to be equal to $(\frac{1+p}{2})(\alpha-\beta)$ instead of $(\alpha-\beta)$. The higher the number of periods, the smaller σ needs to be.

d2a. the possible struggle is resolved according to the conflict function

e. Underemployed workers engage in political turmoil given their number, and productivity is reduced accordingly

f. Payoffs are calculated and output is distributed

1.4.3 Solution of the model

The share of the population that controls the political institutions sets the hiring rate for the public sector determining the size of the government, G. Since the public servants are unproductive, economic optimization by the elite would require that none should be hired, G=0. However, from the description of the model, the elite might have political incentives to hire public servants to reduce the job market mismatch and the ensuing potential political instability.

From Figure 4 it is possible to observe how the preferred outcome for the elite is always the status quo with no challenge from the public servants and no political protests. However, under certain parametric conditions, this is not possible and the elite has to choose between hiring an inefficient number of public servants or leaving too many unsatisfied workers. The trade-off is only one: when deciding how many public servants to hire, the elite indirectly decides how many educated workers will remain underemployed. The main difference with the results from the previous section is that now the elite has to take into consideration the possibility of being challenge by the public employee as an additional cost of increasing the size of the government.

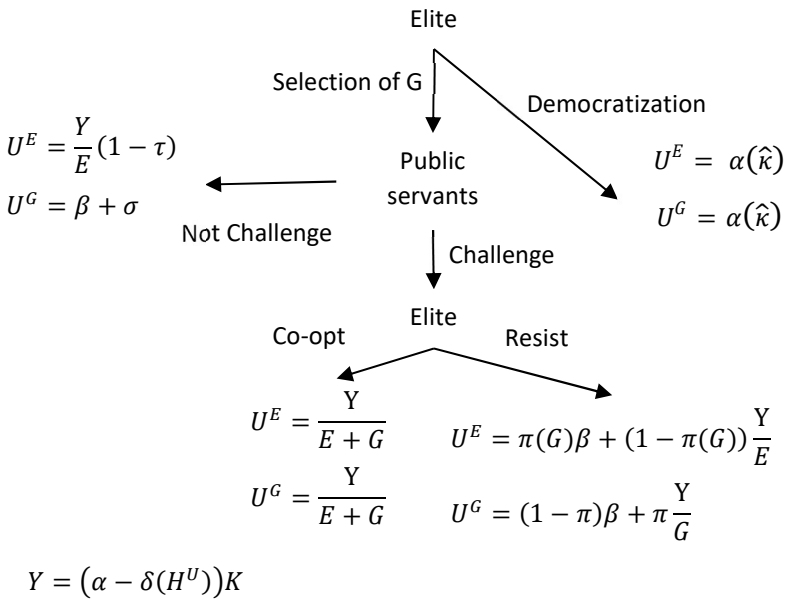

Figure 4: Agents choice in model with bureaucrats

Given the deterministic nature of the model, it is possible to solve it using backward induction.

In the last node, the elite can co-opt challenging public servants[22] or fight them. If the elite decides to co-opt the public servants I assume that they always accept[23]. The elite payoffs are decreasing in the

[22] For simplicity I assume that the elite has to co-opt all the public servants. Of course, a more realistic model would allow for the elite to co-opt only enough public servants as to reduce π(G,E) enough to make an attempted "coup" not appealing. However, this would not change the qualitative results, it would only make the co-optation choice less costly for the elite and thus more frequent.

[23] I believe this assumption is less strong than what might appears: the elite does not have to convince all the public servants at once, but just start with few and then all the others would probably rush to be co-opted to avoid being left out, especially when

number of public servants in both situations: in the first case, the larger the number of public servants, the greater the reduction in the per capita returns to capital; in the second case, the lower the probability of remaining in power.

Proposition 3: It exists a threshold number of public servants G* such that the elite has always an incentive to choose conflict over co-optation for every value of G > G*.

Proof: The exact value of G* depends on the shapes of the conflict function. However, it is possible to prove that this value exists. The elite chooses conflict over co-optation when the payoff from the former is larger than the payoff from the latter as described in equation (21).

$$(21) \qquad \frac{(\alpha-\delta(G))K}{E+G} \leq \pi(G)\beta + (1-\pi(G))\frac{(\alpha-\delta(G))K}{E}$$

When G goes to infinity, the probability of winning for the elite is equal to zero, therefore inequality (21) becomes the inequality described in equation (22).

$$(22) \qquad \lim_{G\to\infty} \frac{(\alpha-\delta(G))K}{E+G} \leq \beta$$

Since the limit of the LHS converges to zero while β is constant, there must be a value G* such that conflict is preferred to co-optation for every G larger than G* QED

This threshold value could still be such that $\pi(G^*) < 1$, however it must exist. Intuitively, the payoff from co-optation tends to zero for large values of G while the minimum payoff from conflict, for $\pi(G)=1$, is the wage in the traditional sector. Therefore, there must be a certain threshold G* such that conflict is always the best response for the elite when the government's size is beyond that point. At the same time, the probability of losing the conflict has to be bounded and

assuming that public servants are risk averse. This is a case for failure of collective action or a multi-player Prisoners' Dilemma, with "defecting from the coup" as the dominant strategy.

monotonically non-decreasing between zero and one and it has to take value zero when there is no public servant, $\pi(G=0)=0$. Therefore, the payoffs from conflict and co-optation are the same when there is not any public servant.

This result shows that, when G^* is such that $\pi(G^*) < 1$, the elite does not mediate when the challenge is particularly strong. And when $\pi(G^*) = 1$ the elite prefers to renounce its access to physical capital because the number of people demanding access to it reduces rents below what can be earned in the traditional sector. In the latter case there is not exactly a conflict, but more the elite relinquishing control against unbearable pressure.

Depending on the specific form of the conflict resolution function and the size of the elite, co-optation can dominate conflict or conflict might dominate co-optation for different ranges of G below the threshold G^*. For example, Figure 5 presents a possible scenario using a logit function to describe the conflict function. In this case, the elite chooses conflict for relatively lower numbers of public servants, then co-optation becomes optimal, and, finally, conflict dominates again for G larger than G^*.

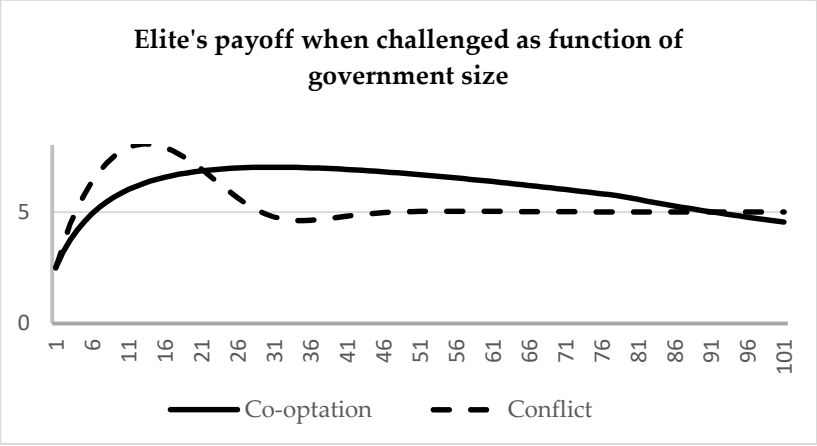

Figure 5: Elite's payoffs as function of government size

In the second-last node, the strategy of the public servants depends on the choice of the elite when challenged. If the elite chooses conflict when challenged, public servants will challenge an uncompromising elite only if their expected payoff is greater than their payoff as public servants, as it is described in equation (23).

$$(23) \qquad (1-\pi(G))\beta + \pi(G)\frac{(\alpha-\delta(G))K}{G} \geq \beta + \sigma$$

Similarly, if the elite chooses co-optation when challenged, public servants will challenge the elite only if the payoff from co-optation is larger than the payoff as public servants, as it is described in equation (24).

$$(24) \qquad \frac{(\alpha-\delta(H^U))K}{E+G} \geq \beta + \sigma$$

Proposition 4: there is a maximum size of the government, G^{max}, that makes challenging the elite profitable. For every $G > G^{max}$, the status quo is preferred.

Proof: From equation (23) it is possible to see how, for G approaching infinity, the LHS monotonically approaches zero. The probability of winning the conflict becomes one, political turmoil disappears, and the share of economic rents secured by each public servant approaches zero. Therefore, there is a value of G defined as $G^{conflict}$ such that the public servants are indifferent between challenging the government and fighting, or maintain the status quo. Moreover, for every G larger than $G^{conflict}$, maintaining the status quo is preferable to challenging the government and fighting for the public servants. If $G^{conflict} > G^*$, the government will always fight if challenged, therefore $G^{conflict} = G^{max}$.

If $G^{conflict} < G^*$, the government does not necessarily fight if challenged, and therefore equation (24) might play a role. However, in this case as well, it exists a level of G, defined as $G^{co\text{-}opt}$, such that the status quo is preferred to challenging the government. Indeed, the benefits from

challenging the government (LHS) approaches zero as the number of public servants increases while the RHS remains constant. QED

Proposition 4 presents an interesting result: once the size of the government is too large, it is not efficient for the government to challenge the elite. This can be interpreted in different ways. From a within the government perspective, internal coordination becomes more difficult the larger the group becomes and at the same time different factions can arise within the government. However, a more articulate characterization of the internal dynamics is required to provide better insights. At the same time, from an economic perspective, the benefit from acquiring access to the economic rent is decreasing in the number of shareholders. On the contrary, the status conferred by working in the government is fixed. If we allow for the status benefit to be deflated by the increasing size of the government the results would be different.

Proposition 5: public servants have an incentive to challenge the elite only when challenging is a dominating strategy.

Proof: when challenging is a dominated strategy, public servants never have an incentive to challenge the government. When challenging is neither dominated nor dominating there are two possibilities described by equations (25) and (26).

(25) $$(1-\pi(G))\beta+\pi(G)\frac{(\alpha-\delta(G))K}{G}\geq\beta+\sigma\geq\frac{(\alpha-\delta(H^U))K}{E+G}$$

(26) $$\frac{(\alpha-\delta(H^U))K}{E+G}\geq\beta+\sigma\geq(1-\pi(G))\beta+\pi(G)\frac{(\alpha-\delta(G))K}{G}$$

In the first case challenging is beneficial for the public servants only when the elite decides to fight and in the second case only when the elite decides to cooperate. However, the payoff from cooperation is the same for elite and public servants and it is possible to prove that the inequalities described in equations (27) and (28) hold for the elite's payoffs under very general conditions.

(27) $$\big(1-\pi(G)\big)\beta+\pi(G)\frac{(\alpha-\delta(G))K}{G}\geq\frac{\big(\alpha-\delta(H^U)\big)K}{E+G}$$
$$\geq$$
$$(1-\pi(G))\frac{(\alpha-\delta(G))K}{E}+\pi(G)\beta$$

(28) $$\big(1-\pi(G)\big)\beta+\pi(G)\frac{(\alpha-\delta(G))K}{G}\leq\frac{\big(\alpha-\delta(H^U)\big)K}{E+G}$$
$$\leq$$
$$(1-\pi(G))\frac{(\alpha-\delta(G))K}{E}+\pi(G)\beta$$

Given the value of G such that the inequalities hold with equality, increasing or decreasing G will move the two external factors in opposite directions, thus making the elite like the opposite of what the public servants like. This means that when fighting is preferred to cooperate by the public servants, cooperating is preferred to fighting by the elite, and vice versa. Therefore, when challenging is beneficial only conditional on a certain response from the elite, the elite never chooses that response. Therefore, public servants challenge the elite only when challenging is a dominating strategy QED

In Figure 6 possible payoffs of the public servants are represented using a particular logistic probability function. This allows to evaluate their decision concerning whether to challenge the elite or not together with the best response function of the elite. The payoff from conflict initially increases in the number of public servants, when the probability of success grows faster than the reduction in payoff. Then, the payoff reaches its point of maximum and it starts declining converging toward zero.

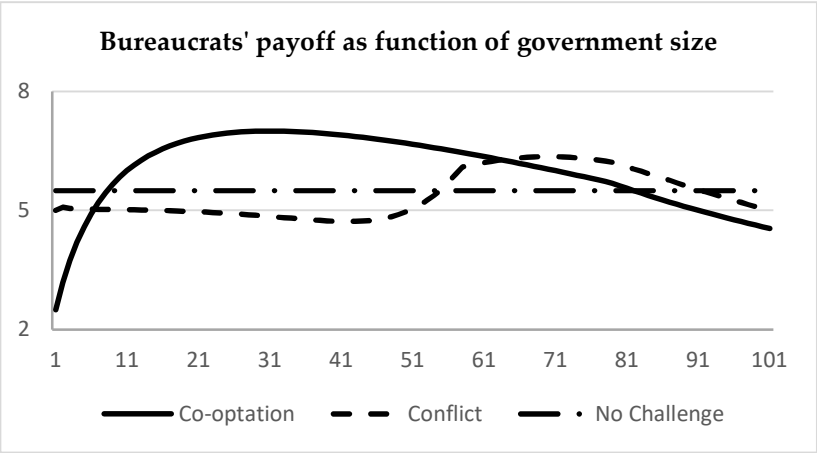

Figure 6: Bureaucrats payoff as function of government size

The payoff for co-optation starts relatively high and can even increase depending on the impact from political turmoil, and then it converges hyperbolically to zero. The payoff function for conflict always starts at the productivity level of the traditional sector since $\pi(G=0)=0$. The payoff function for co-optation starts higher, otherwise the elite would have an incentive to work in the traditional sector, and its progression depends on the political turmoil function: at least for relatively small numbers of public servants, the reduction in political turmoil should offset the cost from sharing capital returns with extra workers.

Finally, in the first node where the number of public servants is chosen, the elite knows not only the threshold for the public employee to challenge them, but also the level of political turmoil depending on the number of underemployed educated workers, including those levels such that political turmoil is zero. Once assessed the threshold for both political protests and public servants' challenge, the elites can compare the outcome from hiring extra public servants with the outcome of having more unsatisfied educated workers and then choose the least costly one. As it has already been described, there is also an extreme case where the elite realizes that the political turmoil

is so high that it is sub-optimal to try to retain control over the economic rent and therefore they decide to open the access to the physical capital to all the educated workers.

In the previous section, I analyzed the relationship between the political turmoil damage function and the tax function, in particular focusing on the optimal size of the government. Adding intra-governmental challenges enriches the analysis. For the analysis of the two corner solutions of the problem and the general interior solution I refer the reader to the previous section. Instead, I want to focus the analysis on those internal solutions where the optimal number of public servants required to prevent significant political turmoil is such that the public servants will challenge the elite. In this case, the trade-off is between external political turmoil and internal political confrontation. The maximization problem is represented mathematically in equation (29).

$$(29) \qquad \max_{G} U^{E} = max\left\{\frac{Y(H^{U})}{E+G};\ \pi(G)\beta + (1-\pi(G))\frac{Y(H^{U})}{E}\right\}$$

This problem can result in either cooptation or conflict depending on different parametric situation. Therefore, considering also the corner solutions, in equilibrium different political institutions can be supported: autocracy when the elite remains unchallenged in power, oligarchy when the elite expands via co-optation, civil conflict when the government attempts to substitute the traditional elite, democratization when the external pressure is too costly to contain. At the same time more or less intense external political turmoil with its negative economic effects can subsist under every institution. Given the difficulty of presenting all these different outcomes using mathematical formulas, Figure 7 through 10 graphically present different simulations that using different parametric specifications achieve different equilibria.

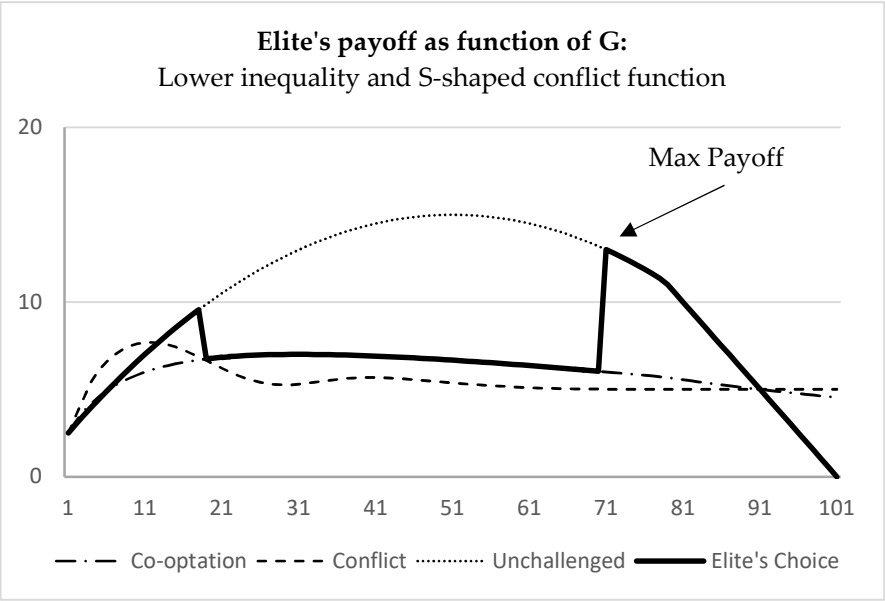

Figure 7: Inefficient government size and political stability

The first example, Figure 7, shows a situation where the elite maximizes their payoff by hiring a large number of public servants, more specifically, the minimum number of public servants such that it would not be worthwhile for them to challenge the elite since the payoff from (in this case) co-optation is smaller than the status benefits they enjoy from working as public servants. As expected, the elite's payoff is not the highest economic one, but it is the highest given the political constraints. This situation was created by choosing a conflict function such that the probability of the elite winning the intra-governmental conflict was really high for low numbers of public servants and then quickly switches to really low after a certain threshold. At the same time, the salary granted to the bureaucrats, determined by the wage in the traditional sector, was kept relatively high, thus reducing inequality.

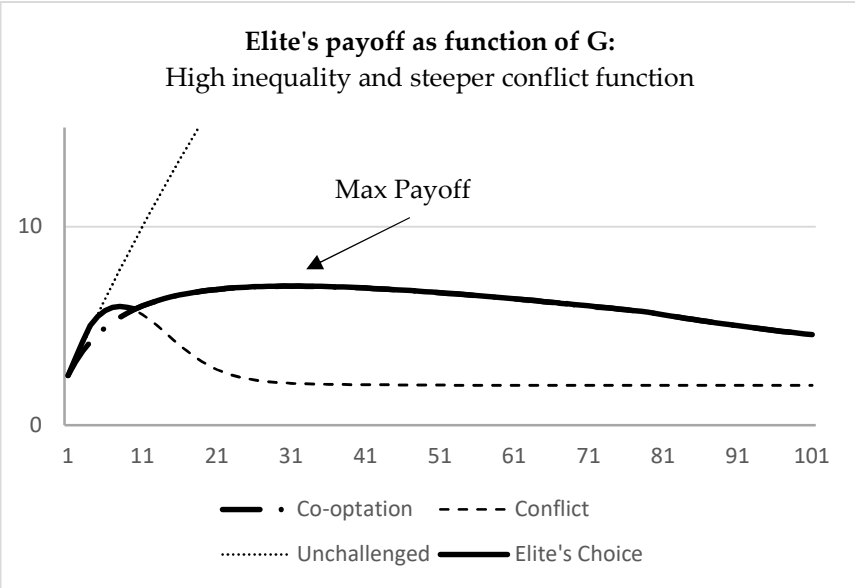

Figure 8: Expansion of the elite

The parametric model represented in Figure 8 shows how, in equilibrium, the elite is going to hire a relatively small number of public servants. These, will in turn challenge the elite, that will co-opt them. In this specification, bureaucrats always challenge the elite because of higher inequality, low wage in the traditional sector, and a conflict resolution function more favorable to the public servants. The probability of the elite winning an internal conflict with the bureaucrats shrinks rapidly with the number of public servants hired. For this reason, except for very small numbers of bureaucrats, the elite prefers co-opting to fight.

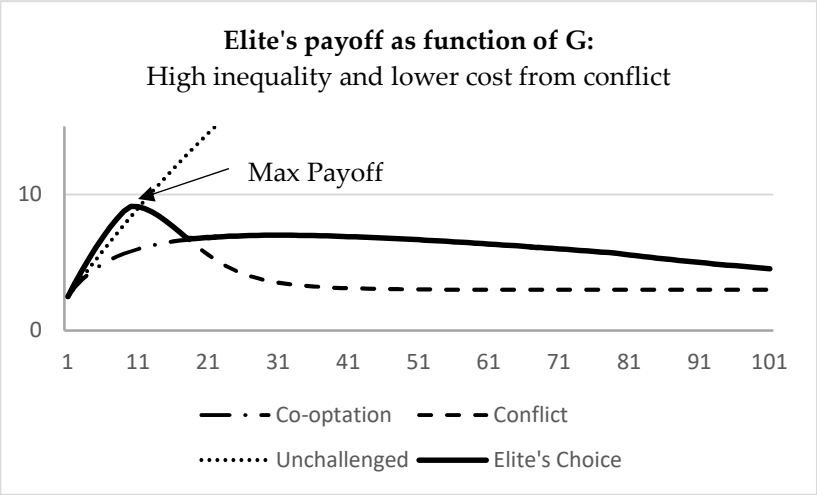

Figure 9: Intra-government conflict

The values of the parameters used to draw Figure 9 lead to internal political conflict in equilibrium. The selection of low wages in the traditional sector incentivizes the public servants to always challenge the government. At the same time, the function determining the destruction generated by intra-governmental conflict was weakened, so that now fighting reduces the economic output by a smaller percentage. For this reason, the elite prefers to resist the challenge of the bureaucrats, despite the use of a normal conflict resolution function. Accordingly, the elite hires the number of public servants such that the probability of remaining in power is maximized while reducing the number of underemployed workers and thus political damage. This strategy can be interpreted as a *dividi et impera* approach: the elite breaks the underemployed workers' front with promises of employment in the public sector for some of them. Then, once the underemployed workers left out lose their steam, betrays the hired ones refusing to pay them and most probably defeating any attempt to seize power. However, there is still a positive chance that the public servants will seize power overthrowing the current elite.

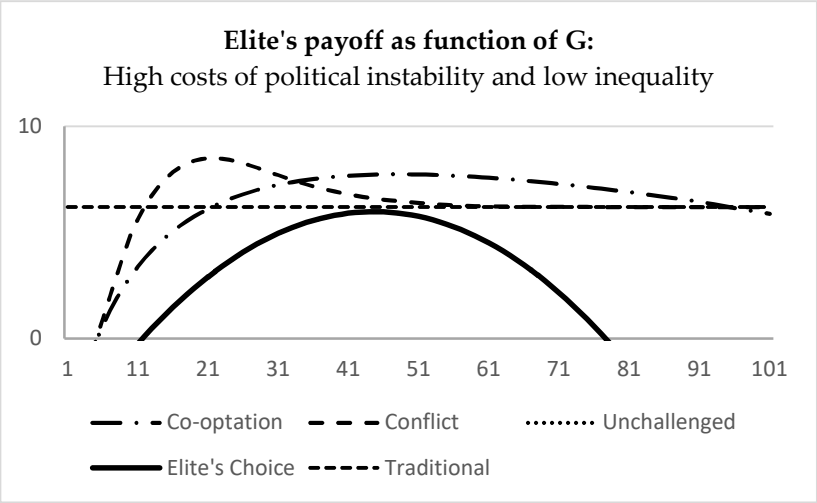

Figure 10: Democratization

Finally, when the damages brought by political turmoil are particularly high and inequality is low, the only option for the elite is to relinquish control over capital and being employed in the traditional sector. Figure 10 shows how the status quo situation provides the elite with a payoff that is lower than the payoff in the traditional sector, even when hiring the number of public servants that balances reduction in political turmoil and the amount of salary to be paid. If the elite were to be challenged or could co-opt the public servants, it would save the wage moneys. However, the low level of inequality, that results in higher wages for the public servants, does not provide the incentive to challenge the elite.

1.4.4 Comparative statics

Since the wage in the traditional sector determines the minimum payoff from conflict, inequality affects the choices of the elite: the greater the inequality between returns to capital and traditional sector, the lower the expected payoff from conflict and the greater the range of G for which the elite is willing to compromise and co-opt

public servants. Equally important is the type of compromise the two parties agree upon: so far, I assumed that co-opted public servants benefit from returns to capital in the same way as the elite. But, if the elite can share less equally, this will reduce the cost of co-optation and make it an efficient option more often. In general, I expect conflict to dominates co-optation for low levels of G, since the probability of losing for the elite grows slowly at the beginning. After the slope of the conflict function increases, co-optation will dominate conflict until G*. Inequality is important also in determining the choice of the public servants making conflict more probable. Contrary to the case for the elite, the number of public servants has an ambiguous effect on their choice: the more public servants, the higher the probability of success but also the lower the individual gain from success.

The main parameter for the public servant analysis is σ, the highest is the value associate with the position, the more difficult will be that the public servants will risk to lose it by challenging the elite. This can be seen as pride in serving the country, in the respectability associated with the role, other cultural traits, but also as access to the source of economic and political power. If instead very little value is associated to the position, economic incentives of benefitting from access to returns on physical capital will quickly overcome the fear of losing the status.

Inequality, the difference between productivity in the advanced and traditional sectors, plays an important role for both public servants and elite. It increases the potential gain from conflict for public servants and increases the potential loss for the elite in case of conflict. Higher inequality, as already shown in Figure 8, should result in a more challenging attitude from the public servants and a more conservative approach, co-optation, on the side of the elite.

