UNIVERSITY OF TRENTO - Italy
School of International Studies

Modeling Contentious Politics:

The case of civil strife and radicalization in the Middle East and North Africa

Eugenio Dacrema

Doctoral Program in International Studies

School of International Studies

University of Trento

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Supervisor: Prof. Stefano Benati

Advisor: Paolo Maggiolini

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Many animals and human species could previously say, "Careful! A lion!".
Thanks to the Cognitive Revolution, Homo Sapiens acquired the ability to say
"The lion is the guardian spirit of our tribe".
The ability to speak about fiction is the most unique feature of Sapiens language.
Yuval Noah Harari (2011), Sapiens: A brief history of humankind, p. 26

Oh yeah!
Been that way since one monkey looked at the sun and told the other monkey,
*"He said for you to give me your f****** share."*
Rust Cohle (2014), True Detective, Season 1, Episode 2

Abstract

This dissertation introduces instruments of agent-based modeling into the literature of contentious politics and broadens the application of game theory and quantitative analytical tools in this field. This work is composed of three working papers that focus specifically on the following topics:

- In the first paper, I present a dynamic agent-based model encompassing the most important and up-to-date findings in the field of contentious politics and synthesize them within one homogeneous theoretical framework. After providing the theoretical description of the model, I run computer simulations to test the concrete functioning of the theoretical dynamics within it and find consistent analogies with real-world events.
- In the second paper, I analyze the influence of socioeconomic inequality on individuals' participation in contentious episodes. I do so by analyzing the socioeconomic trends that characterized three Arab countries – Tunisia, Egypt, and Jordan – during the decade that preceded the 2011 uprisings and the social characteristics of those who participated in the subsequent protests, as they emerged in the 2011 wave of the Arab Barometer surveys.
- In the third paper, I provide an overview of the relatively limited literature that applies the principles of game theory to the study of political or religious radicalization. After describing its main findings, I suggest how Rapoport's seminal work on the historical "waves of terrorism" can be treated dynamically through some fundamental game-theoretic principles such as coordination problems, Thomas Shelling's focal points and in the solutions proposed by the literature on correlated equilibria.

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Introduction

When I started working on this dissertation my original goal was rather simple. As a student and close observer of the Middle East for several years, I was stunned – as were many others – by the popular mass protests that shook the Arab world in 2011. Like most close observers of the Middle East, I felt compelled to understand why these protests had occurred and the socioeconomic and political dynamics that underlay them. Inequality and the so-called "youth bulge" were quickly raised by most scholars and pundits as root causes for the uprisings. Moreover, after having been caught by surprise by this protest wave in the first place, scholars were again caught out when they failed to lead the region in the "expected" direction – to a new era of secular democratization – but rather devolved in most places into various forms of renewed authoritarianism. And furthermore, significant parts of these revolutionary movements quickly assumed the features of political-Islam organizations and, in fringe cases, of violent jihadi radicalization. Clearly, we had still much to learn about both the causes and the developments of those shocking events.

Hence, my PhD research began with a keen interest in seeking answers to the following questions: why did the revolts occur at this specific moment, in 2011 and not earlier (or later)? Indeed, why – when draconian economic measures were introduced in most countries during the first half of the 2000s – did protests not erupt then? If socioeconomic inequalities and the so-called "youth bulge" were important factors, precisely what role did they play? And, finally, why did parts of the popular movements underpinning the protests assume an Islamist tenor during or soon after the uprisings, even in countries, such as Tunisia, that had always been considered rather secular?

Once I started my research, I realized that some of the assumptions underlying my initial approach—and the approach of most literature produced on the topic—were most unsatisfactory. For instance, I had assumed – as had most scholars – a direct relationship between increasing inequalities and the emergence of protests. Yet, during the decade preceding the uprisings inequality had been falling in most Arab countries, as several surveys and analyses published in the interim made abundantly clear. Similarly, I realized that most literature on Islamist radicalization failed to isolate the general dynamics underlying the radicalization of individuals from those factors determining the ideological features that extremism takes according to the specific contexts (Islamist radicalization, left-wing radicalization, right-wing radicalization and so on). In most cases, Islamist radicalization is described as a unique phenomenon caused by the specific features of Islam as a religion and/or of Muslim/Arab societies.[1]

Hence, after the first months of my PhD research, I came to the realization that much of the literature on the 2011 Arab revolts was not generating robust answers to important questions about the causes or the consequences of the uprisings. Emerging accounts either rested on assumptions that had already been proven incorrect by existing research—such as the empirical work conducted by Frederick Solt on the effect of inequality on protest participation[2]—or on theoretical approaches on the generation of contentious episodes that could not transcend localistic, particularistic perspectives. For this reason, then, the existing research was limited by weaknesses in structure and consistency.

[1] There is also a growing literature that sees radicalization as a universal human phenomenon that assumes different forms depending on context. Olivier Roy is the most important name in this new strand of research and his recent public squabble with Gilles Kepel on the issue provides probably the best summary of the contours of the current debate (https://thediplomat.com/2016/07/kepel-vs-roy-arguing-about-islam-and-radicalization/).

[2] Solt's theories are analyzed at length in the first and second papers of this dissertation.

It occurred to me that part of the problem was the lack of theoretical instruments such as game theory and agent-based modeling that could balance analysis of complexity with parsimony and generalizability in the field of contentious politics and by the limited application of quantitative analytical methods within the existing literature on these episodes. In my opinion, such techniques are uniquely placed for analysis of this kind of macro-phenomena. For instance, the analytical tools provided by game theory and agent-based modeling allow us, more than any other qualitative method, to widen and generalize the focus of analysis without losing complexity.

Using these tools in combination, as I have done in the first paper of this dissertation, allows us to model in detail both the interactions occurring at the level of the single individuals interrelating with one another and to observe the aggregated outcomes of thousands of such interactions at the society level. This can be accomplished with even more efficacy through the utilization of software simulations, which allow us to rationalize and generate visual representations of the dynamics at work. Moreover, game theory principles – such as focal points and correlated equilibria – have a remarkable explanatory power also in combination with more qualitative methods of analyses, as was done in the third paper of this dissertation. Finally, more ordinary analytical tools such those provided by the techniques of exploratory data analysis allow for greater explanatory clarity and immediacy, as shown in the second paper.

I think the key word here is parsimony. These tools allow us to combine both the need for complexity in the analysis of collective human behavior and the need to build understandable and usable frameworks to comprehend the phenomenology of such behaviors. In some cases, excessive qualitative analyses risk leaving behind the search for general principles in order to focus exclusively on the specific features of local, circumscribed events. This research approach risks including too many factors, and not being able to isolate those elements that should extracted from

the local context and generalized. Although the opposite – i.e., the disproportionate use of quantitative methods and rationalistic approach – may lead to excessive generalizations and to the lack of understanding of local dynamics, a wise employment of both kinds of techniques would lead, in my view, to the best research outcomes.