The choices of the elite are also affected by the size of the elite, E, with respect to the number of public servants, G. The larger is the size of the elite, the least probable is the success of a "coup" attempt; however, also the loss from co-opting the public servants will be

smaller, given the same value of G, since the loss from co-option is calculated as – Y*(G/ E +G). For these reasons the effect of E on the elite's choices depends on the shape of the conflict function.

Finally, the elite and the underemployed workers are affected by the parameters determining the shape of the functions $\delta(H^U)$ and $R(H^U)$. These functions determine not only the frequency of external political turmoil, but also the elite's trade-off between taxation and political turmoil. The more damaging is the political turmoil, the more willing is the elite to pay taxes to hire educated workers from the traditional sector. To the extreme situation, presented already in Figure 10, when the elite will relinquish economic and political power in order to minimize its losses.

One final comment to the model is the fact that even in a situation of diffused power, or democracy, there might be an incentive to hire unproductive public servants. In fact, political turmoil affects both the elite and the workers and both the advanced and traditional sector, while taxes are paid only by the advanced sector. Therefore, in a democratic developing country, where the majority of the population operates in the traditional sector, hiring unproductive public servants could be a policy preferred by the majority of the population.

Other interesting parameters are conflict costs and constraints on the sharing in case of co-optation. The first reduces the size of the pie for the winner in intra-government conflict; the second reduces the share of returns to capital that the co-opted public servants can demand. Both parameters would probably increase the space for co-optation leading to a larger number of stable oligarchies as in Carothers (2002).

1.6 Concluding Remarks to Chapter 1

This paper has three main goals: exploring the relationship between human capital and political conflict, presenting the trade-off that over-abundance of human capital generates, describing a model that moves beyond the dichotomy democracy – dictatorship for equilibrium political institutions.

The first goal hopefully will help the literature on political conflict to reconcile the economic approach to political violence, whose object is the poor uneducated people joining violent political organizations, and the sociological tenet that human capital is required for the organization and survival of political opposition. According to this paper, also educated workers, in particular situations, have reasons and incentives to engage in political protests, thus bringing the required human capital for sustained and organize political opposition and, potentially, violence. This macro-level analysis should be integrated and supported by a micro-level analysis that could identify the exact motives of the educated workers and also describe the decision mechanism leading to political engagement. Moreover, the model does not analyze the issue of coordination among the educated workers; a fundamental issue for the creation of a cohesive and effective political opposition. Allowing for internal fragmentation would result in a deeper and more realistic analysis of the phenomenon. A first step could be the separation of military and civil public servants. Also, coordination between public servants and underemployed workers could add depth to the current analysis.

The second goal wants to stress how policies expanding access to education, and higher education in particular, should be complemented and integrated with policies facilitating socio-economic fulfillment and political integration. This would reduce the risk of unmet expectations for the people taking these opportunities, spending time, effort and resources, therefore reducing the possibility of grievance and resentment. This, in turn, can lead to political turmoil and, in instances of political instability or weak governments, open

political violence. An empirical examination of this theoretical result requires in depth analysis of individual decision processes, expectations, and feelings. Interviews with recently graduated students could provide further insights when accounting, among other things, for job expectations, political feelings, and employment status.

The third goal contributes a more articulate vision of the evolution of political institutions beyond the classic dichotomy democracy – dictatorship. The majority of the economic literature classifies political institutions on this linear scale and most models presented full democracy as the only steady state. Therefore, the majority of countries was transitioning to democracy or receding from it. The simple static model presented in this paper provides at least one stable equilibrium where an oligarchy is in power unchallenged. Given the right circumstances, it is possible to imagine that repeating the model over time, allowing for more educated workers to enter the economy and for public servants to retire, will maintain the political institution unchanged. Of course, the model is relatively simple and does not account, among other things, for the effect of human capital inside the government, educated public servants, on the effectiveness of the external political turmoil and also for any suppressive technology that the elite could implement to protect its interests from both internal and external challenges. Concluding, I would like to present an alternative point of view for the latter result. The tension does not have to be between democratic and non-democratic political institutions, but it could be an analysis of the internal working of the institution themselves. The elite could be regarded as the holder of *de facto* political and economic power in an imperfect democracy[24]. The coup does not have to be a military action: it could be government officials convincing or forcing the elite to share with them economic rents. Political protests do not have to be violent: educated

[24] The persistence of control of political institutions by the elite after democratization is modelized in Acemoglu and Robinson (2008) and in Albertus and Menaldo (2013).

underemployed workers are found to be more prone to unionize, strike, sign petitions and engage in other activities that could disrupt economic processes or reduce the revenues of the elite. Therefore, I think that this framework of analysis could be interesting to study transitions among institutions but also changing power structures within institutions in countries defined as advanced democracies.

Chapter 2 – Human Capital and Collective Political Activity: Evidence from Sub-Saharan Africa

2.1 Introducing the Empirical Analysis on Collective Political Events

Collective political activities, namely demonstrations, protests, and riots, are the most visible manifestations of popular participation to the political process, especially in those countries with controlled elections and constraint access to political positions. In this chapter I study the relationship between collective political events and human capital. In particular, I test the hypothesis that higher levels of human capital are positively correlated with collective political events and I analyze the possibility that this relationship is causal.

Analyses of popular protests and potential sources of enablement or support have become more popular in the last few years, especially the study of the influence of modern technology on the information and collective action problems (Manacorda and Tesei 2016, Enikolopov et al. 2018). In fact, already in the 60s, sociologists theorized the importance for social movement of informing about the political issues they are concerned about and coordinating members and supporters using appropriate organizational and communication structures[25]. In this paper I support the idea that human capital is the necessary element required to overcome these issues, given the strong correlation between human capital and the development of analytical and organizational skills. Mobile phones and social networks are

[25] For an overview of the main sociological literature on social movements see the Blackwell Companion to Social Movements (2004) and the Wiley Blackwell Companion to Social Movements (2019) edited by Snow, Soule, and Kriesi plus McCammon for the second edition.

instruments that can be used to produce and gather information and to coordinate and organized groups of people, however, they still require human capital to be employed at their full potential. For example, social media have become a *propaganda* battlefield, where it is becoming more and more difficult to distinguish between facts, opinions, and outright fabricated information. Beyond the need for human capital of the individual agent, higher levels of human capital in society increase the probability of leaders to emerge and therefore the probability of socio-political organizations to be created, as it is summarized in Morris and Staggenborg (2004): "[l]eaders are critical to social movements: they inspire commitment, mobilize resources, create and recognize opportunities, devise strategies, frame demands, and influence outcomes", and at the same time "leaders of very different types of social movements […] all enjoyed at least middle-class status and were highly educated".

The idea that more educated people are better prepared and more willing to engage in political activity is not new and it has been empirically tested several times, most recently in Croke et al. (2016). At the beginning of the century, Glaeser, Laibson and Sacerdote (2002) showed the relationship between investments in human capital and in social capital, supporting the idea that people investing in higher education are also more likely to invest in social capital and social skills, thus providing them an edge in the political environment. In another paper, Glaeser, Ponzetto, Shleifer (2007) try to demonstrate a causal relationship between education and democracy. Their argument being that in school people learn how to interact with others and this generates incentives and reasons to participate in the political environment both through voting and organizing. The resulting higher political participation from educated people should thus lead to a stronger support for democracy in countries with higher levels of education. While the second step in their reasoning is not shared by other authors, for example Acemoglu et al. (2005), the literature does not seem to rebut the first finding. On the contrary, other authors analyzed the relationship between education and similar socio-

political characteristics. For example Mattes and Brandon (2007) show the strong correlation between education and knowledge of current political events, Berinsky and Lenz (2011), Dee (2004) and Egerton (2002) demonstrate the causal effect of education on participation in the political process, even though Kam and Palmer (2008) reject the causality link, and Weakliem (2002) describes how more educated people are more critical of the current government, thus usually describing themselves as less satisfied by the government actions.

When looking at similar literature focusing on sub-Saharan Africa, the focus of the empirical analysis in this paper, the role of education in determining dissatisfaction with the government is paired with higher political awareness, but also higher acceptance of the use of violence for political reasons in the study presented in Frieman (2011). However, it is important to notice how these results were obtained from a case study run in rural areas of Kenya during a period when widespread political violence and deterioration of the democratic process could have influenced the perceptions and beliefs of the interviewees. However, similar results are not exceptional in Africa and they are particularly relevant when we consider that in this continent both population and education are growing at a pace sometimes faster than economic growth, potentially leading to the economic bottlenecks and the associated socio-economic issues described in Weber (2019)[26]. Interesting country specific case studies are those by Konings (2002) about the political role played by university students in Cameroon in the '90s and by Amutabi (2002) about the influence of Kenyan universities on the democratization process in that country. Moreover, journalistic evidence abounds about the role of educated youth in the events of the Arab Springs.

[26] In this paper the author describes how "large cohorts of young males can become a disruptive power in countries that increase enrollment in post-primary education" and how "Strong labor markets can in general suppress the detrimental consequences of youth bulges".

Unfortunately, collective political activities are not always peaceful or democratizing, as those who participate are not always peaceful or in favor of democracy themselves. For example, the literature on terrorism started by Krueger and Maleckova (2003) theorizes and empirically tests that, on average, terrorists, a small percentage of the population, seemed to be better educated and wealthier than their reference groups and usually engage in violence more for socio-political reasons than short- or mid-term economic gains. These results corroborate the finding of a part of the literature on political protests and in general political participation that non-economic psychological factors paly an important role in shaping people's political actions and beliefs. For example, King (2018) explains that the puzzling results of local and international programs to support education and employment to reduce violence are due, among other things, to the non-materialistic dimension of youth aspirations and the constraints imposed on youth by political and structural factors. At the same time, Passarelli and Tabellini (2017) describe how perceived unfairness and resignation effects can encourage or constraint political protests despite identical objective economic conditions.

In fact, these papers are an example of the changing focus of the main economic literature on political conflict from its traditional economic opportunity cost approach. Traditionally, the economic literature on political conflict considered education as a tempering factor, since more educated people are assumed to have higher opportunity costs and therefore have less economic incentives to engage in collective political events, especially against the government. The traditional cost-benefit analysis was expanded by Collier and Hoeffler (2004) that included relative deprivation and grievance in the picture, determining different incentive mechanisms. These mechanisms, though, were still biased towards the poorer and less educated agents, clearly suffering more relative deprivation and having more opportunities to develop grievances. However, building on this theory, I claim that it should be allowed for expectations, instead of other people, to determine the reference point for relative deprivation

and for grievances to result from implicit social promises that are not met. Under these assumptions, people that choose to pursue higher education have higher expectations about their future socio-economic status and the contemporary discourse about higher education generate the implicit promise of better jobs and higher social status. Therefore, higher educated people have similar possibilities as less educated people to feel deprived or to develop grievances toward society, maybe even more if we assume that less educated people start with relatively lower expectations. If we add to these motives the fact that more educated people have more means to organize and coordinate political protests, the hypothesis of a positive causal relationship between human capital and mass political events seems more sensible.

This focus on the organizational capacity of human capital can help to bridge the divide between the sociological literature that provides extensive analysis of the life cycle of social movements[27] and the economic literature that focuses on the incentives for, usually, poor and uneducated people to join, but not create, political (often in the literature violent) organizations. Since political organization operates in a similar way as economic organization, by combining labor and resources to produce an output, and requires similar resources in terms of human time, organizational and inspirational skills, money, etcetera, they will also thrive in an environment where these resources, especially human capital, are more abundant. This "industrial" approach to production of political events is explored in details in the main section of the paper.

Delving deeper in the relationship between human capital and means of political activity, the importance of education in dealing with the issues of *information* and *coordination* becomes more evident when we consider the contrasting views in the literature on the role of

[27] For an extensive overview see the Blackwell Companion to Social Movements (2004) and the Wiley Blackwell Companion to Social Movements (2019)

technological instruments in overcoming these issues[28]. On one side, researchers support the idea that a larger diffusion of cellphones and access to social media provides better information about the state of the world and allows for better coordination among people (Breuer 2014, Shirky 2011, Diamond 2010) leading to democratization and stricter control over government behavior. On the other side, researchers are concerned about the quality of the information disseminated (Del Vicario et al. 2016) and about the government use of these tools for propaganda reasons (Gunitsky 2015, Morozov 2012). Moreover, other researchers support the idea that virtual forums instead of being propaedeutic to physical mobilization, substitute it, providing people with alternative, cheaper, and safer way of expressing their dissent[29]. The negative impact on the coordination problem can be compounded by the fact that easier remote communications encourages people to substitute soft ties for the strong ties seen by many as instrumental to collective political action (Bond et al. 2012). Contrary to technology, human capital allows to analyze information, filtering propaganda and fabricated information, to achieve a better understanding of the state of the world and also the skills to coordinate and motivate people for political goals.

In order to test the hypothesis of a positive causal relationship between human capital and collective political events, I aggregated and elaborated data from different sources to build a dataset providing socio-economic information at the first administrative level subdivision for 28 African countries from 2005 to 2015. This approach is intermediate between the traditional country level analysis and the more recent grid level analysis, built on the success of data

[28] An interesting analysis on the role of social media on political activity is presented in Enikolopov, Makarin and Petrova (2018) together with an extensive literature review on the topic.

[29] See Boulianne (2009) for a meta-analysis of the literature on the positive and negative effects of internet on political engagement.

aggregators like the PRIO-GRID project[30]. The advantages of this intermediate approach are a finer geographical level of analysis than the traditional method, similar to the adoption of cells, and, at the same time, more precise data since a lot of socio-economic data are collected at administrative levels (i.e. census data). Moreover, fixed effect at the regional level might be seen as more meaningful than random cell fixed effects. The data used come from both country level datasets and cell level datasets are aggregated through the use of GIS software and more traditional statistical software (STATA).

Traditional econometric analysis using collective political events as the dependent variable show that the coefficient of the variable proxying human capital is positive and significant under different specification, thus supporting the hypothesis presented in this paper. However, I perform an additional analysis to address potential measurement and endogeneity issues. I exploit the fact that all the countries in my dataset have presidential or semi-presidential political systems to use elections to generate a truly exogenous shock. In fact, presidential systems like the United States do not require the president to have the confidence of the parliament and determine that elections must be hold at precise times, contrary to parliamentary systems where elections are hold every time the government loses the confidence of the parliament. Therefore, in presidential systems, the timing of the elections is decided at the moment the constitution is written and therefore it could not be affected by following political events. Of course, constitutions are not always respected, and there are many instances in history when elections have been postponed or anticipated or canceled altogether, however, it is possible to account for this events that are clearly reported and isolate those elections that are truly "regular". At this point, I exploit the fact that the data are at the sub-national level to look at the interaction between the shock and human capital and observe that regions with higher levels of human

[30] For example in Grosfeld *et al.* (2018), Almer *et al.* (2017), Manacorda and Tesei (2016).

capital have higher numbers of collective political events when they are hit by the shock, but also with respect to those regions hit by the same shock but with lower levels of human capital. I repeat the same analysis with traditional economic shock used in the literature as well.

The rest of the paper is organized as follows. Section 2 presents the data. Section 3 presents the identification strategy and the theoretical model behind it. Section 4 presents the econometric results. Section 5 presents the results of the individual level analysis. Section 6 presents a summary of the results and possible paths to further the analysis and solve the criticalities.

2.2 Description of the Data

The main source of data for this analysis is Afrobarometer. Every two to three years Afrobarometer surveys people in several countries in Africa using a randomized stratified sampling process that assure representation of the whole population and coverage of the whole country. For this reason, and the large size of the samples, I could elaborate meaningful statistics at the first level administrative subdivision. The questions asked in the surveys have changed over time, therefore I used only those surveys where the questions relevant for this analysis were comparable (round 3 through 6). Over time, additional countries have been added to each survey, increasing the number of countries available for this analysis from 17 in round 3 to 28 in round 6. Table App.1 in the appendix shows the countries from each survey used in this analysis, the number of first level administrative subdivisions available and possible concerns with comparability of regions across round of surveys. Since there are lags between surveys, I interpolated the missing data in order to have a continue series from 2005 to 2015.

2.2.1 Unit of observation

The unit of observation in this paper is the dyad determined by the following two variables: first level administrative subdivision and

year. Since some countries changed their administrative organization during the eleven years covered in the dataset and different sources use different administrative subdivisions, some adjustments had to be made to allow the merging of different dataset and to maintain comparability across time. Below I describe the main cases.

Until 2011 Ivory Coast was divided into regions, each one divided into departments. In 2011, regions were reorganized and grouped into new first level administrative subdivisions named districts. Since the reorganization happened between round 5 and round 6 of the Afrobarometer survey, adjustments had to be made in order to maintain comparability. Since round 5 does not provide locational information beyond the first level while round 6 provides information about first, second and, depending on the country, third level administrative subdivisions, the data provided for round 6 were regrouped according to the administrative division used in round 5.

In the case of Kenya, Afrobarometer uses the pre-2010 subdivision into 8 provinces for all the surveys. For this reason, all the other datasets were adjusted to use the provincial system instead of the current county system.

Afrobarometer used an old administrative system to run surveys number 3 and 4 in Madagascar and survey number 3 in Nigeria. Using information about second level administrative divisions provided for Madagascar in survey 3 and 4, the data for Madagascar were reorganized according to the new administrative system. Instead, it was impossible to do the same for Nigeria and many Nigerian states had to be dropped from round 3 due to incompatibility with the modern system.

In Senegal, Tanzania, and Zambia the administrative system has remained the same, but new regions (two, four, and one respectively) have been created during the time frame of the analysis. In order to assure consistency across datasets, information about second and

third level administrative divisions were used to reorganize data to assure comparability over time.

In the case of Uganda, Afrobarometer uses the regional system instead of the district system, despite the fact that regions have no administrative role. Data from all the other datasets were reorganized accordingly.

Finally, a few dyads were not surveyed due to civil unrest or insurgency, especially near the Nigeria-Niger border due to the activity of Boko Haram and in northern Mali due to the war with AZAWAD and terrorist organizations. In these cases, I dropped those observations as outliers since the number of political events is clearly affected by the larger conflict taking place in the region.

2.2.2 Dependent variable

The econometric analysis is focused on the relationship between human capital and political activity, in particular political protests. Data about political events are collected by different datasets using different methodologies. In this paper, the main source of data on political events is the Armed Conflict Location & Event Data Project (ACLED)[31] while data from the Social Conflict Analysis Database (SCAD)[32] are used for robustness checks. While SCAD differentiate between organized and spontaneous protests and identifies different types of strikes as well, ACLED does not distinguish between different types of collective political events. For this reason, I created a variable "Organized Protests" that records a political event as

[31] Raleigh, Clionadh, Andrew Linke, Håvard Hegre and Joakim Karlsen. (2010). "Introducing ACLED-Armed Conflict Location and Event Data." Journal of Peace Research 47(5) 651-660

[32] Salehyan, Idean, Cullen S. Hendrix, Jesse Hamner, Christina Case, Christopher Linebarger, Emily Stull, and Jennifer Williams. "Social conflict in Africa: A new database." International Interactions 38, no. 4 (2012): 503-511

organized if the variables actor 1 or actor2 report the name of a known actor beside general entries like "Protestors" or "Citizens"[33].

Political events are assigned to first order administrative subdivisions using the information about location provided in the datasets. In the case of ACLED, information about first, second and third level of administrative subdivision are provided. In the case of SCAD, the information reported in the variables "elocal" and "ilocal" do not always correspond to administrative subdivisions; in this case, I researched the geographical location provided and identified the corresponding first level administrative division. I discarded those events recorded to have happened in unknown places or at the national level.

From both datasets I was able to collect information about total number of collective events, number of protests, and number of riots, all divided also between organized and spontaneous events. The variable protests identifies all those collective events where the participants did not act violently towards other people or their possessions, this does not include potential violent repression from the government or other organized groups. The variable riot, instead, identifies those events where the participants engaged in violence towards other people and or looting and vandalism. Data on strikes were also available, and these were all classified as organized events given their nature.

2.2.3 Principal covariate

Information about education at the first administrative level has been calculated using the Afrobarometer surveys from round 3 to round 6. The first two rounds were excluded due to limited geographical coverage and important differences in the types of questions asked. In each survey the great majority of first level administrative units were covered and a minimum of 150 people were interviewed in each unit.

[33] I thank professor Raleigh for suggesting this approach when I spoke with her during her visit to the University of Florida in the spring of 2019.

From the answers collected two different variables have been calculated: average level of education of the people interviewed on a 1 to 9 scale and percentage of interviewees with a college degree.

Since the average level of education in a region is slow changing over time, additional static variables were created as the mean of the values of the variables over time in the region. In this way, the measure should be more precise and robust to sampling issues in specific round of surveys.

2.2.4 Country-level shocks

Two main types of country-level shocks have been identified: political shocks linked to national elections and economic shocks determined by growth of economic indexes.

The first type of shocks was obtained elaborating the data provided by the Institute for Democracy and Electoral Assistance (IDEA) and from the Electoral Institute for Sustainable Democracy in Africa (EISA) on presidential, legislative, regional and local elections in Africa, both planned and that actually happened. These data were further disaggregated into regular and irregular elections using the information generously provided by Higashijima and Kerr from their working paper "When Does the Honeymoon End? Electoral Cycles of Democratic Satisfaction in Africa". The final result is a series of binary variables identifying years with elections, planned elections, elections that actually happened, and whether these elections happened at the scheduled date (regular) or were rescheduled (irregular). In the case of regular elections, exogeneity of the shock is more probable since the timing of the elections is determined by the constitution. In the case of irregular elections, the shock might be endogenous if the elections were postponed due to protests[34].

[34] See Daxecker et al. (2019) for a study on the relationship between elections and protests in the case of objective or perceived electoral fraud.

The second type of shocks is calculated using data from the World Penn Tables and the International Labor Organization. Binomial variables for growth and unemployment related shocks are created to identify years of negative growth of the real gross domestic product at purchasing power parity, of the per-capita real gross domestic product at purchasing power parity, of the consumption indicator reported in national accounts at the absolute and per capita levels, and for years of positive growth of the unemployment rate.

The literature studying mass political events in developing countries has individuated additional shocks with a high degree of exogeneity, mostly related to the weather or global value chains. Major droughts or weather patterns different from the norm are associated with lower agricultural productivity and political protests in Almer et al. (2017), while change in worldwide commodity prices are used as a shock in Berazneva and Lee (2013) and, together with natural disasters, in Bellemare (2014). However, I decided not to use these indicators because they affect mostly poorer people employed in agriculture while the focus of my research is on tertiary educated people that are usually relative wealthy and working in urban areas. Therefore, these shocks did not seem to identify the same type of political activity as elections or economic growth.

2.2.5 Covariates from Afrobarometer

Additional first administrative level variables have been calculated using the answers collected for the Afrobarometer's surveys. Given the existence of differences in the questionnaires used for the different surveys, I decided for a conservative approach using only those questions that were comparable across surveys. Variables were created measuring the average age in the region, the share of young people (where young is considered to be someone 25 years old or younger), average self-reported access to traditional media, average self-reported access to internet (from survey 4 on), average self-reported access to social media (only for survey 6), average aggregate satisfaction with the central government over different dimensions,

average self-reported interest in politics, average aggregated self-reported political activism across multiple dimensions, share of people claiming to have attended a political demonstration, average aggregated level of privation over multiple dimensions, average outlook on personal and national performance.

Additional information about employment were extrapolated: employment in the formal economy and underemployment. In the first case, it is considered employed in the formal economy someone reporting to be employed full time for a cash paying job. Someone reporting to be employed in a cash paying job only part-time is accounted as half worker employed in the formal economy. In this way, the average value at the regional level of this variable approximates the share of people operating in the formal economy. Instead, workers are identified as underemployed when they report to have attended college and to not being employed in a cash-paying job. In this case I assume that their college education has not paid off and they are employed in the traditional sector.

The interviewer was also asked to report information about the geographical location were the interview took place. While these data may be more approximative, since the sampling strategy was designed to cover a representative sample of the population but not a representative sample of geographical locations, they could still provide information about the average characteristics of the different administrative areas. In particular, there are data about level of infrastructure available (electricity, paved roads, etc.), state presence (police station, military, etc.), cellphone coverage (not for survey 3), and classification of the area as urban or rural.

Finally, using the answers to the appropriate questions, it was possible to create fractionalization indexes along four dimensions: language spoken, religious beliefs, political preferences, and ethnic identification.

2.2.6 Other covariates

Additional covariates were obtained from the PRIO-GRID dataset through the Geographic Information Systems software Q-GIS. The PRIO-GRID dataset uses a cell system to report data about geographical locations. Using Q-GIS I aggregated the cell-level data to the first administrative level, gaining information about land usage, night lights, agricultural land irrigated, weather and temperature patterns, population, economic activity. Additional data about time-invariant characteristics were also available, but were discarded since they would have been lost when using the fixed effect option in the econometric analysis. Using the weather and temperature data I was also able to calculate local level shocks due to drought.

2.3 Identification Strategy

As presented in the introduction, the goal of this paper is to test the hypothesis that there is a positive relationship between human capital, proxied by tertiary education, and collective political actions. Moreover, I explore whether the impact of human capital on collective political actions becomes larger or more significant when focusing on organized collective political actions rather than collective actions in general.