These realizations motivated my decision to widen the scope of my dissertation. The revised goal became to apply analytical approaches that could, in fact, balance analysis of complexity with parsimony and generalizability in the field of contentious politics, with a special focus on topics specific to Middle East studies and radicalization studies, such as the 2011 Arab uprisings and the phenomenon of Islamist radicalization. Complex and variegated rationalistic approaches and quantitative analytical tools emerged as the principal means to achieve this objective. Structured in this way, the work begins with a first paper that focuses on the general dynamics of contentious politics through innovative theoretical instruments, such as game theory and agent-based modeling. In the subsequent two papers I narrow the focus, concentrating on some of the original questions of my work. I touch upon specific topics such as Islamist radicalization, treated through the lens of game theory principles, and the role of inequality in the 2011 Arab uprisings, analyzed using quantitative methods of data analysis.

The general approach to contentious politics utilized in this dissertation finds its theoretical inspiration in the concept of methodological individualism[3], which understands society as the product of the interactions among countless individual decisions. In fact, in all three papers I have attempted to isolate those dynamics linking individual political behaviors and their mutual

[3] See, e.g., (Elster 1982; Hodgson 2007)

continuous interactions to the generation of collective outcomes. I focus particularly on the bidirectional nature of this relationship between the individual and the collective levels: individual decisions influence collective outcomes, and, at the same time, collective outcomes have a direct influence on the determination of individual behaviors.

More concretely, the dissertation is composed of three working papers that focus specifically on the following topics:

- In the first paper, I present a dynamic agent-based model encompassing the most important and up-to-date findings in the field of contentious politics and synthesize them within one homogeneous theoretical framework. After providing the theoretical description of the model, I run computer simulations to test the concrete functioning of the theoretical dynamics within it and find consistent analogies with real-world events. Among them, the model provides a consistent explanation about why, under specific circumstances, significant increases in contentious politics do not occur in the immediate aftermath of major socioeconomic shocks but tend to emerge later, after relatively minor (i.e., "straw that break the camel's back") events. The model also highlights the role played in generating and shaping contentious politics by factors such as the existing degree of socioeconomic inequality, the level of interconnectivity among people, the level of tolerance characterizing the society and the level of repression exerted by the dominant regime on anti-systemic political behaviors. I found that it is not possible to affirm conclusively that any of these factors *always* facilitate (or hinder) the generation of contentious behaviors. Each of them generates diverse effects according to the configuration of the other factors and the nature of the socioeconomic shocks impacting the society.

- In the second paper, I expand the analysis of one of the factors explored in the first paper – namely the influence of socioeconomic inequality on individuals' participation in contentious episodes. I do so by analyzing the socioeconomic trends that characterized three Arab countries – Tunisia, Egypt, and Jordan – during the decade that preceded the 2011 uprisings and the social characteristics of those who participated in the subsequent protests, as they emerged in the 2011 wave of the Arab Barometer surveys. I found that, contrary to the mainstream narrative on the Arab uprisings, the biggest and most effective revolts happened in those countries that had seen overall impoverishment but decreasing inequality rates over the previous decade: Tunisia and Egypt. Moreover, I found a direct relationship between household incomes and likelihood of participation in the protests: the richer the household the more likely members would participate in the protests. This fact contradicts the main narrative on the 2011 revolts and supports the recent theory espoused by Solt.
- In the third paper, I provide an overview of the relatively limited literature that applies the principles of game theory to the study of political or religious radicalization. After describing its main findings, I suggest how Rapoport's seminal work on the historical "waves of terrorism" can be treated dynamically through some fundamental game-theoretic principles such as coordination problems, Thomas Shelling's focal points and in the solutions proposed by the literature on correlated equilibria. In the final part of this paper, I analyze how these principles can be used to tackle the common dynamics characterizing Islamist radicalization in contexts that are ostensibly very different such as Tunisia and the United States. By considering such diverse countries, I aim to debunk the notion, common in the public debate, that Western and Middle East countries are characterized by completely different and

incomparable dynamics and to demonstrate the existence of common universal elements underlying the phenomenon of radicalization.

An Agent-Based Model of Political Identity and Behavior:

The mechanics of contentious politics through the lens of network science

Abstract

"Contentious politics" has become the main label to define a wide range of previously separated fields of research encompassing topics such as collective action, radicalization, armed insurgencies and terrorism. Over the past two decades scholars have tried to bring these various strands together into a unified field of study. In so doing, they have developed a methodology to isolate and analyze the common social and cognitive mechanisms underlying several diverse historical phenomena such as "insurgencies", "revolutions", "radicalization", or "terrorism". To achieve this objective, a multidisciplinary approach was adopted open to contributions from diverse fields such as economics, sociology, and psychology. The aim of this paper is to add to the multidisciplinarity of the field of Contentious Politics (CP) and introduce the instruments of Agent-Based Modeling and network game-theory to the study of some fundamental mechanisms analyzed within this literature. In particular, the model presented in this paper focuses on the mechanisms of political identity formation and change, their translation into political behavior, and the dynamics of cognitive adaptation. Their mechanics are analyzed in diverse social contexts differentiated by the values of four parameter: the extent of repression, inequality, social tolerance, and interconnectivity. The model can be used to explain basic dynamics underlying different phenomena such as the development of radicalization, populism, and popular rebellions. In the final part, different societies characterized by diverse values of the aforementioned four parameters are tested through Python simulations, thereby offering an overview of the different outcomes that the mechanics of our model can shape according to the contexts in which they operate.

Introduction

Why do people periodically rebel against their country's ruling regime? Why are some cases of mass political mobilization and protest peaceful while others turn horribly violent? What are the social, political and economic factors that spur such uprisings? And what role is played by political beliefs? These questions have been a source of research and debate for a much of human history.

They regularly remerge in the aftermath of momentous, often unpredicted, destabilizing events. Over the last two decades, scholars have tried to bring the various forms of confrontational politics—from peaceful protests to violent terrorism campaigns and insurgencies – into a unified field of study. This has seen the consolidation of the subfield of Contentious Politics (CP), which focuses specifically on the investigation of the universal dynamics governing this fundamental and dramatic phenomena in human history. The present paper aims to contribute to the CP literature in two ways. First, it introduces to the field the analytic tools of agent-based modeling. Second, it offers a comprehensive analytical framework for making sense of the dynamics underlying the radicalization of politics in general. At the heart of this is a way of framing the process that sees individual political identities of citizens gradually incorporate anti-systemic views that ultimately undermine the stability of the ruling regime.