Education is relatively easy to measure but it is influenced and affected by many different factors: political, economic, psychological, and sociological. This increases the risk of encountering endogeneity or reverse causality when using education as the main dependent variables. In the specific case of this study, the possible impact of political protests on education is negative: political unrest disrupts classes, reduces funding, and negatively impacts incentives for agents to pursue higher education. Therefore, any significant positive coefficient calculated by regressing political activities on education can be seen as a lower bound of the actual effect. However, to further support the causality relationship and address the issue of potential

endogeneity, I analyze the impact of education on political protests when mediated by an exogenous shock connected to increases in political activity in the theoretical literature (for example in McAdam and Tarrow 2010)[35].

The regressions presented in this paper are based on a political events production function where human capital and potential participants are combined to produce political events. The general production function is described in equation (30):

$$y_{st} = A_{ct} h_{st}^{\alpha} p(econ, poli, cult)_{st}^{\beta} \quad (30)$$

Where y_{st} is the number of political events produced in region s at time t, A_{ct} is a multiplier depending on country and time specific characteristics, h_{st} is the human capital employed in the production function in region s at time t, $p(.)_{st}$ is the number of participants in region s at time t. Both factors of production cannot be measured directly. However, based on the model described in the first chapter, I assume that the amount of human capital available to be employed in the political events production function is positively and highly correlated with the amount of human capital and the level of unemployment in the region during a specific time. At the same time, I assume that the number of participants, or politically active people, in a region at a specific time can be approximated using appropriate economic, political and cultural characteristics of the agents living in the region. Mirroring the traditional production function, the exponents α and β represent the relative importance of the two factors of production in determining the number of events. It is important to highlight the fact that these coefficients depend on the type of the event analyzed: when studying spontaneous mass riots, the number of willing participants will have a larger impact on the number of

[35] There are very few empirical analyses of the relationship between elections and political protests. See McAdam and Tarrow (2013) for a case study and Vadlamannati (2008) for an empirical study on increasing riots in India during elections. Hutter (2013) does not find conclusive evidence of different levels of party-led political protests between election years and "between elections" years.

events observed, while in the case of sophisticated terrorist attacks, human capital will play a larger role. I did not represent this variability of the coefficients explicitly to reduce clutter in the formula.

Since this paper focuses on the role of human capital in determining the number of political events, I do not explore possible specifications for the participants equation, assuming a standard Cobb-Douglas function. In this case the political events production function will have the form described in equation (31).

$$(31) \qquad y_{st} = A_{ct} h(HC_{st}, U_{ct})^{\alpha}_{st} \left(x_{1st}^{\delta 1} \dots x_{kst}^{\delta k} \dots . x_{Kst}^{\delta K}\right)^{\beta}_{st}$$

Where HC and U represents the Human Capital in the administrative subdivision and U represents the level of unemployment in the country[36]. Taking the logarithm of equation (31) I obtain equation (32).

$$(32) \qquad \ln(y_{st}) = \ln(A_{ct}) + \alpha h_{st} + \\ +(\beta\delta_1)x_{1st} + \dots . + (\beta\delta_k)x_{kst} + \dots . + (\beta\delta_{Kst})x_{Kst}$$

This is the theoretical function I use to define the different econometric specifications[37]. Since the dependent variable is always a count variable in this chapter, I mainly use Poisson regressions with fixed effects. More specifically, I use the STATA command ppmlhdfe described in Correia et a. (2019) that allows for the computation of Poisson regression with multiple large fixed estimators and the estimation of every fixed effect. This last feature is important in order to be able to calculate group level margins; in fact, the standard STATA command xtpoisson does not compute the fixed effects and therefore it assumes that they are all equal to zero when used with the command margins, thus providing a sort of average marginal effect. However, the estimates of the fixed effects calculated by the command ppmlhdfe are "are generally inconsistent and not econometrically

[36] Due to the lack of reliable data, I could not use data on unemployment at the administrative subdivision.

[37] The variables used in the econometric analysis are not always in logarithm form, especially in the case of variables measuring percentages or shares.

identified" as it is described in the help file of the command. In many instances I use interaction terms between the variable of interest, human capital, and other variables, for example unemployment, or shocks. In these cases, measuring the average marginal effect is important, given that it is not possible to determine the significance of the influence of the main regressor otherwise. Therefore, I will use the results from ppmlhdfe as the starting point, but I will provide also the results from xtpoisson when there are major differences. In certain cases the Poisson approach might not converge due to non-concavity issues; in these cases, I use a standard linear regression analysis with fixed effects. This type of analysis is not as good as using a maximum-likelihood approach with a Poisson distribution for different reasons: it is linear, it assumes a continuous dependent variable, and allows for negative outcomes. At the same time, it can provide alternative estimates to test the robustness of the model. Additional robustness checks are needed because the main assumption behind the Poisson approach is that each event is independent: the fact that an event happened, does not affect the probability of another event happening. However, in the case of political events, this assumption might not hold: for example, if a protest happens and the police does not intervene, other people learning of it might feel emboldened to organize protests as well, thus increasing the probability of another protest happening. At the same time, if after a protest the government addresses the issues that fueled the protest, the probability of additional protests might be lower. In the following analysis I maintain an agnostic position: I do not assume that previous protests increase or decrease the probability of future protests.

2.3.1 - Analysis using direct influence of human capital and interactions with unemployment

The first specification, described by equation (33), follows directly from the theoretical model and regress the number of different types of protests as a function of levels of human capital, estimated by the share of tertiary educated adults in the administrative region.

Exploiting the higher resolution of the dataset I use an administrative level fixed effect to account for all the time invariant characteristics of each observed unit.

If we indicate a generic administrative subdivision with the suffix *s* and a generic year with the suffix *t*, the first regression model is the following:

$$(33) \qquad y_{st} = \beta_0 + \beta_1 HC_{st} + \beta_2 HC_{st} XU_{ct} + \beta_3 U_{ct} + \beta_4 X_{st} + i_t + f_s + \varepsilon_{st}$$

Where y_{st} represents the number of collective political events, whose type depends on the specification, in an administrative subdivision in a given year, HC_{st} represents the levels of the main independent variable, human capital, in an administrative subdivision in a given year, U_{ct} represents the level of unemployment in a country in a given year, X_{st} represents time dependents covariates at the administrative subdivision level, i_t represent the year fixed effect to control for trends and shocks that affect the whole dataset, f_s represents the administrative subdivision fixed effect, and ε_{st} the error term. Since the dependent variable is the number of events that happened in a specific time period, I use a Poisson model with administrative division fixed effect to estimate the different regressors. In the few cases when the Poisson estimator does not converge due to lack of concavity, usually when using a large number of dummy variables, I use a standard OLS approach with administrative subdivision fixed effects.

2.3.2 - Analysis using exogenous Political and Economic Shocks

In order to address possible concerns due to endogeneity, in the specification described by equation (34) I introduce idiosyncratic shocks at the national level, associated in the literature with higher levels of political activity, and interact them with the human capital variable. This result in a diff-in-diff approach where we can observe the differential effect of the shock on regions with different levels of human capital. The second regression model is the following:

(34) $$y_{st} = \beta_0 + \beta_1 SHOCK_{ct} + \beta_2 SHOCK_{ct} XHC_{st} + \beta_3 HC_{st} + \beta_4 X_{st} + + i_t + f_s + \varepsilon_{st}$$

Where, as in the previous specification, y_{st} represents the number of different types of protests depending on the specification in an administrative subdivision in a given year, HC_{st} represents the human capital variable, X_{st} represents time dependents covariates at the administrative subdivision level, i_t represents the year fixed effect, f_s represents the administrative subdivision fixed effect, and ε_{st} the error term. Differently from the previous specification, $SHOCK_{ct}$ represents the idiosyncratic time-variant shock and an interaction term is reported as well. Since all the administrative subdivisions in the same country are subject to the same shock in the same year but might experience different levels of political activity, the coefficient of the interaction term estimates the impact of different levels of human capital on the number of political events, after controlling for other differences among administrative subdivisions. If β_2 has a positive sign, it indicates that increasing levels of human capital leads, at least in combination with an exogenous shock, to higher numbers of political events.

Given the low variability of a slow-moving variable like education, as a robustness check, I also run the main regressions using a static variable for human capital, calculated as the mean of the human capital variable at the region level over all the years available. This helps also to address possible sampling issues in the Afrobarometer data[38]. Given the time-invariant nature of the average level of human capital $\overline{HC_s}$, its direct impact is absorbed by the fixed effect and therefore, β_3 cannot be calculated.

[38] Over-representation of more educated people should not be a problem, since I aggregated the survey-level data using the weights designed by Afrobarometer exactly to address the issue of over sampling of less represented demographic categories.

2.4 Empirical Results

In this section I present the results of the regressions of numbers of different types of political protests on different specifications. This section is divided into three parts. The first presents the results from the basic specification. The second presents the results from the specification with idiosyncratic time-variant shocks. In the final part I run robustness checks with different sub-sections of the dataset, a different proxy for human capital, weighted political shocks, and measures of collective political activity from a different data source.

2.4.1 - Results of the main regression without shocks

Table 1 presents estimates from equation (33), where the dependent variable is the total number of political mass events as measured by ACLED. Column (1) presents the results using human capital and unemployment independently, column (2) presents the results using a linear interaction between human capital and unemployment, and column (3) presents the results using a quadratic interaction between human capital and unemployment[39]. All regressions estimate the regressors using a Poisson model with the same specification, regional level fixed effects, year level fixed effects to control for trends, especially in the dependent variable, and country level covariates that proxy for A_{ct} in equation (31).

The coefficients of tertiary education, the proxy used for human capital, and its marginal effects are positive and significant only when interacted with human capital, supporting the hypothesis that the influence of human capital in the political sphere is not fixed, but varies depending on the circumstances, in this case when less human capital is employed in the economy and there is a larger pool of potential participants.

39 This last specification was used to test the hypothesis that for very high levels of unemployment, the number of potential participants is so high that the influence of human capital in organizing the events becomes insignificant.

Table 1: Regressions of Mass Political Events on Human Capital and Unemployment

Dependent Variable:	(1) MassEvents	(2) MassEvents	(3) MassEvents
Coefficients:			
Human Capital	0.561	2.658***	-0.674
	(0.258)	(0.004)	(0.685)
Human Capital & Unemployment		-0.152***	0.752**
		(0.002)	(0.032)
Human Capital & Unemployment (square)			-0.034***
			(0.007)
Unemployment	0.074*	0.103**	0.118
	(0.054)	(0.012)	(0.286)
Unemployment (square)			-0.002
			(0.684)
Observations	2870	2870	2870
Groups	308	308	308
Margins (with estimated fixed effects):			
Human Capital	2.935	4.208	4.872
	(0.258)	(0.274)	(0.191)
Unemployment	0.388*	0.375*	0.335
	(0.055)	(0.080)	(0.305)
Margins (assuming all fixed effects = 0)			
Human Capital	0.561	1.72***	1.61**
	(0.258)	(0.009)	(0.011)
Unemployment	0.074*	0.087**	0.124**
	(0.054)	(0.027)	(0.023)

* p<0.1, ** p<0.05, *** p<0.01

Note: Only the coefficients of the variables of interest are reported. P-values in parenthesis. Table App.3. in the appendix reports the estimates for all the variables.

Given these preliminary results, it is important to keep in mind that political events can be driven by many different time and country specific events that can confound the influence of the different variables on the dependent one. For this reason, Table 2 presents results obtained from regressions with the same specification used in

Table 1 adding country-year fixed effects in order to account for time specific country level events that influence the level of political activity.

Table 2: Regressions of Mass Events on Human Capital with country-year fixed effects and region level controls

Type of mass event:	(1) All	(2) All	(3) All
Estimators:			
Tertiary Education	21.781***	29.340**	33.247
	(0.003)	(0.041)	(0.251)
Human Capital & Unemployment		-1.178	-2.477
		(0.615)	(0.805)
Human Capital & Unemployment (square)			0.063
			(0.914)
Unemployment	-11.014***	-10.864***	228.278***
	(0.000)	(0.000)	(0.000)
Unemployment (square)			-11.166***
			(0.000)
Margins:			
Human Capital	21.781***	21.499***	21.897**
	(0.003)	(0.003)	(0.026)
Unemployment	-11.014***	-10.979***	79.526***
	(0.000)	(0.000)	(0.000)
Observations	3249	3249	3249
R2	0.672	0.643	0.656
R2-adjusted	0.643	0.612	0.626

* p<0.1, ** p<0.05, *** p<0.01

Note: coefficients for country-year fixed effects are not reported. Standard errors in parenthesis

Note: only coefficients for significant region level covariates are reported

In order to maintain a sufficient number of degree of freedoms, instead of using administrative subdivision fixed effects, I add additional variables measuring specific characteristics of the regions. Given the high number of dummy variables, Poisson estimators would not converge due to the lack of concavity. For this reason, I used ordinary least squares with standard errors clustered at the administrative subdivision level.

Even though it is not possible to compare the magnitude of the coefficients due to the different methods used, the coefficients of the variable measuring human capital and the average marginal effects are positive and highly significant. This seem to support the idea that, indeed, country specific temporary events play a relevant role in the number of political events happening in a country, thus providing an additional reason to continue the analysis of this relationship using country level shocks.

2.4.2 - Results of the regressions with exogenous shocks

Building on the results from the previous section, I analyze the relationship between human capital and political events when there is a national level shock, using the specification described in equation (34). Table 3 presents the results of the regression of the total number of mass political events on electoral shocks and the interaction between these shocks and tertiary education. This type of regression highlights the additional impact of the shock, depending on the levels of human capital available. The more a shock is exogenous, the more robust the interaction term is to potential endogeneity of the variable of interest, in this case human capital. Given the difficulty of finding a perfect shock, in Table 3, I present the results of the same regression using better shocks in each iteration, showing how the significance and the magnitude of the interaction term increases with the quality of the shock. In column (1), the shock corresponds to an election taking place in that country in that year; this includes all types of elections. However, local elections might not provide a strong enough focus point to help overcome possible coordination issues among protestors. Therefore, in column (2), I use as shock only the main elections: presidential elections in presidential systems and legislative elections in parliamentary systems. This shock could suffer from endogeneity, because the timing of the election could be determined by political disturbances and associated political protests; for this reason, in column (3), I use only planned elections, those elections that

were scheduled by constitutional or legislative provision before they happened. In this way we can reduce the risk of endogeneity.

Table 3: Regressions of Mass Political Events on dynamic Human Capital and Political Shocks (Elections)

Dependent Variable:	(1)	(2)	(3)	(4)
	Mass Political Events			
Type of shock: Elections	All types (Happened)	Main only (Happened)	Main only (Planned)	Main only (Regular)
Election SHOCK = 1	0.206*	0.056	-0.054	-0.032
	(0.062)	(0.631)	(0.632)	(0.797)
Share of Tertiary Educated	0.302	0.212	0.157	0.107
	(0.590)	(0.703)	(0.783)	(0.844)
Interaction Term (Shock=1)	0.156	0.876*	1.028**	1.150**
	(0.717)	(0.062)	(0.038)	(0.025)
Observations	2870	2870	2870	2745
Groups	308	308	308	306

* p<0.1, ** p<0.05, *** p<0.01

Note: Only the coefficients of the variables of interest are reported. P-values in parenthesis Table App.4 in the appendix reports the estimates for all the variables.

However, a second factor of endogeneity can affect the shock: planned elections happen because they cannot be postponed due to protests[40]. Even though a summary analysis of all the elections used in this research does not revealed any situation of this type, column (4) reports the results of the analysis when using as shock only the main elections deemed regular by the external source described in the data section. This last shock can be assumed to be exogenous, considering all the refinements implemented. As in Table 1, the coefficients are estimated assuming a Poisson distribution of the events; region level fixed effects and year dummies are used to control for region level time invariant factors and for time trends in the variables and the standard errors are computed robustly. It was not possible to use

[40] I thank Professor Nisticò for pointing out this second possible path for endogeneity.

country year fixed effects since they would have been collinear to the shock variable. In fact, this analysis tries to disentangle some of the effect of country year events recorded in Table 2. The coefficient of the interaction between the shock and human capital is always positive. As expected, it becomes larger and more significant the better the shock used. This seems to support the idea that the influence of human capital on protests is very noisy, and filtering is required in order to identify it.

In Table 4, I present the results from the same analysis ran in Table 3, using the average value of tertiary education over the period of interest.

Table 4: Regressions of Mass Political Events on static Human Capital and Political Shocks (Elections)

Dependent Variable:	(1)	(2)	(3)	(4)
		Mass Political Events		
Type of shock: Elections	All types (Happened)	Main only (Happened)	Main only (Planned)	Main only (Regular)
Election SHOCK = 1	0.254**	0.101	-0.015	-0.044
	(0.026)	(0.362)	(0.894)	(0.713)
Interaction Term with static education (Shock=1)	-0.079	0.721	0.919*	1.326**
	(0.881)	(0.143)	(0.081)	(0.022)
Observations	2870	2870	2870	2745
Groups	308	308	308	306

* p<0.1, ** p<0.05, *** p<0.01

Note: Only the coefficients of the variables of interest are reported. P-values in parenthesis Table App.5 in the appendix reports the estimates for all the variables..

As explained in the description of the identification strategy, this can help reduce issues generated by sampling problems and the endogeneity of the independent variable at the cost of losing some of the time variability.

Economic shocks, for example negative changes in the growth rate of aggregate or per-capita level of economic variables, are more common in the literature. However, when analyzing political events, endogeneity is certainly an issue and it is difficult to satisfactorily address it: political instability can easily affect economic performances. Moreover, while elections, or other political events happen in a precise time frame, economic events develop over longer period of time, thus making it difficult to pinpoint the exact moment the shock hits. On the other hand, all the countries in the dataset are relatively small from an economic point of view and their economic performances depend as much on worldwide conditions as on national contingencies: for this reason, variation in economic indicators have been used as exogenous shocks in different papers studying political events in African countries. Table 5 and Table 6 present the results of performing the same analysis as in Table 3 and Table 4, respectively, using two different types of economic shocks instead of political shocks. In column (1) the shock is identified with a positive growth in the national unemployment of more than two percent, similarly to what is used in Benmelech et al. (2012). In column (2), negative growth of real gross domestic product (expenditure) per-capita is used; considering an average growth rate over the period of almost 4%, any negative growth of the variable would be considered a shock. Considering changes in real national GDP as shock led to less significant outcomes except when setting the threshold for the shock at minus one percent, a specification that would have included lonely around 10% of the sample. A possible explanation, derived from the results presented in Dal Bò and Dal Bò (2011), is that not all economic shocks have the same effect on political instability: whether the shock affects labor-intensive or capital-intensive industries affects social conflict differently depending on the relative factor intensities of the productive and conflict sectors in the country. This particularly applies to changes in GDP, that could be driven by change in commodity prices, the output of more capital intensive industries. In column (3) through (6) the same regressions as in the first two

columns are run using only protests, column (3) and column (4), and only riots, column (5) and column (6), as dependent variable.

Table 5: Regressions of Different Political Events on Human Capital and Economic Shocks

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
	All Events		Protests		Riots	
Type of Shock:	Unemploy-ment	GDP per capita	Unemploy-ment	GDP per capita	Unemploy-ment	GDP per capita
Economic Shock = 1	0.279**	-0.178	0.112	-0.178	0.432***	-0.119
	(0.030)	(0.300)	(0.441)	(0.289)	(0.005)	(0.592)
Share of Tertiary Educated	0.182	0.345	-0.500	-0.329	0.883	1.185*
	(0.721)	(0.501)	(0.424)	(0.549)	(0.153)	(0.074)
Interaction Term (Shock=1)	1.006**	2.229***	1.187**	2.605***	1.180	1.294
	(0.043)	(0.003)	(0.018)	(0.000)	(0.156)	(0.247)
Observations	2870	2870	2547	2547	2589	2589
Groups	308	308	270	270	277	277

* p<0.1, ** p<0.05, *** p<0.01

Note: Only the coefficients of the variables of interest are reported. P-values in parenthesis

Table App.6 in the appendix reports the estimates for all the variables.

The signs of the coefficients of interest are positive and the estimates are always significant when considering all events or only protests. The coefficients are still positive but not significant when using riots as dependent variable[41]. Even though both the magnitude and the significance of the interaction terms are similar or larger than in the case of political shocks, in this case it is more difficult to support the exogeneity of the shocks given the fact that measures of economic growth are easily affected by political unrest. In the case of

[41] The same happens when using the main political shock on protests and riots separately.

unemployment there is not a similar inverse direct relationship with political protests, but the link between protests and economic growth would indirectly affect employment as well. The fact that the influence of human capital on riots is less significant can be assigned to the more spontaneous nature of riots and to the classification process used by ACLED that includes in riots also violent clashes between different groups of people generated by ethnic or religious tensions: the leaders of this type of events are more easily not formally tertiary educated. I further explore this difference in the section comparing the effect of human capital on organized and spontaneous events.

When using a static measure of human capital the results remain the same when using the GDP per capita shock: positive and significant interaction term when using all the events or only protests as dependent variable, positive but not significant interaction term when using only riots. However, using the unemployment shock produces results that are positive but never significant for every type of dependent variable. This could be due the fact that the unemployment shock suffer more from endogeneity bias and are more sensible to change in specification.

2.4.3 - Organized events vs non-organized events

In the previous section I presented evidence supporting the hypothesis that human capital has a positive impact on the number of mass collective political events. In the last table, I also showed how human capital has a more significant influence on protest than riots and I explained this result with the idea that protests are a more organized type of event that better fit the theoretical model: organized events require more human capital and therefore should be more influenced by human capital availability. This was also described in the production theory presented at the beginning of the chapter. The hypothesis is that organized events require, by definition, organizational and coordination skills that are embedded in human capital, while non-organized, or spontaneous, events might still

happen with low levels of human capital, for example by herd effect. In this section I test this hypothesis comparing the influence of human capital on these two types of events. The coefficient of human capital from regressions using the number of organized events as dependent variable is more significant than the coefficient from the same regression using spontaneous events as dependent variable, thus supporting the hypothesis[42].

Table 6 presents the results of performing the same regressions as in Table 1 with different interactions between human capital and unemployment but dividing the dependent variables between organized and spontaneous events. The dependent variable is the number of all the organized events in column (1), column (2), and column (3) and the number of all the spontaneous events in column (4), column (5) and column (6).

In the first two specifications, columns (1) and (2) and columns (4) and (5), the effect of human capital is positive and significant in the case of organized events but it is not significant in the case of spontaneous events. In the third specification, columns (3) and (6), the results are more ambiguous, with only the interaction coefficients significant, one of them positive and one of them negative.

Using the command margins to calculate the aggregate influence returns different results depending on the command used: keeping all the fixed effects equal to zero, returns an average marginal effect positive and significant. On the contrary, when the fixed effects are estimated, the average marginal effect is not significant, but, estimating the margins for human capital assuming that unemployment is a standard deviation above the mean or below the mean provides results that are increasing, and significantly different from zero and from each other.

[42] Given the different scale of the two variables, comparing the magnitude of the coefficients is more difficult.

Table 6: Same specification as Table 1 with Organized and Spontaneous Events

Dependent Variable:	(1)	(2) Organized	(3)	(4)	(5) Spontaneous	(6)
Human Capital	1.389*	4.506***	1.787	0.036	1.301	-2.637
	(0.087)	(0.000)	(0.478)	(0.949)	(0.224)	(0.165)
Human Capital and Unemployment		-0.229***	0.449		-0.091	1.038**
		(0.002)	(0.439)		(0.124)	(0.014)
Human Capital and Unemployment (square)			-0.025			-0.042***
			(0.233)			(0.005)
Unemployment	0.030	0.073	0.325**	0.103***	0.120***	-0.047
	(0.606)	(0.236)	(0.026)	(0.006)	(0.002)	(0.730)
Unemployment (square)			-0.011**			0.005
			(0.033)			(0.263)
Observations	2522	2522	2522	2683	2683	2683
Groups	267	267	267	288	288	288

* p<0.1, ** p<0.05, *** p<0.01

Note: only the coefficients of interest are shown. P-values in parenthesis

The results presented in Table 6 support the hypothesis that human capital has a more important role in affecting the number of organized events than the number of spontaneous events. In fact, the results presented in Table 6 suggest that human capital affects only the number of organized events. However, as discussed in the previous section, these specifications can be affected by endogeneity, even more when we account for organized events. For this reason, in Table 7 I present the results from running the same regressions as in column (4) from Table 3 and columns (1) and (2) from Table 5 dividing again the dependent variables into organized and spontaneous mass events.

In the case of political shock, the difference between organized and spontaneous events is still extremely significant: both the interaction

coefficient and the margins when the shock is on are significant and positive in column (1) and are not significant in column (2). In the case of economic shocks, the difference is less clear, but still present. This could be due to the type of shock and the type of protests associated with it: economic distress might provide a stronger incentive to overcome coordination and organizational issues than political discontent. In the case of unemployment, , column (3) for organized events and column (4) for spontaneous events, the interaction coefficient is significant only for spontaneous events, while the average marginal effect is significant only for organized events using both computational methods. In the case of GDP per capita, the magnitude of the coefficient of the interaction term is larger and more significant when looking at organized events and the same can be observed for the average marginal effect. Moreover, it is interesting to see how the margins are differently affected by the sign of the direct impact of human capital on the number of events: this is always positive for organized events and always negative for spontaneous events, suggesting that while the overall influence of human capital is clearly positive when organized events are concerned, it could be more ambiguous when looking at spontaneous events.

Table 7: Regressions of Organized and Spontaneous Political Events on Human Capital and different Shocks

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
Mass Political Events	Organized	Spontaneous	Organized	Spontaneous	Organized	Spontaneous
Type of shock:	Regular Elections		Unemployment		GDP per capita	
Margins (fixed effects = 0):						
Human Capital (SHOCK=1)	2.329**	0.614	1.625**	0.945	3.552***	1.936**
	(0.023)	(0.443)	(0.034)	(0.190)	(0.000)	(0.024)
Human Capital (SHOCK=0)	0.745	-0.298	0.842	-0.265	0.923	-0.044
	(0.311)	(0.661)	(0.310)	(0.627)	(0.252)	(0.938)
Margins (estimated FE):						
Human Capital (SHOCK=1)	6.060**	2.568	5.278**	4.679	10.532**	8.162**
	(0.039)	(0.447)	(0.036)	(0.196)	(0.018)	(0.028)
Human Capital (SHOCK=0)	1.798	-0.931	1.818	-0.775	2.095	-0.137
	(0.306)	(0.660)	(0.304)	(0.627)	(0.244)	(0.938)
Coefficients:						
Economic Shock = 1	-0.252	0.102	0.249	0.279**	-0.280	-0.111
	(0.137)	(0.486)	(0.144)	(0.032)	(0.111)	(0.592)
Share of Tertiary Educated	0.745	-0.298	0.842	-0.265	0.923	-0.044
	(0.311)	(0.661)	(0.311)	(0.628)	(0.253)	(0.938)
Interaction Term (Shock=1)	1.584**	0.912	0.784	1.210**	2.628***	1.980**
	(0.024)	(0.215)	(0.216)	(0.040)	(0.001)	(0.025)
Observations	2382	2585	2522	2683	2522	2683
Groups	262	288	267	288	267	288

* p<0.1, ** p<0.05, *** p<0.01

Note: only the coefficients of interest are shown. P-values in parenthesis

2.4.4 - Robustness checks

As described in the previous sections, the effect of human capital on political events is very noisy due to the high number of variables that affects both of them and to the multiple channels that drive the causal relationship from human capital to political events. For this reason, I present in this section different robustness checks to test how sensitive to different specifications the results obtained in the previous section are.

2.4.4.1 – Robustness checks using different subsets of the main dataset

Many covariates used in this analysis, including the share of tertiary educated people, are obtained from interpolating the results of different Afrobarometer surveys; in order to test whether this interpolation affects the results of the analysis, Table 8 presents the results from running the same regression described in Table 1 column (2) using different subsets of the main dataset. In column (1) the original results are reported for comparison, in column (2) I removed all the observations whose Afrobarometer covariates were obtained by extrapolation from original data more than a year away, in column (3) I included only observations from those countries that were covered by at least three rounds of surveys from Afrobarometer, in column (4) only observations from those countries that were covered by all rounds of surveys from Afrobarometer were included, leading to a balanced panel, and finally, in column (5), I report the results from running the basic regression using only the countries and years covered in the Afrobarometer surveys[43].

The estimates of the coefficient of tertiary education is always positive and significant, except for column (5). The results from column (3) and (4) alleviate the fear that the results might be driven by those countries that were sampled only in the last two rounds of surveys or by the unbalanced nature of the main dataset. Similarly, in column (2) I

[43] In the appendix there is a table reporting all the country-year dyads that were surveyed, interpolated or extrapolated.

explored the possibility that extreme extrapolation, meaning extrapolation of observation not adjacent to existing observations, might drive the results. The results from column (5) are not easily comparable since less than one third of the observations are left and, as I describe more in detail below, issues of sample selection bias may arise.

Table 8: Same specification as Table 1 column (2) with different subsets of the dataset

	(1) Full Dataset	(2) Conservative Interpolation	(3) At least 3 surveys	(4) Balanced panel	(5) No Interpolation
Coefficients:					
Human Capital	2.658***	2.253***	2.139**	1.826**	0.763
	(0.004)	(0.007)	(0.011)	(0.037)	(0.382)
Unemployment	0.103**	0.087**	0.087**	0.089**	0.097**
	(0.012)	(0.034)	(0.035)	(0.033)	(0.011)
Human Capital and Unemployment	-0.152***	-0.110**	-0.109**	-0.105**	0.002
	(0.002)	(0.014)	(0.015)	(0.016)	(0.975)
Observations	2870	2696	2557	2349	891
Groups	308	295	245	219	259
Margins (fixed effects = 0)^:					
Human Capital	1.719***	1.560***	1.443**	1.124*	0.776
	(0.009)	(0.009)	(0.017)	(0.075)	(0.222)

* p<0.1, ** p<0.05, *** p<0.01

Note: only the coefficients of interest are shown. P-values in parenthesis

^ The margins calculated using the estimated FE are not significant for any specification

Similar results are obtained when repeating the same exercise with the specifications from Table 4 column (4) and Table 5 column (1) and column (2) as it is shown in Table 9. When using economic shocks, both the coefficient of the interaction term and the margins are positive and significant with every subset of the data. When using the political shock, the coefficient of the interaction term is not significant using the data without interpolation, column (5), and the margins in both column (4) and (5) are not significant. These results could be

driven by two facts: the low number of regular elections left once we remove almost two-thirds of the observations, in column (5), or almost one third of the groups, in column (4), and the possibility of the endogeneity of the shock. In fact, the choice of the year to run the Afrobarometer survey can be affected by the electoral calendars of the different countries (i.e. Afrobarometer analysts prefer to run their survey when there are or there are not elections in the country) and by political unrest (for example, Afrobarometer did not survey those regions affected by Boko Haram in north eastern Nigeria, southern Niger, and those affected by the Tuareg and then Islamist insurrections in northern Mali).

Table 9: Regressions with shocks with subsets of dataset

	(1) Full Dataset	(2) Conservative Interpolation	(3) At least 3 surveys	(4) Balanced panel	(5) No Interpolation
Election Shock:					
Margins (Fixed effects = 0):					
Human Capital (with Shock=1)	1.257*	1.470**	1.433**	0.979	0.642
	(0.080)	(0.034)	(0.047)	(0.242)	(0.737)
Margins (Estimated FE):					
Human Capital (with Shock=1)	7.772*	8.466**	8.477**	6.074	3.371
	(0.084)	(0.035)	(0.049)	(0.246)	(0.752)
Coefficients					
Human Capital	0.107	0.149	-0.040	-0.322	1.070*
	(0.844)	(0.782)	(0.939)	(0.551)	(0.093)
Interaction Term (with Shock=1)	1.150**	1.321***	1.473***	1.301**	-0.428
	(0.025)	(0.005)	(0.002)	(0.021)	(0.810)
Observations	2745	2577	2438	2230	846
Groups	306	293	243	217	257

Table 9: Continued

	(1) Full Dataset	(2) Conservative Interpolation	(3) At least 3 surveys	(4) Balanced panel	(5) No Interpolation
Unemployment Shock:					
Margins (Fixed effects = 0):					
Human Capital (with Shock=1)	1.188**	1.414**	1.235**	1.208**	2.059***
	(0.039)	(0.011)	(0.025)	(0.049)	(0.004)
Margins (Estimated FE):					
Human Capital (with Shock=1)	8.920**	10.052**	8.852**	8.523**	21.608***
	(0.042)	(0.011)	(0.025)	(0.048)	(0.005)
Coefficients					
Human Capital	0.182	0.205	0.191	-0.240	0.365
	(0.720)	(0.680)	(0.709)	(0.654)	(0.625)
Interaction Term (with Shock=1)	1.006**	1.209***	1.044**	1.448***	1.694**
	(0.043)	(0.006)	(0.015)	(0.004)	(0.038)
GDP per capita shock					
Margins (Fixed effects = 0):					
Human Capital (with Shock=1)	2.574***	2.891***	3.090***	2.601***	3.225***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Margins (Estimated FE):					
Human Capital (with Shock=1)	16.833***	18.247***	20.220***	17.898***	22.303***
	(0.002)	(0.000)	(0.000)	(0.002)	(0.000)
Coefficients					
Human Capital	0.345	0.384	0.240	-0.068	0.619
	(0.500)	(0.435)	(0.619)	(0.892)	(0.391)
Interaction Term (with Shock=1)	2.229***	2.507***	2.850***	2.669***	2.606***
	(0.003)	(0.000)	(0.000)	(0.000)	(0.004)
Observations	2870	2696	2557	2349	891
Groups	308	295	245	219	259

* p<0.1, ** p<0.05, *** p<0.01

Note: only the coefficients of interest are shown. P-values in parenthesis

2.4.4.2 – Controlling for time trends at the administrative subdivision and country level

In the main regressions I used administrative subdivision fixed effects and I also controlled for year fixed effects. However, there might be some country or administrative subdivision specific trend affecting some, or all, of the main variables of interest that could affect the results. For this reason, in Table 10, I present the results of performing the same analysis as in Table 1 controlling for country specific trends instead of year fixed effect while maintaining the administrative subdivision fixed effect.

Table 10: Same specification as in Table 1 with region specific time trends and region fixed effect

Dependent Variable	(1)	(2)	(3)
		All Events	
Margins (FE = 0):			
Human Capital	0.298	2.107***	1.999**
	(0.726)	(0.007)	(0.013)
Margins (estimated FE):			
Human Capital	1.645	2.486	3.509
	(0.726)	(0.931)	(0.910)
Coefficients:			
Human Capital	0.298	3.783***	0.182
	(0.726)	(0.000)	(0.932)
Human Capital & Unemployment		-0.271***	0.706
		(0.010)	(0.155)
Human Capital & Unemployment (square)			-0.036*
			(0.060)
Observations	2870	2870	2870
Groups	308	308	308

* p<0.1, ** p<0.05, *** p<0.01

Note: only the coefficients of the variables of interest are reported. P-values in parenthesis.

All regressions were computed using administrative subdivision specific time trends.

The results are similar to the original specification: margins and main coefficient not significant in column (1), margins significant in column (2) and column (3), but only when calculating them setting all the fixed effects equal to zero. Table 11 presents the results of performing the same analysis using the political and economic shocks.

Table 11: Regressions of Political Events on Human Capital and different shocks with region specific trends^

	(1)	(2)	(3)	(4)	(5)	(6)
Type of trend:	Administrative Subdivision specific			Country specific		
Type of shock:	Elections	Unemploy-ment	GDP per capita	Elections	Unemploy-ment	GDP per capita
Margins (FE = 0):						
Human Capital (Shock =1)	0.993	1.520**	2.416***	1.033*	1.773***	1.946***
	(0.256)	(0.032)	(0.006)	(0.096)	(0.002)	(0.002)
Margins (estimated FE)						
Human Capital (Shock=1)	5.4541	8.409**	15.477***	5.356*	7.166**	11.578***
	(0.261)	(0.038)	(0.010)	(0.100)	(0.014)	(0.003)
Coefficients:						
Human Capital	0.510	0.780	0.643	0.573	0.665	0.671
	(0.491)	(0.276)	(0.403)	(0.266)	(0.171)	(0.178)
Interaction Term (Shock =1)	0.483	1.195**	1.773**	0.460	1.108**	1.275**
	(0.294)	(0.017)	(0.050)	(0.252)	(0.014)	(0.043)
Observations	2745	2870	2870	2745	2870	2870
Groups	306	308	308	306	308	308

* p<0.1, ** p<0.05, *** p<0.01

Note: only the coefficients of the variables of interest are reported. P-values in parenthesis

^ Using quadratic trends does not return meaningful results, probably due to the rarity of the shocks.

The average marginal effects are significant for the economic shocks, column (2) and (3), but not significant for the political shock, column (1). However, the latter becomes significant as well when using

country specific trends, column (4). The weak robustness of the political shock to time trends could be due to the fact that the shock is cyclical by construction and the time period covered is limited for many regions. This could result in many countries having had only one regular election in the timeframe covered by the dataset. Therefore, under the assumption that elections increase the number of political events, if a country has only one election at the beginning or the end of the time frame under observation, this could artificially result in the dependent variable "trending" over time.

2.4.4.3 Using an alternative measurement of human capital

Given the relative scarcity of tertiary educated people in many countries in sub-Saharan Africa, it is possible that the main source of human capital could be the general level of education and not only the share of tertiary educated people; in this case, using the average educational attainment for each administrative subdivision it should provide similar results. However, this goes against the theoretical model, that assumes that the main source of the type of human capital used in politics is accumulated through tertiary education. In fact, in Table 12 it is possible to see how using the average level of education as main explanatory variable leads to coefficients that are, in most cases, not significant or that have a negative sign. Performing the same type of robustness check on the analysis for the different impact of human capital on organized and spontaneous events, leads to results similar to those presented in Table 12.

Table 12: Regression of political events on different specifications using average education to proxy human capital

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
			Mass Events			
Specification:	Only Education	Education and Unemployment	Education and Unemployment (square)	Political Shock	Unemployment Shock	GDP pc Shock
Margins (FE = 0):						
Human Capital (SHOCK=1)	0.048	0.056	0.053	0.127	0.060	0.295**
	(0.667)	(0.649)	(0.649)	(0.308)	(0.586)	(0.013)
Margins (estimated FE):						
Human Capital (SHOCK=1)	0.253	0.234	0.265	0.791	0.449	1.975**
	(0.668)	(0.697)	(0.704)	(0.306)	(0.587)	(0.016)
Coefficients						
Average Educational Attainments	0.048	0.068	-0.778***	0.054	0.045	0.064
	(0.667)	(0.685)	(0.001)	(0.640)	(0.684)	(0.575)
Average Education and Unemployment		-0.002	0.241***			
		(0.873)	(0.000)			
Average Education and Unemployment (square)			-0.009***			
			(0.000)			
Interaction Term (Shock =1)				0.073	0.015	0.231***
				(0.196)	(0.752)	(0.002)
Observations	2870	2870	2870	2745	2870	2870
Groups	308	308	308	306	308	308

* p<0.1, ** p<0.05, *** p<0.01

Note: only the coefficients of the variables of interest are reported. P-values in parenthesis

2.4.4.4 Using an alternative measurement of mass political events

A final useful robustness check would be to replace the dependent variable with a variable that measures the same object but in a different way. In the case of political events, another dataset sometimes used in the literature is SCAD, described in the data section. However, despite having similar goals, the two datasets present events that differ substantially in both localization and number. These differences can be due to multiple facts. In the SCAD dataset events can have "Nationwide" as geographical description, while in ACLED they are always associated with at least a first level administrative subdivision: events that happen in multiple cities at the same time are recorded as a single "Nationwide" event in SCAD and as many individual events, one for every city, in ACLED[44]. Also, the definition of what represents an event is different: ACLED counts as one event each day something happens while SCAD counts each event only once and then adds a duration variable counting the number of days the event lasted. I try to address these problems by looking at name of cities in the description of the event to create events specific for those cities and by replicating each observation in the SCAD dataset for the number of days counted in the variable duration, taking into consideration the start and end date of the event to assign each day to the appropriate year. In the end, even after these adjustments, there are still large differences between the two datasets as can be seen in Table 13.

Clearly, the two datasets are very different, not only for number of events collected (ACLED collected around twice as many events as SCAD over more than twice as many administrative subdivisions), but also because there is very low correlation between the variables measuring the same type of events in the two datasets. For organized versus spontaneous events the difference could be due to the use of

[44] Lots of events were lost in SCAD when aggregating at the subnational level. In particular almost 50% of the events coded as Strikes and around 15% of the events coded as Riots were lost.

different definitions for the two types of events, however, for total number of events, protests, and riots it is more difficult to explain such a difference.

Table 13: Comparison between ACLED and SCAD datasets

	ACLED		SCAD^		
	Observations	Number	Observations	Number	Correlation
Total Events	1385	15009	580 / 580	6765 / 8096	0.35 / 0.33
Organized Events	926	6066	270 / 273	3379 / 3637	0.22 / 0.21
Spontaneous Events	1151	8943	471 / 481	3386 / 4459	0.25 / 0.29
Protests and Demonstrations	1058	8552	352 / 355	1476 / 1746	0.31 / 0.28
Riots	998	6457	346 / 403	2765 / 3802	0.28 / 0.30
Organized Protests	637	3357	170 / 170	703 / 705	0.21 / 0.21
Organized Riots	669	2709	42 / 63	152 / 384	0.03 / 0.05
Strikes (Organized)*	335	547	113 / 119	2524 / 2548	0.25 / 0.25

* ACLED Strikes are obtained from a textual analysis of the notes to the events, therefore may result in a double counting of the same event. While for SCAD they are independent.
^ In the SCAD dataset each event has two "event type" variables: one describing the type of the event at the beginning and one assigning a different type if the event changes type over time. The numbers on the left of the "/" refers to types counted considering only the starting type, while numbers after the "/" refers to types counted considering both types (i.e. evolving events counted as two events, one for each type).

Probably due to the large differences between the two datasets, running the same regressions in the main part of the paper using data from SCAD instead of data from ACLED rarely returns significant coefficients, especially when using the time-variant measurement of human capital as in Table 14 where the main regressions of the chapter have been reproduced using the same specifications but with the total number of events measured in the SCAD dataset as dependent variables.

Table 14: Regression of political events on different specifications using SCAD data as dependent variable

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
	Total Number of Events measured by SCAD					
Specification:	Only Educ	Education and Unemployment	Education and Unemployment (square)	Political Shock	Unemployment Shock	GDP pc Shock
Human Capital	0.277	-0.335	-0.929	0.246	0.144	0.263
	(0.381)	(0.542)	(0.186)	(0.441)	(0.664)	(0.413)
Human Capital and Unemployment		0.052	0.213			
		(0.111)	(0.161)			
Human Capital and Unemployment (square)			-0.006			
			(0.270)			
Interaction Term (Shock =1)				-0.032	0.509***	0.158
				(0.897)	(0.010)	(0.489)
Observations	1770	1770	1770	1683	1770	1770
Groups	192	192	192	190	192	192

* p<0.1, ** p<0.05, *** p<0.01

Note: only the coefficients of the variables of interest are reported. P-values in parenthesis

Only the interaction term with the unemployment shock is significant. The magnitude is smaller because the number of events is smaller. Similar results are obtained when using different types of event as dependent variable: organized events, protests, organized protests, riots. However, these results are not too surprising given that protests only has in SCAD about one fifth of the observations in ACLED while Total Events and Riots have around 50% of the observations of ACLED in SCAD. While finding similar results using a different measure of the dependent variable would have been a clear sign of

robustness of the model, not finding comparable results does not necessary prove the opposite, given the great difference between the two measurements.

2.5 Influence of Human Capital on Individual Decision of Participating in Political Protests

The previous section showed the relationship between human capital, proxied by tertiary education, and political protests at the first level administrative subdivision. The path of causation was the need of human capital to support political organizations and to coordinate and motivate participants. The share of tertiary educated people proxies human capital available to organize political protests under the assumption that higher levels of human capital increase the probability that some of it is available for political activities. However, this does not mean that all tertiary educated people participate in political protests or that they participate more often, or more likely, than less educated people[45].

In this section I explore the influence of tertiary education on the choice of individuals to participate in political protests. Participation is determined by two main factors: motive and opportunity. Agents need reasons to participate (motive) and need to be able to join other agents in order to organize mass political events (opportunity). Higher levels of human capital could influence both factors: educated agents could be better able to gather and process information in order to determine whether there are reasons to protest, but also to organize and cooperate with other agents.

[45] For example, Croke *et al.* (2016) shows how more educated agents are less likely to participate in politics when they believe that the political process is not free and the outcome is decided by the government.

2.5.1 - Main results

The econometric analysis uses a logit regression of a binomial variable with value 0 if the agent never attended a political protest in the previous year and value 1 if the agent attended at least one political protest in the previous year over different covariates. Some of these covariates are identified as "Motive" covariates, proxying both access to information and reasons to engage in protest, and others are identified as "Opportunity" variables, proxying the possibilities the agent has to engage in political protests. These two types of variables are interacted with a tertiary education dummy to test whether tertiary education has an instrumental effect on agents' decisions to participate in political protests. If being college educated means that it is easier to access and evaluate information, thus providing reasons to engage in protests, the effect of "Motive" variables should be larger and more significant for more educated people than for less educated people; similarly for "Opportunity" variables.

In order to account for geographical and temporal specific characteristics country-year and administrative division dummies are used. I decided not to use administrative division – year dummies because some important covariates are at the regional level. Additional covariates used in the literature are used as well but they are not interacted with the education variable.

The variables used to proxy reasons for agents to engage in political protests are: satisfaction with the government at the individual and regional level, individual level poverty indicator, regional average belief about the state of the country, and individual beliefs about personal condition and state of the country. The regional level variables describe the "objective" state of the world, as opposed to the subjective state of the world described by the individual level variables. This allows to control for altruistic behavior: agents that engage in political protests, even though they do not have personal grievances, because they feel the current situation is wrong. The variables used to proxy opportunities for agents to engage in political

protests are: political activism and political interest, both at the individual and regional level, and human capital at the regional level. Political interest is used to proxy opportunity instead of reason because it is generated from the answers to questions about discussing of politics, rather than following politics, thus suggesting more an involvement in political discussions than an attention to political news. One last important variable is access to traditional media, radio and television. This variable is identified as "mixed" since it could measure both the access to information about the state of the world, thus providing motives, and access to information about political protests and events, thus providing opportunity.

Using the results from the logit estimation, I calculate the average marginal effects of each variable of interest to determine the significance and general direction of the effect; these values are reported in Table App.7 in the Appendix. Then, I plot the average margins of each variable of interest at different values of the variable itself for both tertiary-educated and non-tertiary-educated people. The difference between the two margins test the hypothesis of the influence of education on "Motive" and "Opportunity" variables. Figure 11 presents the results for the four main covariates measuring motives and Figure 12 presents the results for the four main covariates measuring opportunity.

The average perception of the state of the country (top left graph in Figure 11) has the expected downward slope: when the country is moving in the right direction, people are less likely to protest. More interestingly, the effect is larger for tertiary educated agents than for other agents, and the difference in magnitude is larger the worse the state of the country is. Under the assumption that the average country outlook represents the "true" state of the world, then tertiary educated agents can better identify it and act when it is negative. When looking at individual beliefs about the state of the country and the personal condition (top right graph in Figure 11), and at the individual economic condition (bottom left graph in Figure 11), the marginal

effects have the slope predicted in the literature: agents satisfied with the state of the world protest less and poorer agents are more likely to protest. However, contrary to the literature, the marginal effects are more intense for tertiary educated people and they are convex: the difference in the magnitude of the marginal effects is larger when there is a larger probability of protesting.

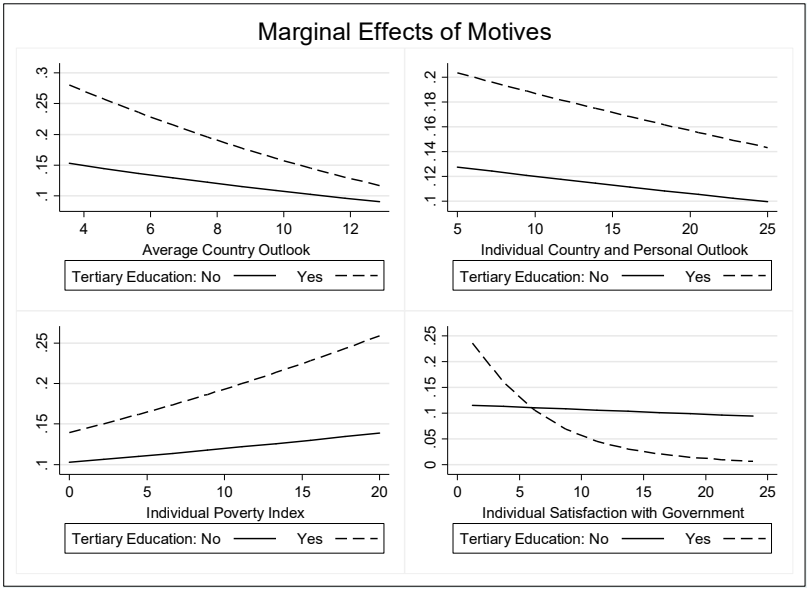

Figure 11: Marginal effects of motives on individuals choice

This difference in margins is due to two effects: educated agents are more likely to act on their beliefs, maybe because more confident in them given the higher human capital available to generate them, and their grievances are stronger when poor or their relative deprivation is more intense when expectations are not met[46].

Finally, the bottom right graph in Figure 11 shows how individual satisfaction with the government is almost constant for non-tertiary

[46] The latter motivation is described in greater detail in Chapter 1.

educated people and on average not significant (see Table App.7 in the appendix), while it plays an important role for tertiary educated people. Educated agents that are extremely dissatisfied with the government are more than twice as likely to protest than non-educated agents in their same situation. At the same time, educated agents satisfied with the government are extremely unlikely to protest. These results support the hypothesis that human capital amplifies the impact of factors that provide incentives to protest.

Figure 12 presents the results for those variables used to test the opportunity hypothesis.