CP scholars distinguish among three main level of analysis: *episodes*, *processes*, and *mechanisms* (McAdam et al. 2001). *Episodes* generally occur over relatively long periods of time. They constitute the main subjects of books and academic analyses and, most importantly, they often become hotly discussed topics in the public debate. Examples of famous contentious episodes are the French Revolution, the Arab Spring upheavals or the era of terrorist insurgency visited by the Red Brigades in Italy. Typically, different *episodes* are not analyzed within the same academic field and are rarely studied comparatively.

CP understands *episodes* as the products of diverse concatenations of similar *processes* adapted to the contingent reality in which they occur. These *processes* usually take place before, during, and even after the *episodes* under examination. For example, scholars point to the industrial revolution, urbanization, the invention of the press, and the spread of the radical ideas contained in the

Communist Manifesto to explain the workers' movements of the first decade of the twentieth century. While such movements constitute a specific episode of contentious politics, the dynamics that led the mix of technological and social changes and the diffusion of new political identities to generate such movements is the focus of this paper: the socioeconomic, social and identity factors constituting the process of political radicalization.

Finally, CP identifies a third, narrower level of analysis: *mechanisms*. These are the engine of *processes* and, consequently, *episodes*. In fact, processes are nothing else but the product of diverse combinations of different mechanisms. Their functionality is similar across geographic and historical distances since they are rooted in the very dynamics through which humans operate individually and collectively. In the following sections, this paper will break down the process of political radicalization into the specific mechanisms that comprise it, to show how they operate in different configurations. In particular, an agent-based model will be introduced, which applies three mechanisms: political identity determination, social network reconfiguration and cognitive adaptation. All of them shape the process of political radicalization, which can take various forms according to the context (insurgencies, terrorism, anti-regime demonstrations, etc.). This paper aims to describe their functioning and their role in the generation of contentious episodes. In so doing, it offers an agent-based model specifically designed by the authors to analyze the dynamic interaction between these three mechanisms according to four key parameters that describe different social and political settings: repression, social openness, interconnectivity, and inequality.

The validity and the implications of theoretical models such as the one presented in this paper are often difficult to assess due to the lack, in most contexts, of an adequate variety of observable data.

Indicators such as levels of discontent, personal political identities, individual attraction to opposition movements, levels of social openness and levels of interconnectivity are, in some cases, measured through proxy indicators or through data collected by specific surveys. However, employing these kinds of techniques is often imprecise or prohibitively expensive in terms of time and resources. Oftentimes, in some contexts, it is simply impossible. In some cases, a few mechanisms described by these models are empirically verifiable through real-life case-studies. Such an approach is presented in the second paper of this dissertation, in which the influence of inequality and income levels on individuals' contentious behavior has been empirically investigated in the context of the 2011 Arab uprisings.

However, in order to appreciate the whole ramifications of complex theoretical models is often necessary to recur to different kinds of empirical application. Among those, software simulations have emerged as crucial instruments in several fields such as economics and political science (see, e.g., Epstein 1999; Cioffi-Revilla and Rouleau 2010). In fact, such techniques have two main advantages: first, software simulations allow to include and see at work the whole mechanics of a model and, therefore, to fully appreciate its ramifications. Second, they allow to arbitrarily modify the settings of the simulated societies and to appreciate the dynamics of the model in rather different contexts.

In the last part of this paper, the proposed model is tested through Python simulations in which different combinations of the four parameters – repression, social openness, interconnectivity, and inequality – are utilized in order to generate networks embodying diverse types of societies. In such networks, each node represents one citizen continuously interacting with other nodes/citizens positioned in its proximity.

Two archetypal societies will be used as benchmarks: “dictatorship” and “open democracy”. The former is socially closed, highly repressive, and scarcely interconnected. Its members have little chance to modify their networks of social relationships. These networks are usually characterized by strong family, clan, ethnic and/or tribal links which encourage behavioral conformism. Violations of these rules are often subject to severe social sanction. People in these societies lack instruments to reach out to individuals who are not positioned in their immediate social neighborhood. In addition, the regime in power does not tolerate alternative political identities and represses supporters of competing, non-conforming ideologies.

The second archetypal society, referred to as “open democracy”, is characterized by a high degree of social openness and low levels of repression against dissent. People can easily modify their networks of social relationships and are equipped with tools allowing them to connect with people positioned relatively far from them. This also allows them to easily access new, different ideas.

We test each of these archetypal societies, first, in their standard versions and then for a wide range of values of the four parameters to evaluate the influence of each parameter on the resilience of these regimes and on the dissemination of anti-systemic ideologies.

The paper proceeds as follows. The first part surveys the two main literatures inspiring this work, Contentious Politics and Agent-Based Modeling applied to social processes. The second part presents the multidisciplinary set of academic work that influenced the theoretical background of the model. The third part describes the theoretical model and its functioning. The fourth part discusses the methodology employed to translate the model into Python code and the findings emerged from the simulations. A fifth part provides conclusive remarks and hints for future research.

1. A review of the fields of Contentious Politics and Agent-Based Modeling

This section presents a brief review of the two literatures constituting the theoretical background of this paper: Contentious Politics and Agent-Based Modeling.

1.1. A modern definition of the field of Contentious Politics

The first obstacle in the study of contentious politics is represented by emotions and personal beliefs. Strong convictions and personal beliefs often surround people's perceptions of episodes of contention and subject their inquiry to various, more or less conscious and/or imposed ideological influences. In many cases, ongoing and unresolved struggles between opposite interests and ideologies animate such emotions, both among the actors involved and, sometimes, even among the supposedly neutral observers. For these reasons, the labels utilized to define episodes of contention and the actors involved in them often have little to do with any classification based on scientific criteria. Instead, they are the product of abstractions, often ideologically inspired. For these reasons, what in one context and according to certain individuals is a "revolution" or a "liberation war", in the narratives of other actors and observers may be known as a violent "insurgency" or even a "terrorist campaign". As the well-known saying goes: one person's terrorist is another one's freedom fighter.

This makes a scientific approach to the field of contentious politics rather difficult compared to other topics in the field. Scholars need to continuously exercise critique and autocritique to avoid any moral and/or ideological filters. They need to be able to isolate and pinpoint common elements and dynamics among episodes and actors that may be labeled (and judged) by their society – including the scholars themselves – in radical different ways and that, at first glance, show significant differences in terms of ideologies, contexts, and the utilized means of contention.

The first fundamental instrument to proceed is a working definition of contentious politics that is, at the same time, effective, parsimonious, and neutral. In this paper, we utilize the definition provided by McAdam, Tarrow and Tilly in their seminal work *Dynamics of Contention* (2001), which has also the merit of providing a parsimonious classification of the objects of study. First, the three authors challenge "the boundaries between institutionalized and noninstitutionalized politics" (McAdam et al. 2001, 7) and stress how important it is to remember that the distinction between contentious and non-contentious politics is itself artificial, and it is therefore necessary to study episodes of contention within their general political and social contexts. They treat contentious politics as a subset of public politics, which, according to them, "consists of claim making interactions among agents, polity members, and outside political actors". In this framework, contentious politics consists of "that subset in which the claims are collective and would, if realized, affect their objects' interests". At this point they add a further category, "transgressive contention", which "is present when at least some parties employ innovative collective action and/or at least some of them are newly self-identified political actors" (McAdam et al. 2001, 12).

The first purpose of such a wide and general definition is to include within the same object of study episodes and phenomena commonly allocated into rather different categories, and often studied within separate strands of literature such as those on social movements, workers movements, ethnic and/or religious movements, populist politics, and even political or religious radicalization. The objective is to remove any kind of preassigned social, historical, ideological, political labels or moral judgment from CP and to establish whether there are micro and macro dynamics common to all such diverse phenomena—and, if so, what they are.

McAdam et al. have proposed doing so by disaggregating objects of study usually considered radically diverse such as the French Revolution, the Italian workers movements of the 1970s, or the development of Islamist opposition movements in North Africa and eliciting the micro-processes and mechanisms composing them. The assumption of the authors is that, once such micro-processes and mechanisms are isolated and well-defined, all these different events, with all their radically different origins, histories, and outcomes, will emerge as the products of different combinations and repetitions of rather similar underlying processes and mechanisms.

One central characteristic of the academic production that followed the publication of McAdam et al.'s seminal work is the use of numerous historical case-studies. For example, Goldstone (2003) has analyzed the interactions between formalized political parties and social movements in several contexts such as the US, Mexico and the former Czechoslovakia. Tilly (2003) explored the dynamics of collective violence across rather different geographical and historical contexts, from soccer hooliganism to the peasant sabotage of landlords' estates in ancient Europe. In a more recent work, Tilly (2004) expanded on the concepts developed in his previous book to analyze the emergence of democracy through episodes of contention in several European countries over the last four centuries. Separately, Brockett (2005) and Yashar (2005) have moved the focus from Europe to South America exploring various episodes of contention, from the emergence of indigenous movements in several parts of the continent to the rural and urban protests that erupted in various countries of Central America in the 1960s through to the 1980s. Bob (2005) compared the experience of local indigenous groups in Nigeria and Mexico highlighting how different media strategies have made them more or less successful in attracting international support. O'Brien and Li (2006) explore the concept of "rightful resistance" developed by rural protestors in rural China to fight the misconduct of local officials. Auyero (2007) and Wright (2007) focus their work on

two specific episodes of violent contention: the disorders and clashes occurred in Argentina in December 2001 and the Oklahoma City terrorist attack in 1995, respectively. Soule (2009) has analyzed the social movements emerging from anti-corporate activism in the United States. Luders (2010) has introduced several concepts that we also utilize in our papers, such as the interest calculations of society members intended as rational agents. Bunce and Wolchik (2011) focus on Eastern Europe analyzing the social movements that brought about the victory of reformist candidates in several countries between 1998 and 2005. In her 2013 book, Della Porta (2013) advanced an original theory of clandestine political violence based on her analysis of several historical cases such as the underground left-wing and right-wing movements in Italy and Germany, and ethnonationalists in Spain. In a more recent work, Della Porta (2016) has also explored the ongoing social and political changes in countries – like those in Eastern Europe and the Arab Mediterranean – that have recently experienced major protest movements that now seem to have settled. Ketchley's (2017) recent work focuses closely on Egypt analyzing the methods and the narratives of contention that led to Hosni Mubarak's ouster in 2011. Of particular interest for our research, Bennet and Segerberg (2013) have conducted comprehensive research on the effects of digitally interconnected networks on modern activism. Although they do not employ full-fledged agent-based techniques, their stress on the importance of networks in contentious action goes in the direction explored by this paper. Similarly, Hadden (2015) has analyzed how the collective dynamics of networks constituted by diverse organizations have shaped the international anti-climate chance movement in recent years.

Most of these works are qualitative, employing an impressive array of techniques and methods of inquiry, conducting many interviews with key players and undertaking significant archival research. In some cases, they also employ quantitative methods, especially for language/discourse

analysis and to manage vast protest datasets. By introducing the tools of agent-based modeling to the field of CP, this paper aims to add to the impressive work carried out by previous authors. In particular, it offers applications, such as software simulations, that make it possible to appreciate the dynamics of contentious in their universalistic nature, without recurring to their contextualization as historical episodes. They allow us to work on a different level, isolated from the influence of historical and geographical contexts.

In this respect, McAdam et al. provide working definitions of these diverse levels of analysis, which we adopt in this paper. They define a ***mechanism*** as a "delimited class of events that alter relations among specified sets of elements in identical or closely similar ways in a variety of situations; ***processes*** are "regular sequences of such mechanisms that produce similar transformations of those elements"; finally, ***episodes*** are defined as "continuous streams of contention including collective claims making that bears of the parties' interests" (McAdam et al. 2001, 24).

Among these definitions, episodes emerge clearly as the objects that can be most easily subject to the apposition of different labels, depending on the different ideological filters employed by the observers. Universally recognized events such as the French Revolution, the 1968 student movement, or the Arab Spring are typical examples of episodes of contention. Their designations – "revolution", "movement" and "spring" – are, for the most part, the consequence of post-hoc negotiations among political and ideological currents. Such events are numerous and are usually the topic of monographic works, but they are of secondary interest for this paper. A few of them are treated briefly in the next sections – without any claim of providing a complete and exhaustive description of them – as examples from well-known events may be necessary to make the theoretic arguments clearer.

This paper focuses mainly on one process, the radicalization of politics, and its underlying mechanisms. It provides a game-theoretic agent-based framework to analyze the process leading single individuals to enact shared political behavior – contentious or not – selected among those available and recognized within their society. Such an approach develops on McAdam et al.'s definition of contention politics as a subset of public policy, which places social identities, constructed through social interactions, at the center of the scene. In this approach the process of continuous "creation, transformation, and extinction of actors, identities, and forms of action" is not limited to the periods in which episodes of contention occur or to the activities of contentious organizations—such as social movements—but it is continuously ongoing both during contention and during what the authors define "routine politics" (McAdam et al. 2001, 56). The focus on social construction as the real engine of identity creation and development and on actors/agents renders the single individuals' decision-making process subject to an understanding of threats, opportunities, and interests that is purely determined by social interaction. This paper builds on this approach by providing a game-theoretic framework in which individuals' rational choices are influenced by factors that are socially determined. In this regard, the model aims to reconcile McAdam et al.'s framework with rationalist approaches. The authors dismiss the latter, arguing that "in taking interests and capacities as given and individually based, in treating trajectories from decision-making to action to consequences as either given or unproblematic, and in treating collective decision making as nothing but individual decision-making writ large, rational action theorists condemn themselves to trouble in explaining how social interaction – including outright struggle – and its outcomes alter actors, actions, and identities" (McAdam et al. 2001, 57).