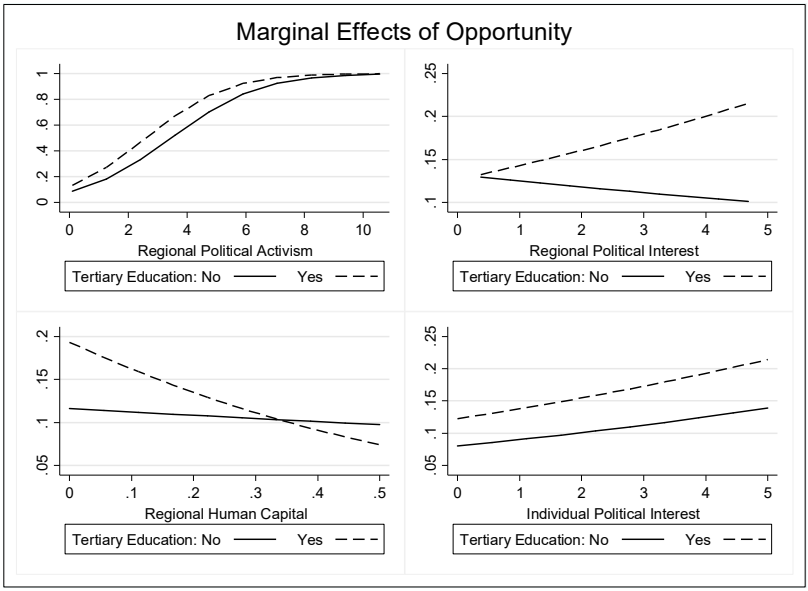

Figure 12: Marginal effects of opportunity on individuals choice

Average regional political activism (top left graph) has a similar magnitude for both tertiary educated and non-tertiary educated agents. In fact, its average marginal effect is significant only for non-tertiary educated agents. This means that given the same level of political activity in a region, all agents are influenced similarly despite

their different educational levels. The results are different when looking at average regional political interest: its marginal effects are positive for tertiary educated agents and negative for non-tertiary educated agents.

As it can be seen in Figure 13, the difference is significant only for relatively large values of political interest.

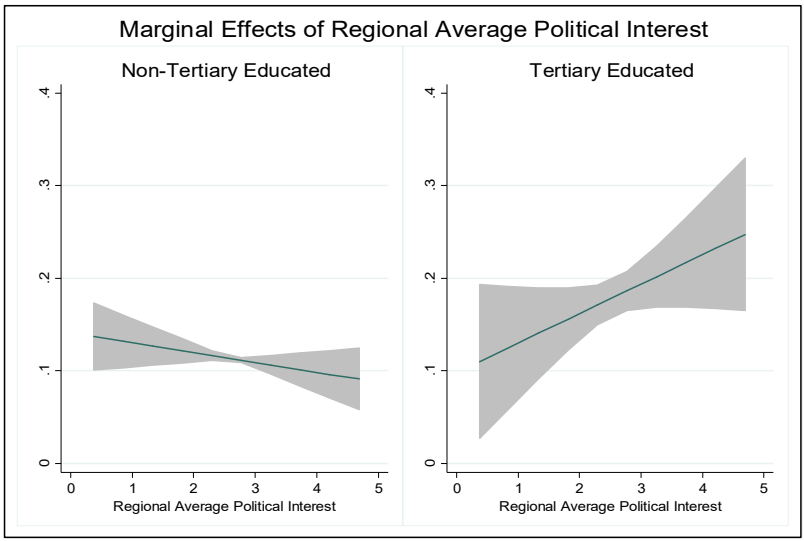

Figure 13: Marginal effects of regional political interest on individuals choice

This suggests that in regions where the political debate is more intense, educated people are more likely to engage in political protests. These first two results show that human capital has a minor influence on the opportunity variables, suggesting that, given the same level of opportunity to protest, human capital has a minor impact in reducing coordination costs.

The bottom left graph in Figure 12 shows an interesting relationship between average human capital and individual human capital. While

average human capital does not seem to affect non-tertiary educated agents, it has a negative slope for tertiary educated agents, suggesting that tertiary educated agents are less likely to engage in political protests in those regions where there is more human capital and, according to the macro analysis, higher chance of political protests. The influence of individual human capital is stronger, and significantly different for tertiary educated people, for lower levels of average human capital, as it is shown in Figure 14.

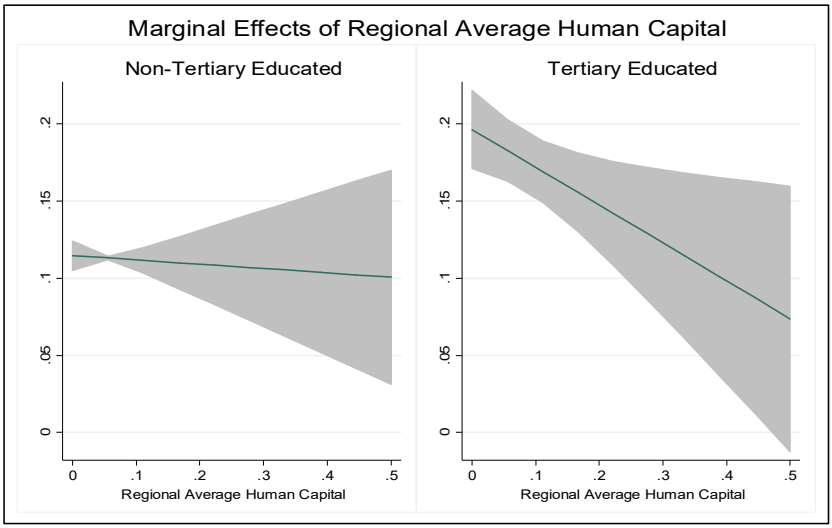

Figure 14: Marginal effects of regional human capital on individuals choice

This result does not support the hypothesis about individual opportunity; however, it supports the assumption behind the results in the macro-analysis: political protests require human capital, therefore, the more human capital, the more protests are organized, but at the same time, the more human capital, the smaller the average amount of human capital used for political reasons. At the same time, when there are motives to protest, protests are organized and if there is less available human capital, a larger share of it will be used in

organizing the protests. Therefore, if there are protests, the human capital of a tertiary educated agent is more likely to be used in regions with lower levels of human capital.

Finally, the bottom right graph of Figure 12 supports the opportunity hypothesis showing how increasing levels of individual political interest are associated with higher probabilities of participating in political protests and this effect is significantly larger for tertiary educated agents than for other agents. A similar result is obtained when looking at individual access to traditional media. Increasing access increases the probability of protesting and the margins are significantly higher for tertiary educated agents. As explained before, this interesting result, while supporting the overall hypothesis that human capital increases the individual probability of protesting, cannot be used to support a specific secondary hypothesis. Access to traditional media provides both motives, since it informs the agent about the state of the world, and opportunity, since it increases awareness of political protests.

2.5.2 - Robustness checks

The same analysis was run using the same specification with an OLS model and as dependent variable the intensity of individual participation in political protests. This variable measure whether the individual would never protest, would protest given the possibility, protested once in the past year, protested more than once in the past year. The signs and the significance of the coefficients were identical to the analysis run with a logit model and the binomial dependent variables. The graphs as well have very similar shapes and confidence intervals, as can be seen in Table App.8 in the Appendix.

2.6 – Concluding Remarks to Chapter 2

This chapter explores the hypothesis that there is a positive causal relationship between human capital and collective political events, mainly protests and riots. Modeling the political dynamics of

collective events like an industrial process that uses human capital and labor to produce political events provides a simple but theoretically sound description of the mechanics behind this relationship. The empirical analysis could not test the model directly given the impossibility to measure the actual amount of human capital and labor used in the production process, the variability of the coefficients due to the type of event, and the uncertainty about the functional form of labor participation. However, assuming a Cobb-Douglas functional form and reasonable covariates, it provides interesting results supporting the hypothesis when performing traditional panel data regressions with fixed effects and year dummies.

In order to address potential issues of endogeneity and sampling error, a proven exogenous shock was used to look at the influence of human capital on political events through the interaction effect with the exogenous shock. The significance and positivity of the results further suggest that human capital has a positive effect on the number of political events, at least during election years.

This chapter contributes to the economic literature in different ways. It presents a simple theoretical approach to empirically test the influence of factors on different political and sociological dynamics where people and factors are combined to generate different outputs. It expands the literature to study the generation of collective political events, and possibly political organizations, thus providing an intermediate level of analysis between the micro-level of opportunity cost and incentives to join political movements, and the macro-level of the relationship between institutions, the economy, and political conflict. It provides a truly exogenous shock that could be used in different types of analysis especially when the variable of interest is time invariant but a fixed effect approach is preferable.

The hypothesis tested in this chapter can be further explored in multiple directions. Finding a suitable region level exogenous shock would allow to run the analysis at an even finer level, while finding

another country level true exogenous shock would allow to check the robustness of the interaction approach described above, testing whether the higher significance of the coefficients when using regular elections instead of the other shocks was due to the different exogeneity of the shocks or to chance. Finally, expanding the analysis to a wider selection of countries would test whether the results presented in this paper can be applied to more advanced economies[47] and, since more advanced economies also have more detailed information at the regional level, reduce the noise from the fact that the data are aggregated from surveys.

[47] Unfortunately, ACLED started only recently to cover some regions in Europe.

Chapter 3: Human Capital and Organized Political Violence

3.1 – Introducing the Analysis on Political Violence

In this chapter, I theoretically describe and empirically test the following theory: increasing levels of tertiary educated youth have a positive effect on organized violent political events when the economy cannot fully employ the stock of human capital and the political system is too closed to new political entrepreneurs.

The starting point of this theory is the tenet that human capital is necessary for every type of social and political organization and that human capital is developed through education. This is summarized in Morris and Staggenborg (2004) when they write that "[l]eaders are critical to social movements: they inspire commitment, mobilize resources, create and recognize opportunities, devise strategies, frame demands, and influence outcomes" and that "leaders of very different types of social movements […] all enjoyed at least middle-class status and were highly educated".

If human capital is required for political organizations and human capital is embedded in education, when does human capital becomes available for employment into violent political organizations? When educated youths cannot find employment in the advanced sector, they earn less and achieve a lower social status than expected. This generates grievances and relative deprivation. According to those economic theories on violence that consider relative deprivation and grievance, as seen in Collier and Hoeffler (2004), this might lead to violence and in general it creates resentment towards the status quo. Some of these youths can decide to address the issue employing their human capital in the political sphere in order to determine a change in society. At this point, if the political institutions are not inclusive and accessible by outsiders, the political activity can take place outside the traditional system, leading to the development of both a peaceful

civil society and potentially violent extra-institutional groups. In those situations where the cost of violence is relatively low, for example due to political instability, weak governments, or fractionalized society, the probability of this extra-institutional actors to become violent increases, possibly leading to the creation of terrorist groups or insurgencies. The size of the resulting violence depends on the support that these actors can harness in the society. Therefore, human capital does not necessarily have a positive effect on political violence, but it can under certain circumstances and when interacting with other socio-economic characteristics. The hypotheses briefly described here will be tested in the empirical section of the paper.

The economic approach to violence, as defined by Becker (1968) and Hirshleifer (2001), even when expanded beyond mere economic calculus, as suggested in Cramer (2011), focuses mostly on the poor and lower educated members of the society, because they are believed to have lower opportunity costs and therefore higher incentives to engage in illegal behavior including political violence. This paper builds on this literature using the standard model of grievances and relative deprivation to show how educated agents can have motivations to engage in political violence as well. Relative deprivation does not have to stem necessarily from comparing individual situations, but could originate from comparing the current situation with an expected one: as I will describe in the theoretical model, the mismatch between expected and actual social position determined by the labor market plays an important role in "radicalizing" tertiary educated people, especially young ones[48]. Moreover, considering opportunity profit instead of opportunity cost, higher educated people, when unable to access the current political or economic establishment, have more to gain from status quo changes

[48] A similar approach is followed in the first chapters of Gambetta and Hertog (2016) that focus on the representation of tertiary educated people, in particular engineers, in jihadist groups in the Middle East.

than poor, uneducated people: rarely a subsistence farmer will benefit from a regime change.

Another contribution of this paper to the literature is to provide a reason, availability of human capital, to explain the creation of groups that can effectively organize and coordinate political actions, those groups that the literature says poor and uneducated people more easily join, but do not create. In particular, this aspect contributes to the literature on terrorism started by Krueger and Maleckova (2003) that were the first to empirically test that, on average, terrorists, a small percentage of the population, are better educated and wealthier than their reference groups and usually engage in violence more for socio-political reasons than short- or mid-term economic gains.

From a development economic perspective, this paper describes how imbalances in the labor market can affect the political sphere and how increasing levels of educated people in economies with small advanced sectors can create political tensions that can negatively affect the development of the economy. Therefore, it encourages a more nuanced analysis of the effects of development strategies, especially concerning the growth of education without the expansion of the labor market[49]. An example of the necessity of a more nuanced analysis of development practice can be found in Friedman et al. (2015).

The theoretical model is described in the next section together with the hypotheses that will be tested in the empirical analysis. In Section 3, I describe the data and the identification strategy. In Section 4, I present the empirical evidence and several robustness checks. The last section concludes the chapter and suggests possible steps forward to refine the empirical analysis and extend the theoretical model.

[49] Ostby *et al.* (2018) presents a review of the literature on the link between education and political violence declaring how "the relationship between education and political violence is complex and multidimensional, depending on type of political violence, mediating factors, and level of analysis".

3.2 – Description of Hypotheses and Identification Strategy

The goal of this section is to show under which circumstances increasing shares of tertiary educated youth positively affect the size of political organized violence in a country. It also describes the hypotheses that will be tested in the empirical section beyond the general causal effect. The model presented in this section is based on the theoretical model described in the first chapter, however it focuses specifically on political violence and it is more deterministic. The analysis is centered on human capital and how it is allocated to different economic and political activities depending on the economic and political institutions of a country. Modeling this allocation as a residual flow process allows for an easier description of empirically testable hypotheses at the cost of limiting the theoretical analysis of the mechanics leading to specific outcomes.

I decided to concentrate my attention on young educated people, and not all educated people, as carriers of human capital, because individuals, especially in bureaucracies and large organizations, tend to be conservative and supporters of the status quo since, in the words of Thomas A. Koeble, "[w]hen making decisions, individuals do not ask the question "how do I maximize my interest in this situation?" but instead "what is the appropriate response to this situation given my position and responsibilities?" In the majority of situations, rules and procedures (that is, institutions) are clearly established, and individuals follow routines."[50] This, as noted by Migdal (2001), generate centripetal forces that help the state to remain unchallenged. On the contrary, between the end of school and their settlement in the workforce, youths have still that freedom from position and responsibilities that can allow some of them to actively challenge the status-quo. Moreover, during this transitional phase, expectations are more easily disappointed and relative deprivation more acutely felt.

[50] This quote is from Migdal (2001).

Young workers recently graduating from college have high expectations about not only being employed but also being employed in certain jobs, and peer pressure and competition are stronger and more intense. However, I explicitly test this hypothesis comparing results of the main regressions when focusing only on young tertiary educated people and when considering all the tertiary educated people.

3.2.1 – Description of the hypotheses

When young people have concluded their compulsory education and have not joined the workforce yet, they find themselves in a fluid situation: their final condition, including type of employment, political preferences, and level of political engagement, is still not fully form. Figure 15 describes a possible path that defines, in a simplified and deterministic way, the final condition of each young entering the labor market for the first time. Figure 15 also describes the contingencies that could influence the choice at every step and that could lead a young person from the acquisition of human capital via education to its employment to organize violent political opposition. Given the importance in the literature of tertiary education in determining accumulation of human capital and the acquisition of other important socio-political skills, throughout the model, I assume, for simplicity, that only two levels of human capital can be accumulated: none, by people that did not acquire tertiary education, and some, by people that acquire tertiary education. I also assume that there is only one type of human capital that can be used both for economic and political activities[51].

Step 1 has already been described in chapter 1 and it is internalized in the data, since they already present the number of youths divided according to educational attainments. In theory, unobserved

[51] The analysis does not change if we assume that economic human capital and political human capital are different but are both accumulated primarily through tertiary education.

individual characteristics could contribute to both the choice to acquire education and the choice to participate in violent political activities. However, given the large number of people that pursue higher education and the small number of people that participate in violent political activities, this link seems unlikely.

In Step 2 educated Juniors become employed but, as described in chapter 1, only a certain number of them is able to find a job in the advanced sector given the limited number of jobs offered. This number depends on the size of the economy, the size of the advanced sector and, in a dynamic framework, on the growth rate of the economy with respect to the growth rate of the pool of educated agents. For this reason, as it has been previously described, a number of educated agents cannot achieve the expected socio-economic status and does not have the possibility to employ their human capital, thus leading to grievances.

Step 3 depends on the socio-cultural characteristics of each agent and on the specific socio-political characteristics of the different countries to determine the share of people that becomes politicized once they are underemployed. Given the time and geographical width of the analysis, I was not able to find satisfying data to measure individual and country socio-economic characteristics at the aggregate level; for this reason, I did not explicitly empirically test the hypothesis generated by this third step. Moreover, different socio-cultural characteristics can be associated with different types of politicization and radicalization as it is described in Gambetta and Hertog (2016) and allowing for theses difference would complicate the analysis without providing additional insights on the relationship between human capital and political violence. At this stage, it is important to notice how we would expect the agents to engage in illegal criminal activities[52] or try to emigrate to a different country, instead of engaging in the political sphere, if the grievances were only economic.

[52] I would like to thank professor Di Salvatore for suggesting this possibility and encouraging me to expand the analysis of this step.

For this reason, I assume that people are willing to use their human capital in the political arena when they desire to fix or fight the system that was, at least from a subjective point of view, unfair to them, and as a meaningful employment of the human capital that they accumulated but could not use in the economic sphere[53].

Step 4 represents the decision of the politicized agents to operate within the current political system or externally to it. Political opposition does not mean working or joining the party not currently in power. That could still be seen as working within the system if that party is a traditional party likely to control the government in the future. Political opposition means working outside, not necessarily against, the institutionalized political system (i.e. grass-root movements and civil society organization but also terrorist groups and extra parliamentary parties). At this step, I assume that there are only two possible paths for politicized Juniors: joining the political establishment or create political opposition[54]. While the choice is affected by the intensity of grievance and relative deprivation and depends on individual cultural and psychological reasons (i.e. propensity toward risk, non-monetary rewards from engaging in political activities, status rewards from being a public servant) the political environment and the choices of the agents in control of the political institutions are extremely relevant, as described in chapter 1. Countries with freedom of speech, more open and fair electoral procedures, and a more inclusive political class will witness lower levels of extra-institutional opposition and a larger number of agents joining the traditional system. On the contrary, countries with more

[53] In this work I assume that political activity does not provide any monetary reward. While this is not the case in the real world, it would complicate the model without adding additional insights. I assume that "professional politicians' jobs" are included in the advanced sector.

[54] A third option, not analyzed in this paper, is migration. Educated juniors unable to find a job in the advanced sector can try to migrate to a different country to find employment in the advanced sector there. Migration would reduce the pressure on the political system allowing for some disgruntled juniors with human capital to leave the polity.

elitist political institutions, less fair and more selective electoral procedures, and a less open political class will experience more intense external political opposition.

As mentioned before, extra-institutional political activity does not have to become necessarily violent. It is in Step 5 that the remaining human capital is allocated between peaceful and violent political opposition[55]. At this stage the repressive capacity of the state has a large influence in determining the ex-post cost of engaging in violence. At the same time, international dynamics can reduce the ex-ante cost of engaging in political violence. On one hand, stronger states can more easily defend themselves from attacks and retaliates, on the other, foreign countries can provide direct moral and material support to violent opposition groups (i.e. US and USSR during the Cold War) and regional political instability due to interstate wars or civil conflict in neighboring countries increase the availability of weapons[56] and the possibility of founding bases of operation.

The last step determines the characteristics of the political events that are possible when educated agents decide to pursue violent political opposition thus making human capital available. Political violence can assume many different forms, but I divide it according to the number of people involved, in particular, the inclusion or exclusion of uneducated people.

[55] Chapman (2008) presents results suggesting that the separation between peaceful and violent political opposition is not exact at the individual level.

[56] An example of the effect of increasing availability of weapons on regional stability is analyzed in Strazzari and Tholens (2014) with respect to the Libyan civil war.

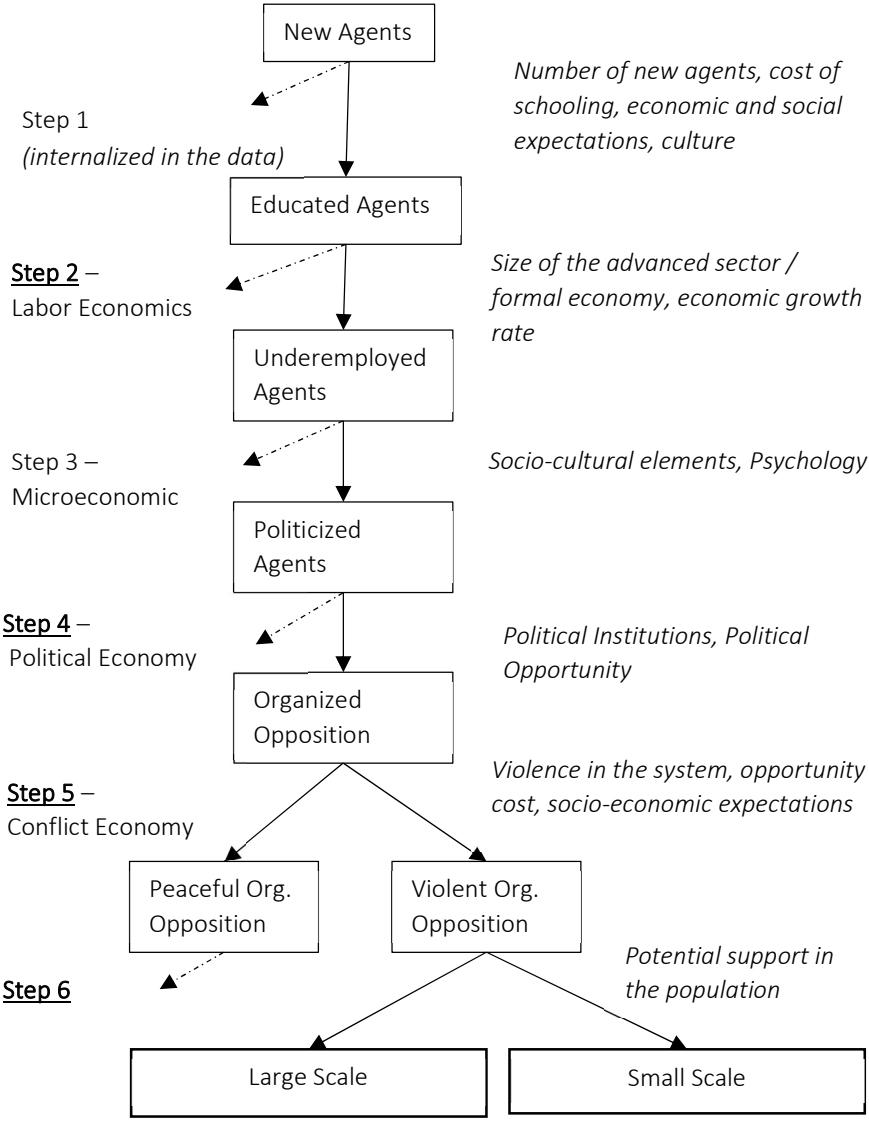

Figure 15: Model of residual allocation of human capital to political activities

This results into two categories: large-scale violent political events and small-scale violent political events. The type of actions depends on several factors but in particular on the level of grievance in society, the number of potential supporters, and the availability of human capital to organize and coordinate the participants. This chapter does not explicitly analyze the role of uneducated juniors in violence given the existence of an extensive literature on the topic[57].

In this analysis, I focus on civil wars as an example of large-scale political violence and terrorist groups as an example of small-scale political violence. Given the numerous factors that determines the onset of civil wars, I focus on their intensity, under the assumption that more intense conflict between the government and the rebels requires a higher degree of organizational and coordination skills on the rebel side, thus better identifying the role of human capital than other measures.

The model can be seen as a binary system: all the human capital not absorbed in the economy is used in one political activity. However, I prefer to interpret it as a residual model: at every step part of the human capital is absorbed and the rest moves forward until the remaining part is used for political violence. This assumes a positive view of the human nature that sees violence as the last possibility.

3.2.2 - Identification strategy

The theoretical model presents a causal path from educated agents, more specifically youths, to organized political violence via underemployment and grievances. The hypothesis in this paper is that, everything else equal, countries with higher levels of educated youth have a larger available stock of human capital required for the creation and maintenance of those organizations that can perpetrate political violence. The everything else equal caveat is extremely important since the amount of human capital applied to political

[57] For example Cramer (2011) and Allan and Steffensmeier (1989)

violence is residual, being first employed in the economy and the traditional political arena.

The empirical analysis focuses on Step 5, but uses as dependent variables events described in Step 6 given the absence of a general measure of organized political violence. Large-scale political violence, especially civil conflict, is the topic of a large literature in economic[58] that extensively describes the difficulty of determining causal relationship given the high risk of endogeneity and reverse causality generated by the profound impact that these events have on the economic, political, and sociological characteristics of the countries affected. Since education is mostly accumulated at the beginning of the working life, reverse causality can be addressed using lag levels of educational attainments. However, this reduces the ability to isolate the impact of educated youths, it is less robust when countries witness several events of large-scale political violence during the time coverage in the dataset, and its effectiveness is reduced when using fixed effects, an econometric technique that requires independence across all periods. At the same time, any causal effect from political violence to education would be negative (schools are closed, the economy stagnates thus the advanced sector does not grow, young people are killed or recruited) therefore reducing the magnitude of a positive effect of education on political violence. For this reason, significant positive coefficient can be interpreted as a lower bound estimate.

The economic literature on small-scale political violence is only relatively smaller[59] and the analysis is relatively easier due to smaller risks of endogeneity. At the same time, very different types of events can be assigned to the small-scale political violence category: coups are usually carried on by the military and require only temporary

[58] For example Michalopoulos and Papaioannou (2016), Goldstone *et al.* (2010), Miguel *et al.* (2004), Fearon and Laitin (2003).

[59] See Gaibulloev and Sandler (2019) for a review of the literature on terrorism after 2001.

organization, terrorism presents more stable forms of organizations but at the same time less interactions with the general population, and small-scale guerilla and insurgency could be assigned to this category as well. In this analysis I focus on terrorist groups, the type of violent political organization that best fit in the theoretical model.

The influence of human capital on organized political violence is dependent on several other variables that determine the final allocation of it. In a country with a vibrant economy and a developed advanced sector, most of the human capital will be absorbed by the economy. Similarly, in a more open society, where access to the political sphere is easier and less regulated, there is less need for external political opposition and the human capital that cannot be absorbed by the economy, together with the associated grievances, is mostly absorbed by the institutional political system. At the same time, when grievances can be addressed openly and through democratic channels, peaceful opposition, via civil society, is more likely than violence. Violence is also constrained by the repressive capacities of the state, whether a democracy or an autocracy. However, especially in the case of large-scale organized political violence, higher state capacity can lead to more political violence, if more resources are available to both sides. Finally, human capital alone is not sufficient to generate large-scale events, but it needs to be paired with a sufficiently large amount of labor. Given the complexity of these interactions, I use the relationship described in equation (35) to estimate the influence of human capital among young people on large-scale political events taking into considerations all the interactions at the different steps in the process:

$$y_{st} = \beta_0 + \sum_{s=2,4,5,6} \sum_{i=1}^{N} \beta_{int(i)} \left(HC_{ct} \; x \; X_{ct}^{si} \right) + i_t + f_c + \varepsilon_{ct} \quad (35)$$

Where y_{ct} represents the political variable of interest, HC_{ct} represents the human capital, X_{ct} represents different covariates, i_t represents year fixed effects, f_c represents country fixed effects and ε_{ct} the residual. The superscripts and subscripts identify different aspects of the model: c identifies different countries, t identifies different years,

s identifies different stages in the process, i identifies different covariates in each stage, and *int* represents all the interactions in every stage depending on the number of covariates used at each stage. The interactions of human capital with other variables of interest are probably specific for each type of interaction and could be country or period specific. Moreover, they could be affected also by the interactions among all the variables that separately interact with human capital. The scope of the empirical analysis is to test the influence of human capital on political violence through the mediation of the steps described before and not the particular examination of each step. For this reason, I assume that using linear interactions, or log-linear in the case of Poisson processes, clustered at the stage level is sufficient to filter enough noise in the data to provide a consistent estimate of the influence of human capital on political violence. The study of specific interaction forms at each different step could provide interesting insights on the topic, but it is beyond the scope of the analysis presented in this chapter.

Formula (36) describe the section of equation (35) referring to step s, if step s has two covariates that proxy measures affecting the absorption of human capital.

$$(36)\ \ldots + \beta_{sh} HC_{ct} + \beta_{s1} X_{ct}^{s1} + \beta_{s2} X_{ct}^{s2} + \beta_{s1h} HC_{ct} * X_{ct}^{s1} + \\ + \beta_{s2}\ HC_{ct} * X_{ct}^{s2} + \beta_{s12h} HC_{ct} * X_{ct}^{s1} * X_{ct}^{s2} + \cdots$$

Since the final influence of human capital on the political variable y_{ct} is difficult to assess by looking at the estimates of the coefficients, throughout this chapter, I present average marginal effects instead of the estimates of the coefficients. Steps 2, 4, 5, and 6 are explicitly analyzed in the empirical analysis, while step 1 and step 3 are not. The result of stage 1, the accumulation of human capital, is already represented in the data that includes the educational attainments of the agents. Stage 3, being at the micro-level, cannot be explicitly estimated at the country level, but under the assumption that the socio-cultural characteristics behind it are country specific and time

invariant, their effects are absorbed by the country fixed effects, f_c. Moreover, I always use year fixed effects to account for possible trends in the data, especially considering that for certain specification the time span can be very large.

Depending on the different types of dependent variables I use different econometric techniques to estimate equation (35). In the case of continuous or intensity variables, I use OLS panel data regression with country fixed effects. If the variables are count variables, I use a Poisson regression with conditional fixed effects. In the case of the Poisson, and in general other techniques using maximum likelihood estimations, given the high number of interactions, the use of year fixed effect paired with robust standard errors can prevent convergence. In these cases, I prefer keeping the years fixed effect rather than the robust standard errors for two reason. In the OLS regressions the years fixed effects are extremely significant and greatly influence the significance of the estimates (coefficients that are extremely significant without years fixed effects can become insignificant or in general less significant when adding years fixed effects); this suggest that controlling for time trends is important. Moreover, I compared the results from Poisson regressions using years fixed effects or robust standard errors and using year fixed effect the significance of the margins is lower, therefore, using years fixed effects does not bias the results in a direction favorable to acceptance of the hypotheses.

3.2.3 – Analysis of potential issues of the empirical analysis

The main concern in this type of analysis is reverse causality: political conflict affecting tertiary education[60]. However, higher education is measured as a stock accumulated over several years even when focusing only on young people, therefore political violence today should not affect education today and, except for very long civil

[60] For example Bertoni et al. (2018) describes the negative influence of the Boko haram conflict on education in Nigeria

conflict, it should not affect future educational levels as well. Unfortunately, expectations on future political conflict might affect school enrolment decision and government policies today and therefore the future educational level of the population. But this would negatively affect the size of the coefficient of tertiary education in the panel regression; since I expect to find a positive effect of education on political violence, if I find one, I can consider it as a lower bound (gross of the opposite effect of political violence on education). I decided not to directly tackle this issue with an instrumental variable approach because finding a satisfactory instrument for education against political violence is extremely difficult since most variables that affect education affect political conflict as well.

The literature on political violence suggests that the effect of some variables on political violence may not be monotonic (for example Abadie (2006) on the effect of political freedom on terrorism), for this reason I include the squared values of some variables as well.

Omitted variables bias is another possible issue and two possible sources are the lack of suitable measures of unemployment and of inequality. Data on unemployment are few and temporally discontinuous and this would tremendously reduce the number of observations. Moreover, in many countries it is really difficult to tell unemployed people from subsistence farmers and informal workers. In a similar way, data on inequality are very scarce and using them would have greatly reduced the size of the dataset.

3.3 – Description of the Data

The main independent variable is the number of young people, 15 to 29 years of age, with at least partial tertiary education[61] presented in

[61] The dataset provides measures of exposure and completion for each level of education. I use exposure (i.e. enrollment without requiring graduation) because the type of human capital associated with political activity is developed during tertiary education, and actually graduating has a marginal effect on the accumulation of

Barro, R. and Lee, J-W (2013). From the same dataset I also use the number of tertiary educated people older than 25 in order to address potential issues with endogeneity. The main independent variable is the share of people with tertiary education, in order to avoid biases due to different sizes in population. The main quality of the Barro-Lee dataset is its geographical and temporal span since it covers 146 countries from 1950 (or the year of independence) till 2010. In order to exploit this large panel of countries and years, I decided to calculate my dependent variables from those datasets with the largest coverage possible. Specifically, I use data on civil conflict from the INSCR dataset *Major Events of Political Violence (MEPV)* and data on terrorist organizations from the *Extended Data on Terrorist Groups (EDTG)*[62]. The MEPV dataset covers all the countries and years in the Barro-Lee dataset with few exceptions due to the different coding for some countries (mostly because Barro-Lee keeps the list of countries constant over time, so Germany is always Germany even before 1990, while MEPV adjusts the list according to historical events, Germany East and Germany West before 1990 and then Germany). The EDTG dataset covers 760 terrorist groups between 1970 and 20116 operating in the majority of the countries of the world.

The data most commonly used in the literature on civil conflict come from the Uppsala Conflict Data Program. However, I decided to use the data from the INSCR because they provide more information about each event, in particular, the intensity variable uses a ten-level scale against the 2 levels used in the UCDP and there is information about political violence in the region and among the neighbors of each country. These data allow for a better test of the model, where human capital is associated more to intensity and duration rather than onset. In the case of terrorism, the main dataset used in the literature is the

human capital. This distinction will be important when performing robustness checks with different cohorts.

[62] Hou, Dongfang, Khusrav Gaibulloev, and Todd Sandler. "Introducing Extended Data on Terrorist Groups (EDTG), 1970 to 2016." Journal of Conflict Resolution, (June 2019).

Global Terrorism Database. However, this database focuses on act of terrorism, while the analysis presented in this work focuses on the creation of terrorist groups and organizations. Under this respect, the EDTG dataset provides more fitting data since it focuses mostly on terrorist groups, describing ideology, organization, involvement with local communities and other characteristics that I consider more useful in investigating the role of human capital,

From the MEPV dataset I generate new variables on beginning, duration, escalation and continuation of civil conflicts to test not only the intensity of this type of events but also their occurrence and duration. Starting from the EDTG dataset I create a country-year panel dataset that includes information about the number of groups operating in the country, their ideologies, structure, mortality, international ties, and other specific characteristics.

The analysis is complemented with the use of covariates based on the dynamics described in the theoretical model. The variables behind Step 1 are internalized in the dataset from Barro-Lee, so no control is needed for this step. Step 2 explains how the size and expansion rate of the economy, and in particular of the advanced sector, determines the level of underemployed educated agents. For this reason, I use data from the World Penn Tables dataset[63] on levels and growth rates of both real GDP and real GDP per capita at constant purchasing power to proxy the size of the economy and its dynamics, employment share of the population to proxy for the size of the formal economy (this is a good proxy when working with developing economies where a large share of the population is employed in traditional economic activities) and the capital stock at constant national price to proxy the size of the advanced sector.

[63] Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table" American Economic Review, 105(10), 3150-3182, available for download at www.ggdc.net/pwt

Step 3 is more at the microlevel and I do not have data to proxy the relevance of grievance in the socio-cultural traditions of different countries or average psychological characteristics of different populations. However, since these factors play an important role in every analysis of societal dynamics, I assume that they are country specific but time invariant and therefore their effect is absorbed by the country fixed effect that I use in all the regressions[64].

To account for the political institutions that are fundamental in Step 4, I use variables from the Polity IV Project on level of democracy and autocracy in a country and a combination of different variables to calculate indicators on the competitiveness and the openness of the elections. I also use the variable indicating failed states: those states where the authority of the central government ceased to exist.

From the MEPV dataset I also use variables on average and absolute levels of regional political violence as well as indicators of interstate wars with neighbors. I also use data from the World Bank on urbanization levels to proxy opportunity costs, more concentrated population should reduce the costs of coordination and recruitment. These variables proxy the factors that play a role in Step 5. State capacity is another important variable frequently used in the literature on civil conflict and political violence, for example in Faeron and Laitin (2003), since the ability of the state to tax and mobilize resources was seen as a negative incentive for civil conflict. However, more recent literature, as in Thies (2010), shows how the causality relationship may be reversed, with civil conflict affecting state capacity. In this paper I use the share of the GDP consumed by the government calculated from the World Penn Tables to account for state resources and capacity.

[64] Since some of the data cover a 50-year time span, some of these characteristics might change, especially those concerning natural resources and fractionalization. Therefore, further research with data on these variables could be interesting.

Data from the World Bank on population and data from Barro-Lee on the size of the working force and the level of uneducated people provide further control related to Step 6.

Two other important variables in the literature are natural resources and inequality. High levels of these variables increase the probability of civil war due to the effect of greed on potential insurgents according to Collier and Hoeffler (1998). However, Faeron and Laitin (2003) find that indicators such as religious and ethnic diversity, lack of democracy, and economic inequality do not play an important role in determining the causes of civil war. The same is true for natural resources with the exception of oil[65]. However, in Faeron (2005) is further stressed the point that oil rents can increase the prize of the state but at the same time provide resources to the state to counter violent insurgency and therefore can have a mixed effect. For this reason and for lack of sufficient data on inequality[66], I decided not to use data on inequality and use panel data fixed effect to take into consideration state specific natural resources endowments as well as geographical features.

3.4 – Results of the Empirical Analysis

This section is divided in three parts: main results from the analysis of large-scale organized political violence, main results from the analysis of small-scale organized political violence, and robustness checks on both types of results.

3.4.1 – Large-scale organized political violence

The intensity of civil conflict is described using an ordered ten level scale. For this reason, using an ordered logit estimator would be the most appropriate approach. Unfortunately, to my knowledge, there is

[65] van der Ploeg (2011) analyzes the ambiguous influence of natural resources on different economic and political indicators

[66] For example, the World Income Inequality Database (WIID4) covers around 30% of the dataset used in the analysis.

not any theoretical approach to ordered logit process that supports fixed effects. Only recently, Pforr (2014), an estimator for multinomial logit with fixed effects has been developed for STATA. Using this estimator would not take into account the ordered relationship of the variable. A the same time, the codebook for the MEPV dataset states that: "A ten-point scale is used for assessing the magnitude of warfare events and their impact on societal-systems. The scale values are considered to be comparable across time, place, and typologies of warfare (e.g., interstate warfare, wars of independence, civil warfare, ethnic warfare, genocide). The scale is roughly logistical and the orders of magnitude can be considered a ratio scale for analytic purposes.". For this reason, a Tobit model could be used; however, in this case as well, there are no estimators of Tobit models with fixed effects. Given the importance of fixed effects in the literature on civil conflict, using a linear regression model with fixed effects seems a better approach than using another method with random effects.

The first part of the analysis is a four-step additive process that takes into consideration the main steps described in the model. Table 15 presents the average margins of human capital at each step, the covariates used in each step, and statistics about the regressions ran before calculating the marginal effects. All the variables in each step are interacted with human capital and among themselves as described in the previous section. Column (1) reports the coefficient of regressing human capital on intensity of civil conflict, with year fixed effects and no other covariate. The coefficient is negative and highly insignificant, supporting the idea that human capital, per se, does not affect the intensity of large-scale political violence. Column (2) presents the average marginal effect of human capital after Step 2, when covariates proxying the size of the economy and, in particular, the size of the advanced sector, are added. The coefficient is now large and positive and significant at the 5% confidence level. The coefficient becomes even larger and more significant in the specification reported in column (3) after Step 4 is added. At this stage, covariates are added to control for openness of the political system and other characteristics

that affect the capacity of the traditional political sphere to absorb human capital. Moreover, the level of urbanization is used to proxy for easiness of association: if more people live close to each other in cities it is easier to organize and coordinate political opposition. In column (5) the average marginal effect of human capital is reported after adding controls for Step 5: state capacity, proxying for repressive capacity, and regional instability[67], proxying cost to access weapons.

Table 15: Average Margins of Educated Youth for each different stage

	(1) Base	(2) STEP_2	(3) STEP_4	(4) STEP_5	(5) STEP_6
Tertiary Educated Youths	-0.551	6.744**	6.899**	6.944**	7.218**
	(0.744)	(3.305)	(2.872)	(2.915)	(2.929)
List of covariates for each specification		GDP (squared)	""	""	""
		Advanced Sector	""	""	""
			Electoral Openness	""	""
			Government Type	""	""
			Urbanization	""	""
				Government Size	""
				Regional Instability	""
					Low Educated Youths
Observations	6881	5865	5737	5736	5736
Groups	135	130	129	129	129
R2-within	0.052	0.086	0.119	0.133	0.135
R2-between	0.003	0.106	0.109	0.140	0.150
R2-overall	0.024	0.103	0.109	0.138	0.139

* p<0.1, ** p<0.05, *** p<0.01

Note: Standard Error in parentheses. Year fixed effect were used for every specification

[67] Controlling for other variables like regional episodes of political violence and intestate war does not significantly affect the results.

The coefficient is positive, larger than in column (4) and significant at the 5% confidence level. Finally, column (6) reports the result of the complete model, after accounting for the size of potential supporters. The coefficient is even larger than in the previous specifications and it is significant at the 5% level.

The overall average marginal effect provides a synthetic indicator of the direction and overall significance of the variable of interest. However, looking at the average marginal effect at significant levels of the main covariates allows to better understand the dynamics represented by the interactions and to test some of the assumptions of the model.

In Step 2 of the model it is argued that a smaller economy, and, in particular, a smaller advanced sector lead to higher levels of human capital and higher levels of underemployment. Figure 16 presents the average marginal effects of tertiary education on the intensity of civil conflict as a function of the capital intensity of the economy, a proxy for the relative size of the advanced sector, keeping the GDP per capita, a proxy for the size of the economy, fixed at different levels: low (top left graph), medium-low (top right graph), medium-high (bottom left graph), and high (bottom right graph).

When the economy is relatively large (bottom two graphs) the assumption of the model is clearly met: a smaller advanced sector determines a higher and more significant influence of human capital on civil conflict. Interestingly, the larger economy seems to suffer less from this unbalance; maybe because larger economies have a developed tertiary sector that absorbs human capital without being as capital intensive as the manufacturing one. When the size of the economy is smaller (top two graphs) the relationship is inverted: a larger advanced sector increases the size of the average marginal effect of human capital.

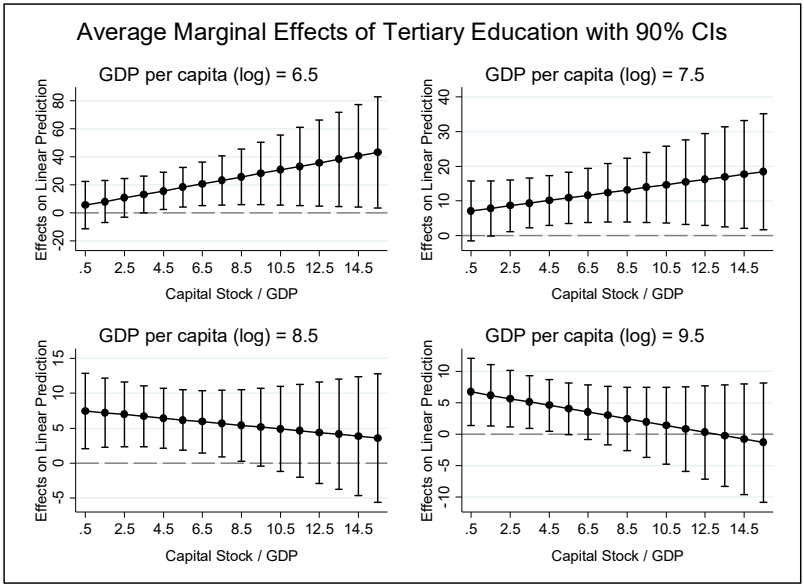

Figure 16: AME of human capital on conflict at significant values of economic variables

It is interesting to notice how the average marginal effect is more precise (i.e. smaller confidence intervals) for intermediate sizes of the advanced sector. This inverted relationship can be due to several reasons. First of all, in less developed economies with a large extractive sector the capital stock ratio might not be a good proxy for the size of the advanced sector, since most of the capital would be that invested in the mining and extractive industry that absorbs low levels of human capital. On the other hand, poorer countries, on average, provide less opportunities for formal tertiary education. However, a larger advanced sector can become an alternative source of production of, political, human capital through work associations and trade unions (for example Lech Walesa in Poland and Tom Mboya in Kenya both started as trade unionists before becoming politicians). If this were the case, the influence of the relatively small amount of

formal human capital could be amplified when the amount of informal human capital is larger. The two causes described above, are mutually inclusive especially when considering that in many less developed economies the main trade unions are those linked to the mining sector and the majority of strikes and civil unrest happen at extractive sites (for example in Zambia).

In step 4 the influence of human capital is mediated by the openness of the electoral system, that measures how easy it is for a newcomer to join the traditional political sphere, the type of political institutions, that measure the openness of the system and also the intensity of repression of dissent, and urbanization, that, clearly imperfectly, measures the difficulty of association and coordination for like-minded individuals.

Table 16: Average Marginal Effects of Tertiary Education at different levels of Electoral Openness

	dy/dx	Std. Err.	z	P>z	[95% Conf. Interval]	
Electoral Openness =						
0 (close)	7.250**	3.065	2.37	0.018	1.242	13.257
1 (partially open)	-1.147	16.476	-0.07	0.945	-33.439	31.145
2 (open	20.571	40.882	0.50	0.615	-59.557	100.698

The average marginal effect of human capital at the three different levels of electoral openness when keeping all the other variables at their mean values is significant only when the electoral system is close, as it is shown in Table 16.

Figure 17 presents the average marginal effect of human capital for different types of government, measured on the Polity2 scale, at the three levels of electoral openness. The Polity2 scale goes from "strongly autocratic" (-10) to "strongly democratic" (+10)[68]. The

[68] I refer the reader to the Dataset Users' Manual for further details about the interpretation of this variable. Marshall, M. G., Gurr, T. R., and Jaggers, K. "Political Regime Characteristics and Transitions, 1800-2017", Dataset Users' Manual, POLITY IV PROJECT, Center for Systemic Peace, 2018. www.systemicpeace.org

graphs do not report all the values of the Polity2 indicator, but only those that are observed in the data. By construction, only certain combinations of the Openness indicator and the Polity2 indicator are feasible. For example, a fully democratic country (Polity2=10) can only have a value of Openness equal to 2. On the contrary, autocratic countries cannot have a fully open electoral system.

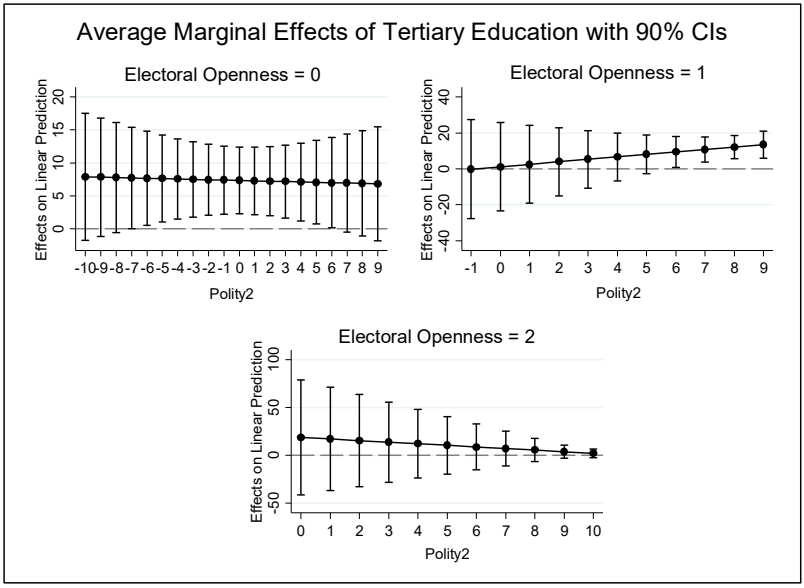

Figure 17: AME of human capital on conflict at significant values of political variables

When electoral openness is greatest, the average marginal effect is decreasing in democracy but also the confidence interval is narrowing. Therefore, it is not possible to determine whether there is in fact a negative relationship or that the effect is more consistently negligible for more democratic countries. When considering systems with partially open electoral systems (top right graph), there is a positive relationship between democracy and the average marginal effect of human capital. According to the model, this can be the result

from the fact that in more autocratic regimes repression of political dissent is harsher thus increasing the cost of engaging in political opposition. Finally, in the case of close electoral systems (top left graph), the average marginal effect has a similar magnitude independently of the type of government. However, it is significant only for intermediate values of the Polity2 scale. This suggests that human capital has a consistent positive effect only in countries with political regimes neither strongly autocratic nor fully democratic. This can be determined by a quadratic effect of government type on the opportunity cost of engaging in political opposition: in more autocratic regimes the potential cost of political opposition can be extremely high, at the same time, strongly democratic regimes usually have institutions that are more resilient to external opposition and more inclusive, even when the electoral process is less competitive, therefore the potential gains from external political opposition are lower. On the contrary, in intermediate regimes, repression is less severe than in autocratic regimes and at the same time external political opposition can be more profitable, especially when the electoral process is close.

Step 5 considers the allocative choices of human capital between peaceful and violent external political opposition taking into consideration the capacity of the state to confront political violence and the influence on the cost of violence by political instability and conflict in neighboring countries. In the empirical analysis, I used the government consumption as a share of GDP to proxy for state capacity and civil unrest in neighboring countries to measure political instability in each country's region. Figure 18 presents the average marginal effect of human capital for different levels of state capacity under four possible levels of regional instability.