In this paper, socially determined factors concur in influencing the potential benefits and risks involved in the individual decision-making process. In this sense, ***mechanisms*** represent the cognitive filters shaping the interaction between the context and the individual decision-making processes. They are based in the very biological characteristics of the human mental elements involved in cognitive elaboration. In game-theory terms, mechanisms are responsible for the attribution of numeric values within the definition of the utility function of a single subject, produced in the contexts of her ongoing interaction with her social context. In this way, mechanisms determine the order of preferences of each player; players' preferences determine individual actions; and individual actions determine the social context. They can be defined as the *chains of transmission between dependent variables* (i.e., individual choice) and *independent variables*—factors socially determined by the context. At the same time, they represent also the reverse process: *chains of transmission between individual actions and the factors determining the social context*. Such a refined definition of mechanisms makes their analysis through the lens of agent-based modeling particularly useful.

1.2. A review of Agent-Based Modeling applied to contentious social processes

The model proposed in this paper is original and specifically designed by the authors to address the dynamics described by CP literature. However, in the past several agent-based models different from the one included in this paper were designed to describe social processes. The foundations for the application of agent-based modeling to this kind of purpose were laid by Epstein in his 1999 seminal work. The idea behind agent-based modeling is to reproduce macro-level phenomena from the bottom-up or, in Epstein's words "*Situate an initial population of autonomous heterogeneous agents in a relevant spatial environment; allow them to interact according to simple*

local rules, and thereby generate—or "grow"—the macroscopic regularity from the bottom up" (Epstein 1999, 42). Thus, models focus mainly on the rules and dynamics regulating agents' decision-making processes and their micro-level interactions – both with other agents and with their surrounding environment. By so doing, these models aim at reproducing regularities and phenomena that are usually observed at the macro-level. If this reproduction is successful – i.e., if the macro-level outcome of the micro-level dynamics simulated by the models are close to the actual reality – a model and its theoretical basis can be considered solid and well-suited to explain the specific macro phenomenon under analysis.

Five combined characteristics constitute, according to the author, the main arguments supporting the use of agent-based modeling: Heterogeneity and autonomy of the simulated agents, their bounded rationality, and the presence of an explicit space in which their interactions occur locally. For instance, the agents' heterogeneity and autonomy allow us to go beyond the classic representative agent methods common to much of economics literature; their autonomy make them independent from top-down pre-set institutions and allow the micro and macro levels to co-evolve; finally, the possibility to set several specific features for each agent – including specific preferences and levels of information – allow for the creation of networks inhabited by agents characterized by bounded rationality. Hence, agents of agent-based models are rather diverse and more sophisticated than, for example, the representative agent of the neoclassic economic literature while, at the same time, preserving their basic – rationality – although bounded to a certain extent. In this respect, it is worth noting that, in such models, rational decision making is only one determinant of agents' behavior. In fact, "*agent-based approaches may decouple social science from decision science. In the main, individuals do not decide – they do not choose – in any sensible meaning of the term, to be ethnic Serbs, to be native Spanish speakers, or to consider monkey brain*

a delicacy. Game theory may do an interesting job explaining the decision of one ethnic group to attack another at a certain place or time, but does not explain why the ethnic group arises in the first place or how ethnic divisions are transmitted across the generations. […] *Cultural (including preferences) patterns, and their nonlinear tippings are topics of study in their own right with agents*" (Epstein 1999, 49). Furthermore, in several models, agents are provided an explicit space they interact with, in addition to their interactions with their neighbors. Thus, most dynamics generated by an agent-based model occur locally, both in the geographic and in the social senses, and together concur in generating macro outcomes.

An important characteristic of agent-based modeling stressed by Epstein is its suitableness to assimilate and integrate findings from diverse disciplines. For example, it can integrate findings from psychology when modeling the single agents' decision-making process; or from sociology when modeling the dynamics of interactions among agents; furthermore, it can integrate the results of empiric research in political economy when modeling the behavioral dynamics of the agents in relation to specific macroeconomic parameters – for example, the effects of inequality on individuals' political behavior. In general, agent-based modeling is well suited to integrate and test together the results of different branches of behavioral social science.

Epstein (2002) was also the first to create an agent-based model of civil strife, which was inspirational for several successive works. Using two variants of the same model, he aimed at simulating both revolts against a central authority and the eruption of violence between two rival communities. The agents of Epstein's model can be either normal citizens or cops. Citizens can be one of three possible states: Quiet, Active, or Jailed. Each citizen is characterized by three

attributes: vision radium (v), level of grievance (G), and level of risk aversion (R). Cops have only two attributes: vision radium (v*, which can be different from v), and a position in the graph. The parameter v and v* are set at the beginning, together with T, citizens' threshold for rebelling. G and R are heterogeneously assigned to each citizen. L represents the perceived legitimacy of the central authority; its value is homogeneous for all citizens. N is the net risk term of each citizen, which is the product of R by the estimated arrest probability (P). P can be written as:

$$P = 1 - \exp(-k \,|\, C / (A+1) \,|_v)$$

where $|\, C / (A+1) \,|_v$ is the ratio between the number of cops and the number of rebelling citizens (Active) that each citizen is able to see within her vision radius v. k is the arrest constant and it is set so that when C = 1 and A = 1 the probability of being arrested is 0.9 (which means k = 2.3). The simulation occurs within a 40x40 torus space according to three basic rules repeating for each agent (citizen or cop) at each iteration:

- Citizen rule: if $G - N > T$ the agent becomes Active;
- Cop rule: each cop scans all sites within v* and, if it finds Active agents, it arrests one of them randomly chosen. The arrested citizen remains inactive for a preset number of iterations;
- Movement rule: at each iteration all agents (citizens and cops alike) move to an empty site within their vision radium randomly chosen.

Epstein's model explains several features of real civil strives. For instance, citizens show a deceptive behavior, hiding their grievance when they are close to cops and turning rebellious when

cops are no longer close; the configuration of the simulation produces punctuated equilibria i.e., periodic bursts of rebellion involving large shares of the population; finally, sudden or gradual modifications of the legitimacy value L produce rather different effects. While regimes seem to be able to cope with a gradual loss of legitimacy, a sudden loss – even if smaller in absolute terms – is far more likely to produce a rebellion.