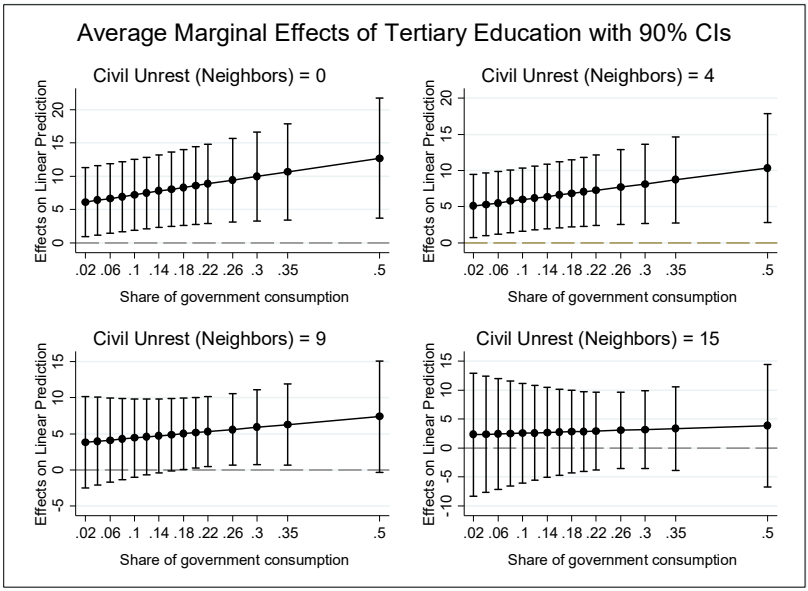

Figure 18: AME of human capital on conflict at significant values of regional stability and government capacity

Interestingly, the average marginal effect is increasing in state capacity, independently of the level of regional instability. According to the model, the relationship should be the opposite since higher state capacity means better capacity to deal with violence, thus increasing the cost of engaging in political violence with respect to peaceful political opposition. However, this relationship could also capture the influence of human capital on conflict intensity during civil conflict. If more human capital means better organized and coordinated insurgency, once civil violence starts, higher state capacity means that the conflict will be more violent, because the prize is higher (controlling the government means controlling more resources if the state capacity is larger), but also the resources available to the faction in power to fight the opposition are larger. Regional instability

reduces the magnitude of the average marginal effect, this can be seen clearly in Table 17.

Table 17: Average Marginal Effects of Tertiary Education at different levels of Civil Unrest (Neighbors)

	dy/dx	Std. Err.	z	P>z	[95% Conf. Interval]	
Civil Unrest (Neighbors)=						
0	8.350**	3.461	2.41	0.016	1.567	15.134
4	6.873**	2.835	2.42	0.015	1.317	12.429
9	5.027*	2.990	1.68	0.093	-.834	10.888
15	2.811	4.311	0.65	0.514	-5.637	11.260

The reason behind this interaction effect can be similar to the one described in the case of developed advanced sector in poorer economies. In a situation of high regional instability, the importance of traditional education in supplying the human capital to civil conflict is reduced by the fact that knowledge of civil conflict skills and tactics can be learned from neighboring countries or even directly imported in the form of returning fighters.

Finally, in Step 6, a measure of potential support for large-scale political violence is used in order to address the choice between large scale and small-scale violent political opposition. Ideally, I could follow the literature and use a measure of unemployed low educated youths to proxy the potential support for political violence. However, I could not find such a measure that could cover a large enough number of countries in my dataset. For this reason, I used the measures, provided in Barro-Lee, of young people with an educational level equal between "no schooling" and "primary school completed". This measure, as shown in Figure 19, influence the average marginal effect making it larger as the measure of low educated agents increases. This is the direction expected from the model, but the difference between the average marginal effect at the minimum and the maximum is extremely small and not statistically significant.

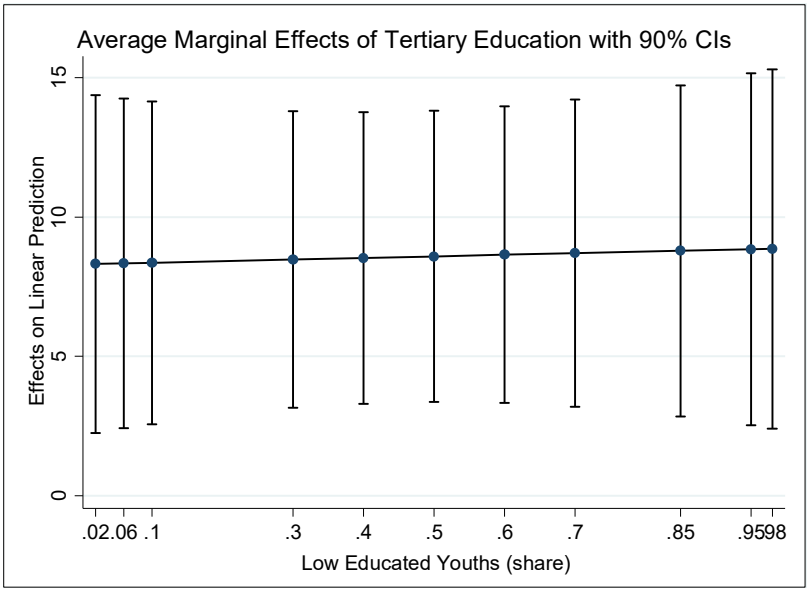

Figure 19: AME of human capital on conflict at significant levels of potential support for mass political opposition

In order to expand the analysis of large scale violent political opposition, I used the same specification used in column (5) of Table 15 to estimate the impact of human capital on the probability of a civil conflict to start, continue, or escalate. However, the conditional fixed effect logit does not converge due to the high number of interactions. Using a simpler model does not provide significant results, but this does not mean that there is not any effect since, as shown in Table 15, the sign and the significance of the effect of human capital is mediated by the interaction with different variables. I also transformed the continuous variables into categorical ones (i.e. low income, middle income, high income countries), but the regression does not converge in this case either. I also tried without years fixed effects and robust standard errors, but it still does not converge with the full specification.

3.4.2 – Small-scale organized political violence

In this second part of the empirical analysis I present the results of regressing measures of small-scale organized political violence, namely the presence and intensity of terrorist groups, on the same specification used in Table 15. When the dependent variable is a count, I use a conditional fixed effect Poisson regression to calculate the results with year fixed effects.

Table 18 presents the result of running the same regression on counts of different types of terrorist groups operating in the country. In column (1) the dependent variable is number of groups operating in the country: the average marginal effect of human capital is not significant at the 10% level. However, this is due to the fact that some types of terrorist groups use different ideologies to motivate and activate their base and therefore might not need traditional human capital. When we look at political motivate groups, as it is shown in column (2), the average marginal effect is positive, large and significant at the 1% level. Comparing these results to those for terrorist groups motivated by religious or ethnic based beliefs, displayed in column (3), the difference is stark: the average marginal effect is not significant, it is negative and relatively small. Column (4) provides a robustness check for political groups: in this case the dependent variable counts only those political groups whose main base of action is in the country. The average marginal effect is still positive, significant at the 1% level, and relatively large. The last two columns present the results of running regressions dividing terrorist groups along a different line: whether they provide services to the local community (column (5)) or not (column (6)). In this case as well, the average marginal effect of education is positive and highly significant for those groups that employ more human capital (in this case to organize and provide services) while it is not significant for those groups that do not provide them. It is important to highlight the fact that political groups and groups that provide services are positively correlated but the correlation is less than 0.6, thus

suggesting that these two measures actually capture different types of groups.

Table 18: Average Margins of Tertiary Educated Youth on terrorist groups (different types)

Type of terror groups:	(1) All	(2) Political	(3) Nationalist or Religious	(4) Political^	(5) Services to Community	(6) No Services to Community
Tertiary Educated Youths	1.127	6.449***	-0.592	5.409***	3.477***	0.076
	(0.755)	(1.508)	(0.922)	(1.629)	(0.905)	(1.442)
Observations	3954	2909	2968	2717	3422	3301
Groups	85	60	65	56	73	69

Notes: Standard Error in parentheses
^ main base only
* p<0.1, ** p<0.05, *** p<0.01

In addition to the number of different types of groups in a country, further analyses can be run using measures to proxy the intensity of the terrorist activities of these groups. Table 19 presents the results from OLS panel data regressions with country and year fixed effects using some of these measures. Column (1) presents the results from using the total number of casualties attributed to terrorist groups operating in the country. The average marginal effect is positive and significant at the 5% confidence level. A very similar result is presented in column (2) when using only the number of casualties caused by terrorist attacks perpetrated by groups whose principal base is in the country. In column (3) the duration in years since formation of every group based in the country is used as dependent variable: the coefficient is positive and significant. Since the intensity of terrorist activities may be correlated to the number of groups operating in the country, in column (4) and (5) the average number of casualties and the average duration, respectively, are used as dependent variables. The coefficients are still positive and significant, even if at the 10% confidence level for the average number of

casualties. I use a linear regression method instead of a Poisson method for two reasons: casualties can happen, and indeed happen, in the same instant and the probability of a casualty happening affects the probability of another casualty happening, thus invalidating the two fundamental assumptions of a Poisson process.

Table 19: Average Margins of Tertiary Educated Youth for xtreg of intensity of terrorist groups (different measures)

	(1) Casualties (all groups)	(2) Casualties (main only)	(3) Duration main	(4) Casualties Average	(5) Duration Average
Tertiary Educated Youths	931.060**	995.807**	241.783**	393.784*	31.258**
	(468.578)	(439.195)	(112.324)	(229.751)	(13.741)
Observations	5736	5736	5736	5729	5736
Groups	129	129	129	129	129
R2-within	0.050	0.044	0.270	0.044	0.364
R2-between	0.002	0.039	0.003	0.001	0.002
R2-overall	0.041	0.037	0.057	0.036	0.148

Notes: Standard Error in parentheses
* p<0.1, ** p<0.05, *** p<0.01

Even though the specification used to run the regressions is the same in Table 18 and Table 19, the number of observations and groups differs because when using a Poisson model with fixed effect the groups with the count equal to zero for every observation are dropped, while they are used in the standard OLS panel regression.

In the same way I did for large scale political violence, I present below an analysis of the average marginal effects of human capital at different values of different covariates to better observe the interactions at different steps. All the margins are calculated from the regressions whose results are presented in Table 18 column (2).

Figure 20 presents the interaction from Step 2.

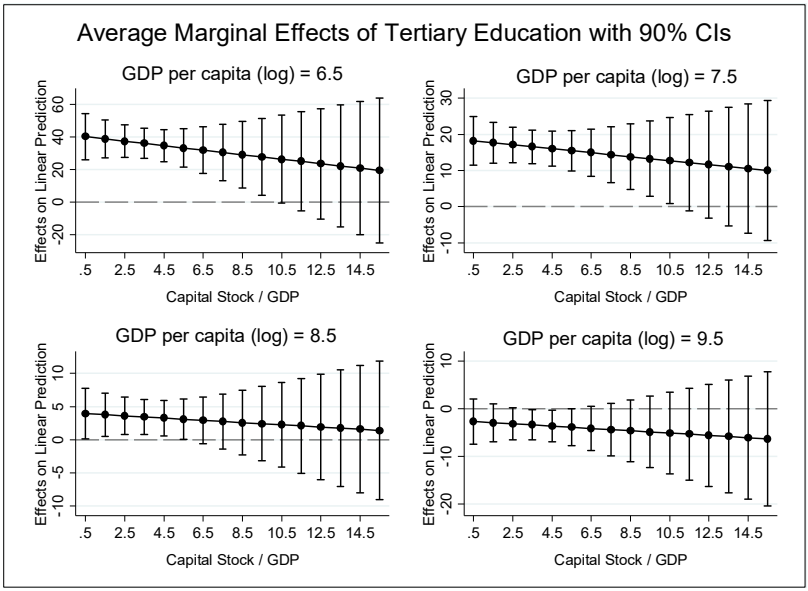

Figure 20: AME of human capital on terrorism at significant values of economic variables

A smaller size of the advanced sector is associated with higher average marginal effects. These effects are larger in relatively smaller economies. In richer economies, the margins are actually negative but significantly different from zero in a small interval. This type of relationship is exactly what the model predicts, with relatively smaller economies and smaller advanced sectors absorbing less human capital thus increasing the amount of human capital potentially available for political opposition.

Moving to Step 4, Table 20 presents the average marginal effects of human capital at different levels of electoral openness. The average marginal effects are always significant but, following the predictions of the model, they are positive for close and partially close electoral systems and it is negative for open electoral systems. This supports the theory that a more inclusive and welcoming political system

reduces the incentives for political opposition and increases the capacity of the system to absorb excessive human capital.

Table 20: Average Marginal Effects of Tertiary Education at different levels of Electoral Openness

	dy/dx	Std. Err.	z	P>z	[95% Conf. Interval]	
Electoral Openness =						
0 (close)	6.450***	2.097	3.08	0.002	2.340	10.560
1 (partially open)	10.659**	4.882	2.18	0.029	1.091	20.228
2 (open)	-251.623**	127.223	-1.98	0.048	-500.976	-2.271

The fact that the coefficient is significantly larger for partially open systems than for close systems indicates that a close electoral system might proxy for something else as well. This is shown more clearly in Figure 21 where the relationship between average marginal effects and type of governments is shown.

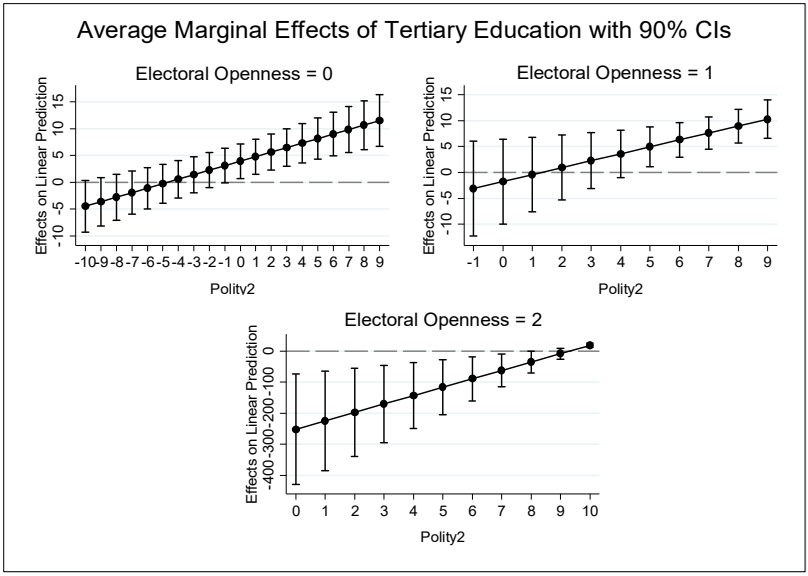

Figure 21: AME of human capital on terrorism at significant values of political variables

From the graphs, it is clear that autocratic types of government reduce the influence of human capital, independently of the type of electoral system. However, given the strong correlation between government type and electoral system, part of this effect could have been caught in the results from Table 20. These results support the hypotheses of the model: more democratic regime reduces the cost of political opposition but they also reduce the cost of operating inside the political system when the electoral system is open. Therefore, small scale political violence is more affected by human capital in those countries that are more democratic but at the same time with a harder to join political elite.

The interactions from Step 5 are presented in Table 21 and Figure 22 below. Table 21 reports the influence of civil unrest among neighbors on the average marginal effect of human capital.

Table 21: Average Marginal Effects of Tertiary Education at different levels of Civil Unrest (Neighbors)

	dy/dx	Std. Err.	z	P>z	[95% Conf. Interval]	
Civil Unrest (Neighbors)=						
0	7.852***	1.731	4.54	0.000	4.460	11.244
4	6.143***	1.462	4.20	0.000	3.278	9.008
9	4.006***	1.489	2.69	0.007	1.089	6.924
15	1.443	2.000	0.72	0.471	-2.478	5.363

As in the case for large scale events, more unrest reduces the marginal effects of human capital, that is always positive and significant at the 1% level, except for extreme levels of civil unrest when it is not significant anymore. This result can be explained in the same way as in the case of large-scale political events. The results are very similar to the case of large-scale events also when considering different levels of government capacity.

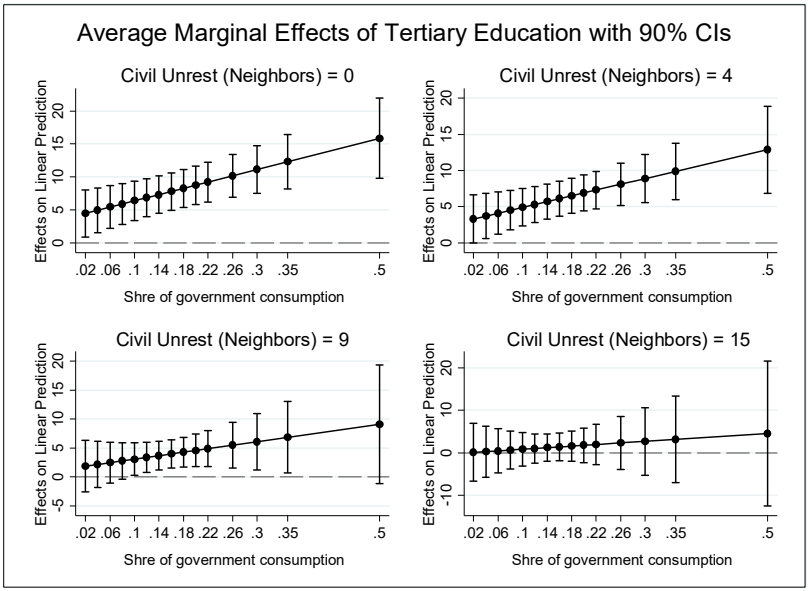

Figure 22: AME of human capital on terrorism at significant values of regional stability and government capacity

Larger governments seem to amplify the average marginal effect of human capital, especially in extreme cases (i.e. the government consumes half of the national product). This amplification becomes smaller the higher is the level of civil unrest in the region. The model suggests that higher government capacity should increase the level of repression thus reducing the number of people choosing political violence as a form of political opposition.

Without a counterfactual, observing the influence of increasing size of the government on peaceful political opposition, is difficult to test this hypothesis. At the same time, it is important to highlight how terrorism is just one of the possible forms of violent political protest but one that requires the smallest number of supporters and it is most difficult to detect by governments. Therefore, it might be that the amplifying effect of the government size on the average marginal

effects of human capital is due to the fact that when the government is particularly strong and capable terrorism is the most efficient way of carrying out violent political opposition.

Similarly to the case of large-scale events, the hypothesis presented in Step 6 of the model is not supported by the empirical evidence. Figure 23 shows how the influence of higher levels of the measure proxying the potential number of supporters goes exactly in the opposite direction of what expected: higher numbers of potential supporters increase the average marginal effect of human capital on the number of terrorist groups in the country.

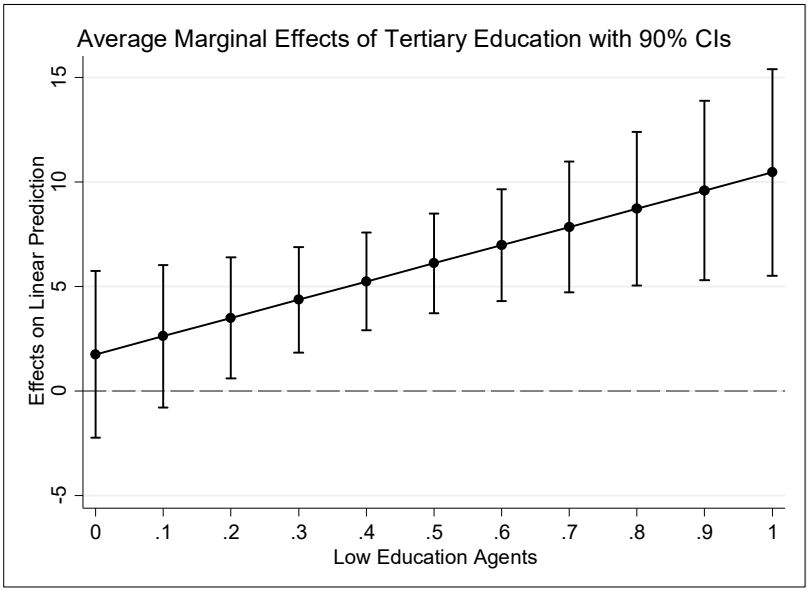

Figure 23: AME of human capital on terrorism at significant levels of potential support for mass political opposition

As in the previous case, while the hypothesis could be wrong, it is also important to remember how this measure of potential supporters should be improved by taking into consideration only the unemployed part of the low educated agents.

3.4.3 - Robustness checks

The main concern with the analysis of large-scale events is that of endogeneity, since the share of educated youths in the country can be easily affected by political unrest. As I described previously in this paper, the marginal effect of human capital on political violence, being positive, can be regarded as a lower bound of the effect. However, in Table 22, I ran the same regression as in Table 15 using the share of tertiary educated people 25 and older, meaning all those people that, most likely, already completed their studies.

Table 22: Average Margins of Tertiary Educated People (25 and older)

	(1)	(2)	(3)	(4)	(5)
	Base	STEP_2	STEP_4	STEP_5	STEP_6
Tertiary Educated Youths	-0.545	6.347	7.792*	7.527*	7.327*
	(0.936)	(4.108)	(4.324)	(4.386)	(4.386)
List of covariates for each specification		GDP (squared)	""	""	""
		Advanced Sector	""	""	""
			Electoral Openness	""	""
			Government Type	""	""
			Urbanization	""	""
				Government Size	""
				Regional Instability	""
					Low Educated Youths
Observations	6881	5865	5737	5736	5736
Groups	135	130	129	129	129
R2-within	0.052	0.077	0.114	0.128	0.129
R2-between	0.002	0.069	0.079	0.102	0.107
R2-overall	0.025	0.080	0.90	0.115	0.114

Notes: Standard Error in parentheses. Year fixed effect were used for every specification
* p<0.1, ** p<0.05, *** p<0.01

Interestingly, when using the share of tertiary educated people 25 years and older to run the same regression as in Table 18, using the number of different types of terrorist groups as dependent variable, the average marginal effects are strengthened, as it is shown in Table 23 below, and all the coefficients are now positive and highly significant. The difference between the different types can still be seen in the different magnitude of the coefficient or the significance level, but less starkly than in the original specification. Using data for the 30 to 40 year old cohort and 40 to 50 year old cohort present similar results.

Table 23: Average Margins of Tertiary Educated People (25 and older) on terrorist groups

Type of terror groups:	(1) All	(2) Political	(3) Nationalist or Religious	(4) Political^	(5) Services to Community	(6) No Services to Community
Tertiary Educated Youths	6.981***	16.381***	4.413***	11.192***	8.379***	6.118**
	(1.242)	(2.401)	(1.588)	(2.625)	(1.485)	(2.422)
Observations	3954	2909	2968	2717	3422	3301
Groups	85	60	65	56	73	69

Notes: Standard Error in parentheses
^ Main base in the cuntry only
* p<0.1, ** p<0.05, *** p<0.01

Another issue with the main explanatory variable is that the measure is not precise since the authors of the dataset estimated many observations based on the data available that, for some countries only cover one year over the all sample. For this reason, Table 24 presents the results from running the same regression as in Table 18 but using only those countries with at least two sources in the Barro-Lee dataset. The results clearly confirm the findings from Table 18, with the coefficients with the same sign and high levels of significance.

Table 24: Average Margins of Tertiary Educated youths on terrorist groups using only the subset with multiple basic observations for education

Type of terror groups:	(1) All	(2) Political	(3) Nationalist or Religious	(4) Political^	(5) Services to Community	(6) No Services to Community
Tertiary Educated Youths	0.591	5.403***	-1.543*	5.671***	2.844***	1.127
	(0.701)	(1.452)	(0.878)	(1.620)	(0.857)	(1.412)
Observations	3386	2675	2482	2583	3004	2957
Groups	72	55	54	53	63	62

Notes: Standard Error in parentheses
^ Main base in the country only
* p<0.1, ** p<0.05, *** p<0.01

The same exercise was done with the regression in Table 19 without lack of significance.

Another possible concern is that some variables proxying the factors identified in the model are not appropriate or suffer from measurement errors. In the case of GDP per capita I ran the same analysis on the average marginal effects of human capital performed for both large- and small-scale events using the GDP per capita data provided by the World Bank. These two measures are similar, but not identical, with a correlation of 0.96, but, more interestingly, almost 15% of the observations are available only in one of the two datasets. This means that the regressions are ran on similar but not identical datasets, thus controlling for possible selection biases. Table 25 shows the average marginal effect of human capital on both large-scale events and small-scale events when using the World Bank measure of GDP per capita. These effects are positive and significant at the 5% and 1% level respectively.

I also performed the analysis of the marginal effects at different levels of GDP per capita without noticing major difference or loss of significance.

Table 25: Average Marginal Effects of Tertiary Education when using World Bank GDP per capita instead of World Penn Tables

	dy/dx	Std. Err.	z	P>z	[95% Conf. Interval]	
Average Marginal Effect on Civil Conflict	9.887***	3.600	2.75	0.006	2.831	16.943
Average Marginal Effect on Political terrorist groups	6.324***	1.713	3.69	0.000	2.967	9.682

A more problematic variable could be the measure of electoral openness calculated from the Polity IV dataset. This is a very specific variable that describe the openness of the selection process for the executive in the country. While it describes properly what the model indicates as relevant at step 4, it has only three values and it might miss some other characteristics of the political process relevant to our analysis. For this reason, I used the measure of Political Rights from the Freedom House project that measures a broader aspect of the political system and is also finer, since it goes from 1 (perfectly free) to 7 (completely unfree). Table 26 presents the average marginal effects of human capital on large scale events at different levels of political freedom. The coefficients are all positive, but contrary to the case of electoral openness they are significant for high and medium levels of freedom, but not for less free societies. This shows that the two variables are measuring different aspects of the factor described in step 4 that determine the allocation of human capital to political opposition.