Epstein's model was very successful due to its simplicity and its capacity to explain several relevant phenomena observed during real civil strives. Over the following years, other scholars used it as benchmark, proposing expanded versions of it while keeping intact its core structure. Goh et al. (2006) expand on it adding a new parameter, greed, and developing the movement rule by letting agents choose their movements according to precise strategies produced by dynamics of evolutionary learning; Kim and Hanneman (2011) incorporate two important elements: the generation of grievances through a dynamic of relative deprivation (through the comparison between one individual's own wage and the average wage of her neighbors) and a group-identity effect conditioning the agents' preferences; Fonoberova et al. (2012) utilizes Epstein's model to simulate crime and violence in urban settings; Finally, Lemos et al. (2014) expand on Epstein's model by adding the effects of imprisonment delay, of feedbacks of rebellion bursts on the government's legitimacy, and of sustained media coverage.

In addition to these expansions of Epstein's model, several entirely original models were developed over the last two decades. Doran (2005) used agent-based modeling to study the dynamics of guerrilla warfare opposing weaker insurgent forces and a stronger regular army. Davies et al. (2013) used agent-based modeling to reproduce the 2011 London riots, modeling the micro-dynamics that led to the macro-events occurred from August 6th to August 10th 2011.

Mackowsky and Rubin (2013) used agent-based modeling to analyze the dynamics of institutional change, taking into account the influence of connectivity on the size of protests. Finally, Cioffi-Revilla and Rouleau (2010) in their MASON model of politics, environment, and insurgency created a sophisticated simulation of the natural environment surrounding the interactions between government and polity including the role of natural resources.

All these works incorporate strands of literature on behavioral science. The most impressive works in this regard are probably those of Kim and Hanneman – who included dynamics elicited from the literature on relative deprivation – and Goh et al. – who included dynamics of evolutionary learning. However, until now none of the works produced tried to consistently include references to the scholarship of contentious politics. This represents a significant hole in the literature, since contentious politics is the scholarship created with the precise aim of studying phenomena of contention in all their aspects and diverse expressions. This paper aims to fix this shortcoming exploiting the multidisciplinary nature of the contentious-politics literature, which is well-suited to be elaborated within an original agent-based modeling framework.

2. The components of the model and their theoretic roots

One of the main obstacles one encounters while approaching the study of contention is the numerous factors that influence the origin and evolution of contentious situations. Such factors are often the subject of rather different and separated fields of research—sociology, psychology, economics, anthropology, and so on. For this very reason, the theoretical bases of the model presented in this paper are multidisciplinary, ranging from the study of identity (mainly covered by psychology and sociology) to the study of the effects of socioeconomic inequality on the political behavior of individuals, a topic intersecting themes of economics and political science. In this section, the diverse literatures constituting the theoretical background of our model's mechanics are briefly outlined to indicate the full range of factors considered during its design. These factors cluster into four main categories:

- The concepts of political identity and political behavior;
- The dynamics of the generation and diffusion of social discontent;
- The influence of social status and inequality on individual decisions to embrace contentious ideologies; and
- The process of radicalization of politics.

2.1. A definition of political identity

The concept of political identity is central to the model presented in this paper. In the theoretical framework adopted, political identity must be intended as one of each individual's numerous potential identities. Hence, before defining what a political identity is, it is necessary to explore the broader concept of human identity.

2.1.1. Psychological and sociological approaches to the concept of identity

The topic of identity has been approached by several academic fields, and especially by psychology and sociology. In psychology, the main strand of literature that addresses the topic is social identity theory, while in sociology the preponderant thread focuses on identity theory (for a review of similarities and analogies between the two theories, see Hogg et al. 1995). Their appellations may be similar, but their differences are considerable. While social identity theory focuses on the cognitive aspects of identity formation, identity theory takes as its core subject the way in which individuals' various identities impact on their social behavior. However, both these approaches entail common elements that are relevant for the inquiry conducted in this paper. For instance, both literatures stress the importance of "roles" in guiding individual behavior. Such roles are multiple and socially determined. They are multiple because each person every day plays several of them, sometimes even at the same time. A person may play the role of a parent for her children, of a colleague for the people she works with (and within her workplace, depending on the person she interacts with, she may play the role of peer, a superior, or a subaltern), or the role of a friend or a wife.

None of these roles is fixed. Instead, each possesses socially and culturally determined features that are constantly changing and evolving, even if only gradually. The society in which individuals live shapes the behavior and the expectations associated with each role. In most cultures, parents should be nurturing and loving, but often also strict and authoritative. Depending on their culture, parents may be expected to act differently whether they are male of female; in more conservative societies, mothers are often expected to be more present for their children, sometimes to the detriment of their professional careers, while fathers are often expected to be the "breadwinners" of their families, prioritizing their careers over time spent with their children. Analogous considerations can be made about other roles such as those of work colleagues or friends. Each

role therefore does not entail fixed behaviors; instead they evolve with time and with the changes occurring in the collective culture.

However, identities are not simply assemblages of expected behaviors. Each identity also contains filters to decipher the legitimacy of certain situations, behaviors, and attitudes, providing the meanings and the ethics to understand and judge them. Furthermore, they provide the cognitive tools to discern between people legitimately invested with one role and people who are not, or between those who are part of a certain group – whose membership entails a certain role(s) – and those who are not. Such elements may or may not have reflections in physical reality; people working for the same company may share the same identification card or even the same uniform, as do people working for the same military institution. Genetic bonds may be the traditional features to discern whether someone is another person's parent or not, although having gone through the publicly recognized bureaucratic procedure of adoption has become in most cultures an equal determinant of parenthood. Other genetic or cultural features (skin color, eye shape, spoken language, etc.) can identify individuals as belonging to a certain ethnic group, or to a certain nationality and so on.

A first binary classification proposed by McAdam et al. (2001) for the many identities possessed by each individual is that between embedded and detached identities. The first "inform a wide range or routine social relations, as in a village where membership in a given household strongly affects everyday relations" (McAdam et al. 2001, 135). These are supposed to be the identities that a person activates almost every day in her routine interactions with people physically close to her (children, neighbors, colleagues, etc.). In contrast, detached identities "inform only a narrow, specialized range of intermittent social relations, as when membership in a particular school graduating class dwindles in importance on occasional reunions of chance encounters" (McAdam

et al. 2001, 135). To the latter group belong also identities linked to concepts such as nation, religion, or ethnic group. Few people in their everyday life activate the identities linked to these concepts. Nevertheless, they are important because in most cases (although not in all of them) detached identities constitute the base for the kind of identities that are relevant for the scope of this paper: political identities.

2.1.2. Defining political identity

Although of minor importance in everyday life, such detached senses of belonging often constitute the framework used by people to identify themselves when interacting in the political sphere. The first reason for this resides in the fact that detached identities have less to do with the everyday, concrete reality and are prevalently linked to the imaginary realm. This allows them to interconnect a larger number of people who do not interact often among themselves or do not even know each other (and likely never will).