Table 26: Average Marginal Effects of Tertiary Education on conflict at different levels of Political Rights (FH)

	dy/dx	Std. Err.	z	P>z	[95% Conf. Interval]	
Political Rights						
1 (more free)	16.888**	6.882	2.45	0.014	3.399	30.377
2	14.325**	5.747	2.49	0.013	3.060	25.589
3	11.761**	4.689	2.51	0.012	2.572	20.951
4	9.198**	3.772	2.44	0.015	1.806	16.590
5	6.6341**	3.123	2.12	0.034	.5132	12.756
6	4.071	2.928	1.39	0.164	-1.667	9.8091
7 (less free)	1.508	3.267	0.46	0.645	-4.896	7.9116

The analysis of the margins at different levels of political freedom for all the different types of government displayed in Figure 24 returns results that are actually more in line with the prediction of the model.

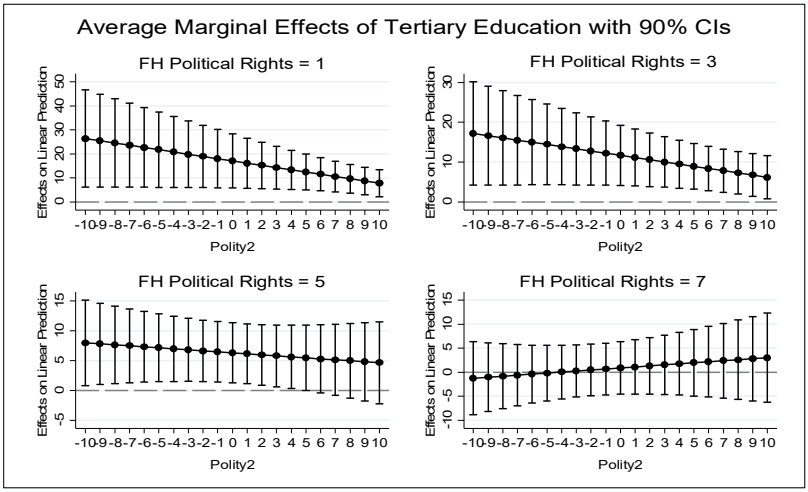

Figure 24: AME of human capital on conflict using a different measure of political openness

The average marginal effects of human capital are decreasing in the level of democracy, similar to what was described in the original analysis for the highest levels of electoral openness, but in this specification they are significant. The relationship remains similar, but with smaller marginal effects, for intermediate levels of political rights. Finally, for not politically free society, the relationship is reverse, with the average marginal effects increasing with the level of democracy. This means that when joining the political system is impossible, in less autocratic societies, where the cost of political opposition is lower, will witness higher level of it.

Table 27 presents the average marginal effects of human capital on small scale events at different levels of political freedom. The average marginal effects are all positive and significant and are decreasing with the level of freedom. This contradicts the results from the original analysis where the effects were positive and significant for close electoral systems and negative and significant for completely open electoral systems.

Table 27: Average Marginal Effects of Tertiary Education on terrorism at different levels of Political Rights (FH)

	dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
Political Rights (Freedom House) =						
1 (more free)	12.285***	3.365	3.65	0.000	5.691	18.880
2	11.338***	2.820	4.02	0.000	5.811	16.865
3	10.391***	2.358	4.41	0.000	5.769	15.013
4	9.444***	2.036	4.64	0.000	5.453	13.434
5	8.496***	1.925	4.41	0.000	4.723	12.270
6	7.549***	2.060	3.66	0.000	3.512	11.586
7 (less free)	6.602***	2.399	2.75	0.006	1.899	11.304

However, when looking at the interaction with different types of government, reported in Figure 25, the overall effect is similar to that described in the original analysis.

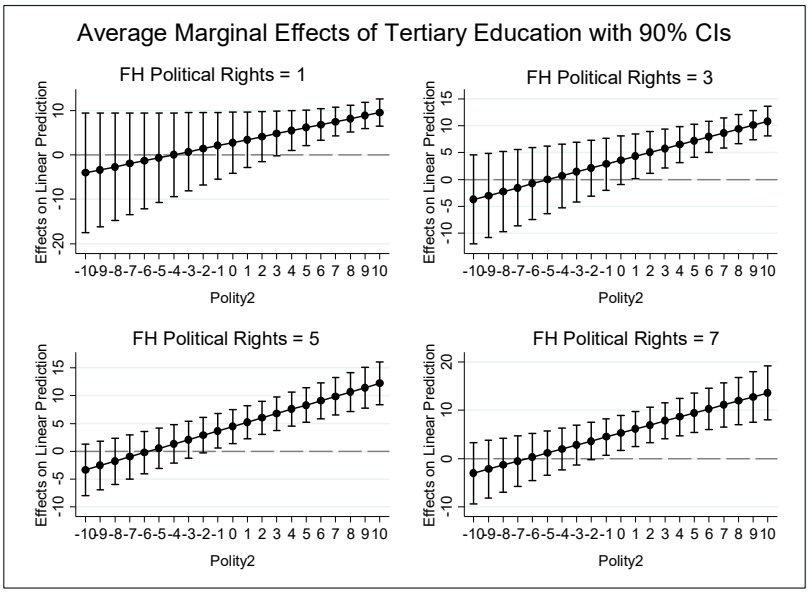

Figure 25: AME of human capital on terrorism using a different measure of political openness

The average marginal effects are increasing in democracy and, for every given level of democracy, their magnitude is larger in countries with less political rights.

Finally, both types of events, terrorism and civil conflict, can take place over multiple years, for this reason I rerun the two main regressions, one on civil conflict and one on the number of political terrorist groups, controlling whether there was civil violence in the previous period or there were already terrorist groups active in the previous period. I also control for failed states, a classification provided in the MEPV dataset, since these states, were the authority of the central government has collapsed could influence the final

results. Table 28 presents the average marginal effect for both cases. They are both positive and significant, even though, in the case of terrorist groups only at the 10% significant level.

Table 28: Average Marginal Effects of Tertiary Education when controlling for ongoing events and failed states

	dy/dx	Std. Err.	z	P>z	[95% Conf. Interval]	
Average Marginal Effect on Civil Conflict	3.819**	1.900	2.01	0.044	.094	7.543
Average Marginal Effect on Political terrorist groups	3.026*	1.572	1.92	0.054	-.055	6.107

3.5 – Concluding Remarks to Chapter 3

According to the literature on civil conflict poorer, less educated and unemployed young people are more likely to join rebellions and violent political opposition, however in this paper I present and support the theory that educated young people are needed to provide the human capital required to organize and maintain violent political opposition. This process is theorized in a step model that describes how excess human capital, not absorbed in the economy or the traditional political sphere can be used for violent political opposition. The hypotheses described in the model find support in the empirical analysis when focusing on the intensity of civil conflict and on the number and efficiency of terrorist groups. The main result of this paper is that when there is a number of educated young people that cannot employ their human capital in the economy, due to underdevelopment of the advanced sector, nor can manifest their concerns and look for redress of their grievances in the political sphere, it increases the risk of political opposition outside the institutionalized framework. Under certain circumstances, especially when the cost of violence is lower, this can lead to political violence.

This paper contributes to the current literature by connecting the analysis of the labor market to political economy analysis, in particular on the roots of political violence. Moreover, it expands the literature on civil conflict, in particular describing a potential origin for those violent political organizations that poor less educated people are more likely to join due to their lower opportunity costs. This generative mechanism could be applied at other public organization, not necessarily violent; for example, it could be use to analyze the development of civil society.

Of course, this paper does not exhaust the argument: among other things, it needs the inclusion of good measures of inequality and unemployment to better test the hypothesis developed in the final step of the model about the role of potential supporters in the population in determining the scale of the events. Moreover, step 3, that determines the politicization of the underemployed educated youths, should be better analyzed and empirically tested in order to provide a better understanding of the reasons behind politicization, and potentially radicalization. What are the reasons behind politicization? Are people moved by greed (conquering the access to resources and wealth)? Are they moved by political grievance (feeling excluded by the current political game)? Are they moved by collective grievance (or altruism)?

Another interesting path of analysis is the normative aspect generated by the paper's results: how can developing countries increase the human capital of their populations without increasing the risk of violent political struggles? How can governments and the international community channel the energy generated by these kinds of opposition movements in a positive way? Evidence of this issue have been reported in the literature and might become even more relevant in those developing countries where the economy is slowing but the birth rate and the graduation rate are not.

Also, a sequential equation model could be developed using GDP growth rate, youth unemployment growth rate, university graduation rates and other flow measure to create a proper dynamic model.

Finally, an interesting analysis could be to assess the final impact of the excess human capital on the economy building on the literature on the effects of political instability on economic growth, for example in Aisen and Veiga (2013) and Alesina et al. (1996).

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Appendix

Table App.1 - Number of countries and regions surveyed by each round of Afrobarometer

Country	Round				Notes (Cause of missing administrative subdivision(s))
	6	5	4	3	
Benin	12/12	12/12	12/12	12/12	
Botswana	15/15	15/15	15/15	15/15	
Burkina Faso	13/13	13/13	13/13		
Burundi	17/17	17/17			
Cameroon	10/10	9/10			Sampling Randomization
Cote d'Ivoire	19/19 (30/33)*	19/19			Change in administrative organization. Subdivision of round 6 can be turned into subdivision of round 5.
Gabon	9/9				
Ghana	10/10	10/10	10/10	10/10	
Guinea	8/8	8/8			
Kenya	8/8	8/8	8/8	8/8	
Lesotho	10/10	10/10	10/10	10/10	
Liberia	15/15	15/15	15/15		
Madagascar	22/22	22/22	21/22 (6/6)*	21/22 (6/6)*	Change in the administrative organization
Malawi	25/27 (3/3)	0/27 (3/3)	25/27 (3/3)	25/27 (3/3)	For each round, 1 missing is the same while the other is different every time. Afrobarometer uses as main administrative division a 3-region system. Finer subdivision information in round 3, 4, and 6.
Mali	9/9	6/9	9/9	9/9	War in northern Mali
Mozambique	11/11	11/11	11/11	11/11	
Namibia	13/13	13/13	13/13	13/13	
Niger	7/8	8/8			Boko Haram insurgency
Nigeria	34/37*	37/37	37/37	24/37°	*Boko Haram insurgency / °Old administrative organization

Senegal	14/14	14/14	14/12*	14/12*	Two subdivisions were added before round 5. "Created" using information in round 3 and round 4
Sierra Leone	4/4	4/4			
South Africa	9/9	9/9	9/9	9/9	
Swaziland	4/4	4/4			
Tanzania	26/29*	26/26	26/26	26/26	New organization before round 6. Returned to old organization using information in round 6.
Togo	5/5	5/5			
Uganda	5/5	5/5	5/5	5/5	
Zambia	10/10	10/10	10/9*	10/9*	One subdivision added before round 5. "Created" using information in round 3 and round 4
Zimbabwe	10/10	10/10	10/10	10/10	
Region coverage	98%	99%	99%	94%	
Regions	354	320	273	232	
Countries	28	26	19	17	

Table App.2: Year of survey for countries in each round of Afrobarometer

COUNTRY	Round 6	Round 5	Round 4	Round 3
Benin	2014	2011	2008	2005
Botswana	2014	2012	2008	2005
Burkina Faso	2015	2012	2008	
Burundi	2014	2012		
Cameroon	2015	2013		
Cote d'Ivoire	2014	2013		
Ghana	2014	2012	2008	2005
Guinea	2015	2013		
Kenya	2014	2012	2008	2005
Lesotho	2014	2012	2008	2007
Liberia	2015	2012	2008	
Madagascar	2014	2013	2008	2005
Malawi	2014	2012	2008	2005
Mali	2014	2012	2008	2005
Mozambique	2015	2012	2008	2005
Namibia	2014	2012	2008	2006
Niger	2015	2013		
Nigeria	2014	2012	2008	2005
Senegal	2014	2013	2008	2005
Sierra Leone	2015	2012		
South Africa	2015	2011	2008	2006
Swaziland	2015	2013		
Tanzania	2014	2012	2008	2005
Togo	2014	2012		
Uganda	2015	2011	2008	2005
Zambia	2014	2012	2008	2005
Zimbabwe	2014	2012	2008	2005

Table – App.3: Regressions of Mass Political Events on Human Capital and Unemployment

Dependent Variable:	(1) MassEvents	(2) MassEvents	(3) MassEvents
Margins (with estimated fixed effects):			
Human Capital	2.935	4.208	4.872
	(0.258)	(0.274)	(0.191)
Unemployment	0.388*	0.375*	0.335
	(0.055)	(0.080)	(0.305)
Margins (assuming all fixed effects = 0)			
Human Capital	0.561	1.72***	1.61**
	(0.258)	(0.009)	(0.011)
Unemployment	0.074*	0.087**	0.124**
	(0.054)	(0.027)	(0.023)
Estimators:			
Human Capital	0.561	2.658***	-0.674
	(0.258)	(0.004)	(0.685)
Human Capital & Unemployment		-0.152***	0.752**
		(0.002)	(0.032)
Human Capital & Unemployment (square)			-0.034***
			(0.007)
Unemployment	0.074*	0.103**	0.118
	(0.054)	(0.012)	(0.286)
Unemployment (square)			-0.002
			(0.684)
Urbanization	-0.683	-0.556	-0.699
	(0.386)	(0.450)	(0.324)
Regional Infrastructure	0.104	0.090	0.093
	(0.317)	(0.367)	(0.344)
Regional Product	-0.041	-0.035	-0.013
	(0.138)	(0.189)	(0.661)
Poverty	-0.059	-0.045	-0.033
	(0.117)	(0.224)	(0.359)
Political Interest	0.330***	0.321***	0.336***
	(0.005)	(0.007)	(0.005)

Table – App.3: Continued

Political Activism	-0.001	-0.001	-0.002
	(0.819)	(0.639)	(0.595)
Expectations	-0.090***	-0.089***	-0.076***
	(0.000)	(0.000)	(0.000)
Development of Formal Economy	-0.309	-0.576	-0.787**
	(0.373)	(0.120)	(0.045)
Religiosity	1.647***	1.746***	1.717***
	(0.001)	(0.000)	(0.000)
National Product	-0.000*	-0.000	-0.000
	(0.055)	(0.229)	(0.571)
National Population	0.057***	0.050***	0.033***
	(0.000)	(0.000)	(0.006)
Size of the Government	1.856	0.950	1.134
	(0.188)	(0.489)	(0.396)
Democracy	-0.196***	-0.193***	-0.200***
	(0.000)	(0.000)	(0.000)
Autocracy	0.179***	0.177***	0.186***
	(0.001)	(0.001)	(0.000)
Observations	2870	2870	2870
Groups	308	308	308

* p<0.1, ** p<0.05, *** p<0.01

Note: coefficients for year fixed effects are not reported. P-values in parenthesis

Table – App.4: Regressions of Mass Political Events on dynamic Human Capital and Political Shocks (Elections)

Dependent Variable:	(1)	(2)	(3)	(4)
	Mass Political Events			
Type of shock: Elections	All types (Happened)	Main only (Happened)	Main only (Planned)	Main only (Regular)
Election SHOCK = 1	0.206*	0.056	-0.054	-0.032
	(0.062)	(0.631)	(0.632)	(0.797)
Share of Tertiary Educated	0.302	0.212	0.157	0.107
	(0.590)	(0.703)	(0.783)	(0.844)
Interaction Term (Shock=1)	0.156	0.876*	1.028**	1.150**
	(0.717)	(0.062)	(0.038)	(0.025)
Urbanization	-0.426	-0.501	-0.498	-0.594
	(0.570)	(0.488)	(0.495)	(0.417)
Infrastructure	0.134	0.144	0.143	0.110
	(0.310)	(0.271)	(0.272)	(0.399)
Regional Product	-0.061**	-0.064**	-0.063**	-0.068***
	(0.019)	(0.011)	(0.013)	(0.007)
Poverty	-0.068	-0.068	-0.067	-0.054
	(0.111)	(0.102)	(0.109)	(0.179)
Political Interest	0.377***	0.372***	0.366***	0.351***
	(0.001)	(0.001)	(0.001)	(0.003)
Political Activism	-0.002	-0.003	-0.003	-0.003
	(0.274)	(0.192)	(0.152)	(0.210)
Expectations	-0.094***	-0.098***	-0.099***	-0.104***
	(0.000)	(0.000)	(0.000)	(0.000)
Development of Formal Economy	-0.195	-0.257	-0.240	-0.191
	(0.631)	(0.537)	(0.559)	(0.633)
Religiosity	1.978***	1.871***	1.875***	1.970***
	(0.000)	(0.000)	(0.000)	(0.000)
Democracy	-0.179***	-0.183***	-0.177***	-0.189***
	(0.000)	(0.000)	(0.000)	(0.000)
Autocracy	0.159***	0.165***	0.159***	0.168***
	(0.000)	(0.000)	(0.001)	(0.000)
Observations	2870	2870	2870	2745
Groups	308	308	308	306

* p<0.1, ** p<0.05, *** p<0.01

Note: coefficients for year fixed effects are not reported. P-values in parenthesis

Table – App.5: Regressions of Mass Political Events on static Human Capital and Political Shocks (Elections)

Dependent Variable:	(1)	(2)	(3)	(4)
	Mass Political Events			
Type of shock: Elections	All types (Happened)	Main only (Happened)	Main only (Planned)	Main only (Regular)
Election SHOCK = 1	0.254**	0.101	-0.015	-0.044
	(0.026)	(0.362)	(0.894)	(0.713)
Interaction Term with static education (Shock=1)	-0.079	0.721	0.919*	1.326**
	(0.881)	(0.143)	(0.081)	(0.022)
(sum) wgt_urban_ih_ipo	-0.404	-0.451	-0.452	-0.535
	(0.583)	(0.523)	(0.529)	(0.455)
(mean) NEA_Infrastructure	0.143	0.152	0.151	0.116
	(0.273)	(0.239)	(0.240)	(0.366)
(sum) wgt_gcp_mer_ipo	-0.059**	-0.062**	-0.061**	-0.065***
	(0.025)	(0.015)	(0.018)	(0.010)
(mean) IND_privation	-0.072*	-0.073*	-0.070*	-0.058
	(0.095)	(0.083)	(0.092)	(0.149)
(mean) IND_PoliInterest	0.386***	0.384***	0.376***	0.361***
	(0.001)	(0.001)	(0.001)	(0.002)
(mean) IND_PoliActivism	-0.002	-0.003	-0.003	-0.003
	(0.333)	(0.225)	(0.179)	(0.217)
(mean) IND_outlook	-0.096***	-0.101***	-0.101***	-0.107***
	(0.000)	(0.000)	(0.000)	(0.000)
(mean) IND_FormalEcon_Employed	-0.137	-0.209	-0.199	-0.176
	(0.739)	(0.619)	(0.633)	(0.657)
(mean) relig_intensity	2.030***	1.932***	1.926***	1.997***
	(0.000)	(0.000)	(0.000)	(0.000)
democ	-0.178***	-0.183***	-0.177***	-0.189***
	(0.000)	(0.000)	(0.000)	(0.000)
autoc	0.158***	0.163***	0.158***	0.168***
	(0.001)	(0.000)	(0.001)	(0.000)
Observations	2870	2870	2870	2745
Groups	308	308	308	306

* p<0.1, ** p<0.05, *** p<0.01

Note: coefficients for year fixed effects are not reported. P-values in parenthesis

Table – App.6: Regressions of Mass Political Events on Human Capital and Economic Shocks

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
	All Events		Protests		Riots	
Type of Shock:	Unemployment	GDP per capita	Unemployment	GDP per capita	Unemployment	GDP per capita
Economic Shock = 1	0.279**	-0.178	0.112	-0.178	0.432***	-0.119
	(0.030)	(0.300)	(0.441)	(0.289)	(0.005)	(0.592)
Share of Tertiary Educated	0.182	0.345	-0.500	-0.329	0.883	1.185*
	(0.721)	(0.501)	(0.424)	(0.549)	(0.153)	(0.074)
Interaction Term (Shock=1)	1.006**	2.229***	1.187**	2.605***	1.180	1.294
	(0.043)	(0.003)	(0.018)	(0.000)	(0.156)	(0.247)
Urbanization	-0.549	-0.407	-0.581	-0.377	-0.462	-0.406
	(0.374)	(0.591)	(0.314)	(0.564)	(0.555)	(0.686)
Infrastructure	0.160	0.128	0.220*	0.196	0.123	0.089
	(0.143)	(0.256)	(0.092)	(0.109)	(0.326)	(0.517)
Regional Product	-0.045*	-0.039	-0.083***	-0.068***	-0.001	-0.006
	(0.054)	(0.130)	(0.000)	(0.003)	(0.982)	(0.853)
Poverty	-0.046	-0.043	-0.040	-0.029	-0.052	-0.061
	(0.219)	(0.249)	(0.416)	(0.519)	(0.242)	(0.215)
Political Interest	0.288***	0.352***	0.124	0.171	0.465***	0.527***
	(0.005)	(0.002)	(0.282)	(0.142)	(0.001)	(0.001)
Political Activism	-0.002	-0.002	0.000	0.000	-0.003	-0.004
	(0.470)	(0.348)	(0.895)	(0.865)	(0.357)	(0.209)
Expectations	-0.107***	-0.080***	-0.096***	-0.061**	-0.121***	-0.108***
	(0.000)	(0.000)	(0.000)	(0.017)	(0.000)	(0.000)

Table – App.6: Continued

Development of Formal Economy	-0.096	-0.314	0.278	0.102	-0.582	-0.934*
	(0.782)	(0.391)	(0.458)	(0.773)	(0.214)	(0.070)
Religiosity	2.013***	1.718***	2.759***	2.408***	1.095**	0.846
	(0.000)	(0.000)	(0.000)	(0.000)	(0.043)	(0.151)
Democracy	-0.158***	-0.159***	-0.173***	-0.166***	-0.131***	-0.144**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.016)
Autocracy	0.143***	0.140***	0.157***	0.145***	0.119**	0.130**
	(0.001)	(0.002)	(0.000)	(0.000)	(0.018)	(0.036)
Constant	4.647***	4.235***	4.273***	3.438***	3.542***	3.793***
	(0.000)	(0.000)	(0.000)	(0.003)	(0.004)	(0.007)
Observations	2870	2870	2547	2547	2589	2589
Groups	308	308	270	270	277	277

* p<0.1, ** p<0.05, *** p<0.01

Note: coefficients for year fixed effects are not reported. P-values in parenthesis

Table App.7: AME on the probability of participating in Political Protests

		Coefficients	Standard Errors
Motives			
(IND) Personal and Country Outlook			
Tertiary Educated:	No	-0.001***	(0.000)
	Yes	-0.003*	(0.002)
(IND) Poverty Index			
Tertiary Educated:	No	0.002***	(0.000)
	Yes	0.005***	(0.001)
(IND) Satisfaction with government			
Tertiary Educated:	No	-0.001	(0.003)
	Yes	-0.030***	(0.011)
(ADM) Average Country Outlook			
Tertiary Educated:	No	-0.006	(0.005)
	Yes	-0.017**	(0.008)
(ADM) Average Satisfaction with Government			
Tertiary Educated:	No	0.009	(0.014)
	Yes	0.048**	(0.022)
Opportunity			
(IND) Political Interest			
Tertiary Educated:	No	0.012***	(0.001)
	Yes	0.019***	(0.004)
(IND) Political Activism			
Tertiary Educated:	No	0.171***	(0.006)
	Yes	0.207***	(0.019)
(ADM) Average Human Capital			
Tertiary Educated:	No	-0.040	(0.067)
	Yes	-0.306***	(0.110)
(ADM) Average Political Activism			
Tertiary Educated:	No	0.074**	(0.038)
	Yes	0.111	(0.085)
(ADM) Average Political Interest			
Tertiary Educated:	No	-0.007	(0.008)
	Yes	0.019	(0.018)
Mixed			
(IND) Traditional Media			
Tertiary Educated:	No	0.004***	(0.001)
	Yes	0.006***	(0.002)
P-values < * 0.1, ** 0.05, *** 0.01			
Notes: round-country and administrative subdivision fixed effects were used together with other control variables.			

Table App.8: AME on the Individual Political Protests variable (reg)

		Coefficients	Standard Errors
Motives			
(IND) Personal and Country Outlook			
Tertiary Educated:	No	-0.001***	(0.000)
	Yes	-0.003*	(0.002)
(IND) Poverty Index			
Tertiary Educated:	No	0.002***	(0.000)
	Yes	0.007***	(0.002)
(IND) Satisfaction with Government			
Tertiary Educated:	No	-0.000	(0.003)
	Yes	-0.030**	(0.012)
(ADM) Average Country Outlook			
Tertiary Educated:	No	-0.008	(0.005)
	Yes	-0.015*	(0.008)
(ADM) Average Satisfaction with Government			
Tertiary Educated:	No	0.014	(0.014)
	Yes	0.057***	(0.019)
Opportunity			
(IND) Political Interest			
Tertiary Educated:	No	0.011***	(0.001)
	Yes	0.017***	(0.004)
(IND) Political Activism			
Tertiary Educated:	No	0.195***	(0.011)
	Yes	0.244***	(0.024)
(ADM) Average Human Capital			
Tertiary Educated:	No	-0.028	(0.080)
	Yes	-0.246**	(0.103)
(ADM) Average Political Activism			
Tertiary Educated:	No	0.069*	(0.041)
	Yes	0.079	(0.092)
(ADM) Average Political Interest			
Tertiary Educated:	No	-0.011	(0.008)
	Yes	0.032*	(0.019)
Mixed			
(IND) Traditional Media			
Tertiary Educated:	No	0.004***	(0.001)
	Yes	0.007***	(0.002)
P-values < * 0.1, ** 0.05, *** 0.01			
Notes: round-country and administrative subdivision fixed effects were used together with other control variables.