Such detached identities are often exploited, or even created, by collective political actors, such as political parties, movements, etc. These actors are always the carriers of "ideological packages" or, as they are called in the literature on social frames, "master frames" (for an overview on frames and master frames, see Benford and Snow 2000). A master frame is a coherent combination of single frames, each explaining one aspect of society. Once put to work together, they aim to provide a filter to read reality in its entirety with as few contradiction and explanatory holes as possible. Like the notion of identity, the concept of frames has been taken up in several subfields. In the classic literature on social movements, collective-action frames – as defined by Benford and Snow (2000) – consist in the descriptions of the situation, including who is held responsible or blamed for perceived problems, that a collective of people adopts and that motivates their

concerted collective actions. However, in the literature of contentious politics, frames have assumed a broader meaning that encompasses the entire understanding of the social reality in which the individuals act, including their understanding of the opportunities and risks entailed by a certain action, which in the literature on social movements are given as absolute elements not subject to different interpretations (McAdam et al. 2001).

In the context of this paper, frames are defined as the complex cognitive schemata that provide individuals with the necessary filter to understand their surrounding reality, including their own role in it. A "master frame" may, for example, include a single frame tracing lines across the national polity between those who are (or should be) invested with certain rights or certain responsibilities and those who are not. They may describe the current situation as positive or negative and, in the second case, provide an explanation of the cause-effect dynamics that led to the current outcome and assign blame for it. Such an operation implies the assignment of different roles to the members of different social groups comprising the polity. For example, in the classic capitalist–neoliberal frame based on strict meritocracy, wealth and success depend on the skills and the work-ethic of each individual. Thus, those within the society who fail and lag behind find themselves in this condition due to their own personal responsibility, and the same should be said about those who are successful and get ahead. Others may frame the same situation rather differently: the rich and successful are so because they are privileged and corrupt, and profit from their positions to cheat on other honest people, blocking their access to power and wealth.

These two examples represent a rather simplified version of the clash of frames in the current confrontation in many Western democracies between the so-called traditional political parties and the so-called populist formations. The latter often describe the elites as socially (if not "anthropologically") divided from the rest of the people – the real, legitimate "people". This

describes a reality in which the real political divide is the one between political and financial elites – often described as "outsiders" – and the people. The latter is defined as that group that is more "real" than the elites and the only rightful recipient of the political power of which they were unfairly deprived. Obviously, such different frames to understand reality appeal in rather different ways to different members of the society. Those who feel part of the elite – whatever the definition given to it – or that, anyway, are satisfied by their position in the current system may tend to adopt the first set of frames, which describe them in positive terms as rightfully successful members of the society. In contrast, those who do not feel satisfied by their position in the current system may feel belittled in the reality described by the neoliberal frame, in which they are described as social losers. At the same time, they may find more convincing and self-enhancing the set of frames provided by a populist movement that describes them as honest and rightful members of their society unfairly deprived of their access to success and wealth. The capacity of each frame to serve the individual's need of self-esteem and self-empowerment is key to understand its success in spreading within certain social groups.

However, in many cases providing a "good story about herself" is not sufficient to lead a person to adhere to a certain political identity. Two more factors are key: "cultural resonance" and "salience". Cultural resonance the degree to which a frame can be readily recognized and understood by an individual. To maximize cultural resonance, a frame should provide explanations and descriptions that are consistent with previous frames employed in a society. For this reason, the frames utilized in a certain society to read and understand specific problems and situations have often evolved from of previous ones.

Together with cultural resonance, "salience" is fundamental to make a frame attractive for individuals. In fact, it is not sufficient that a frame describes a certain problem in a way that is

convincing and self-enhancing. To be adopted by an individual, a frame must also be "credible", which means that several other people in the individual's network adopt it or take it seriously. The more people adopt a frame the more it is treated as credible and, therefore, attractive to other individuals. This dynamic is well represented by the evolution of fringe movements and parties that slowly gain momentum only to become mainstream at an increasingly rapid pace. And it is a dynamic that is well reflected in the model presented in this work, as we show in the next sections.

Within one society's political life, frames are usually included in the master frames utilized by the existing collective political actors, such as parties and movements. Both the number and diversity of such actors and the various kinds of master frames employed will vary greatly from society to society. In very closed, authoritarian societies we often observe the presence of one "national" party – representing one "official" ideology – and the prohibition of other political entities to operate. In this context, we may observe the creation of small clandestine organizations employing anti-systemic master frames whose members and sympathizers are likely to be at risk of state repression. In contrast, in open society we have a variety of political entities often advancing master frames that include similar or even overlapping single frames. In many respects, the concept of political master frame is comparable to that of "ideology", especially in the definition provided by Freeden (1994, 141): a "particular patterned clusters of political concepts. An Ideology is hence none other than the macroscopic structural arrangement that attributes meaning to a range of mutually defining political concepts". The concept of political identity, as intended in this paper, includes frames assigning meaning to basic political concepts such as 'power' 'justice', 'freedom', 'rights', 'equality', "democracy", "citizenship" and so forth. Within a normal Western democracy, for example, political parties often differ over what rights are legitimate, and which are not (the

right to abortion, right to same-sex marriage, etc.), or who is to be considered an equal citizen with access to those rights (whether foreigners have or not the right to access national welfare, or whether welfare should be free and universal or not). Furthermore, these concepts provide the criteria to filter among who is legitimately part of the country's polity and who is not. For example, citizenship may be guaranteed on a "blood-line" basis—the doctrine of "ius sanguinis" – or on territorial basis, to anyone who was born on the national territory ("ius solis"). In providing such meanings, they also establish the frame for what is considered a legitimate, effective repertoire of political action.

However, master frames usually go further in detailing such key concepts. In fact, what they provide, in exchange for adherence to them, is a complex construction of each individual's location in the community and her ties with others. This concept is key for the scope of this paper, since one of the main factors influencing the capacity of a political entity, and the master frame it employs, to attract the members of a society is the extent it is able to provide people with frames to understand their reality and their place in it. In some cases, individuals embrace the master frame of a movement or a party in its entirety. It is usually the case of the activists and the members of that party. In most cases, however, in shaping their own political identity people may adopt frames included in different master frames among those available. To explain and filter each situation, a person may employ a frame that better suits her needs for self-esteem and self-enhancement, that is more resonant with her culture, and that is more salient among her family and friends. The final outcome of all the frames employed by a single individual has not to be perfectly coherent and homogeneous. For example, a person may think that discrimination is wrong when people of her nationality have to go through complex procedures to obtain a visa for another country, and at the same time may think that foreigners coming to her country should not be allowed in easily. Also,

each person can change the frame utilized for certain situation in different points in time. Changes may occur for several reasons. For example, she may have come in contact with a new frame she did not know about, or changes occurred in her life – for example, the level of her personal satisfaction, as we analyze in the next sections – that brought her closer to a different frame.

In general, the amalgamation of all frames utilized by an individual in the political sphere, which is here defined "individual political identity", will pose her closer to one particular political entity among those available in the society in that moment in time, although she does not adopt all the frames included in that entity's master frame. Therefore, we can imagine each individual positioned along a continuum whose ends represent the two political entities whose master frames are the most distant from each other. Hence, each person's political opinion may end up closer to one of the two extremes or to another, more "moderate" entity, when available, within the continuum.

2.1.3. Political identity and political behavior

Were people to act in isolation there would be no need to distinguish between political identity – the combination of the political frames and beliefs of each individual – and behavior. People would just act according to those frames and beliefs. However, in reality people *are* embedded in multiple social relationships that may prevent them from acting as they would in isolation, or that even push them to act contrarily. In the example utilized in the previous paragraph, we encountered a person of the view that virtually no foreigners should be allowed to enter her country. According to this belief, she may be attracted by the activities of movements supporting hard policies on immigration. She may join their marches or sit-ins, and she may support their arguments in political discussions with other people. However, it may happen that she is also embedded in a

relationship network in which most of the people condemn discrimination against foreigners and support liberal visa policies. This majority may include people that are very close to this person, such as close friends or even relatives. Therefore, the influence exerted by her social environs may hinder her from fully acting as she would in isolation. She may avoid joining racist marches or even speak out loudly about visa crackdowns. In other words, to an external observer, her realized political behavior would differ significantly from her actual political identity. In some respects, this mirrors the "salience" effect described in the previous paragraph. In that case, a person may be encouraged to adopt a certain frame that she approves since it is very "popular" within the society. In the case described here, however, she is pushed away from her preferred frame choice, or even induced to behave according to other frames more accepted in her social surrounding.

In this paper we try to model the individual and collective dynamics that lead a person to form a political identity and enact a certain political behavior also under the influence of her social surroundings. We add parameters that vary according to the "openness" of the society considered. By "openness" we mean several features that are often correlated – like, for example, the general degree of "tolerance" for different opinions. In closed, traditional societies, for example, people tend to show less tolerance for people not conforming to mainstream behaviors. Also, the same degree of openness may influence the chances that a person has to shape the network of her social relationships according to her beliefs. In fact, in close society characterized by rigidly regulated relationships a person may be hindered from reshaping her traditional social network.

Finally, the model tackles this potential gap between identity and behavior by describing two ways through which an individual might address this mismatch. For instance, a person may try to reshape her social network by adding relationships with more likeminded individuals and cutting those with people who reveal political behaviors that contradict her beliefs. However, such reshaping

may not always be easy (or even possible) in very socially rigid environments. The second method is the most "cognitively painful" and consists in the gradual adaptation of a person's beliefs to their social surrounding's average opinions.

2.2. Socially constructed satisfaction and discontent

The topic of how and why people – or groups of people – come to experience discontent with their status within their society has been an important subject of inquiry for a long time. Its ramifications touch several disciplines and influence our understanding of numerous phenomena, including social upheaval, civil protest, political and religious radicalization, and populist politics. For this reason, scholars from different disciplines have tried to provide explanations for social discontent.

One of the most popular multidisciplinary approaches to social discontent is the relative deprivation (RD) literature. RD draws contributes from many fields – including psychology, sociology, and economics—and has connected with other fields studying human behavior and human identity (for a review see Smith et al. 2012). The main insights from RD research revolve around the satisfaction or discontent generated when individuals compare their own status or conditions (or that of their in-group) with those of others. Runciman (1966) classified the assessment into two main kinds: in-group comparison and out-group comparison. In-group comparison is when someone compares her own situation with that of others with similar features who belong to the same community. Out-group comparison is the inverse: an individual weighs her circumstances against those of others perceived as having different social and/or physical features and who are thus deemed to belong to a different community or sub-group. These two types of comparison can lead to significantly different outcomes, for example regarding people's

attitudes toward social hierarchies and socioeconomic inequalities (see, e.g., Davis 1959). According to Hirschman and Rothschild (1973), in-group inequality in periods of economic growth can be perceived as a positive development. The authors use the analogy of people stuck in traffic who start seeing other cars moving. Although those at the back cannot yet move, seeing others moving is welcome news since they know that their turn will soon come. In relation to inequality, we may surmise that people at the bottom may have a positive attitude toward it if they think that soon their situation will also improve. However, to perceive a situation in these terms people should think that the other individuals they observe improving their status have features similar to theirs or, in other words, that they belong to their social group. If inequality favors people perceived as belonging to other ethnic, national, and/or cultural groups, their attitude is more likely to be immediately negative since they may think that the improvement experienced by these people will not translate into improvement for them.

Yizhaki (1979) treats Runciman's theory of comparison as analogous to the calculation of economic inequality within a society. He defines the social discontent generated by relative deprivation as the sum of the distances between an individual's income and the income of the richest members of the community. Objective measures of inequality, such as the Gini index, become, therefore, a reliable proxy for social discontent.

However, the analogy between socioeconomic inequality and social discontent has been repeatedly contested in recent years (Smith et al. 2012). In fact, while several empirical works have proven the correlation between feelings of discontent and negative attitudes toward growing inequality, scarce or no correlation between perceptions of inequality and actual measures of inequality have been found. In particular, Brunori's (2017) recent study on the relationship between measures of inequality of opportunity and its perception across European countries shows a lack of correlation

between perceptions and actual measures. Instead, he proves that perceptions of inequality are influenced by other determinants, such as experiences of intergenerational upward social mobility. In sum, empirical works tend to demonstrate that if people are experiencing social discontent, they may think their society is unjust but if they are experiencing an improvement in their own situation, they perceive their society to be fair, regardless of the real measures of inequality.

Gurr (1968) moved away from interpersonal and intergroup comparisons to concentrate on the concept of *expectations*. Discontent is not primarily generated by the comparison between one's own situation and that of others but by the comparison between one's own situation and her own expectations. Thus, to isolate the determinants of discontent one should focus on the determinants of expectations and on why and how in some cases they do not match the actual situation of an individual.

A more economics-focused current in the study of discontent dates back over a century, to Karapetoff's (1903) research on the relationship between social satisfaction and economic growth; in particular, with the rapidity with which people are able to augment the amount of goods in their possession. Karapetoff (Karapetoff 1903, 681) found: "The degree of life-satisfaction of separate individuals or of whole societies is measured not by the absolute quantity of goods possessed, but with the rapidity by which this quantity increases". Karapetoff's perspective introduces another kind of comparison in determining people's perception of well-being. Instead of comparing themselves to peers or other social groups, people compare their current situation to their past: they are more satisfied if today they possess more than yesterday. Similarly, Davies (1962) affirms that one fundamental determinant of discontent within a society is economic growth. People tend to be more content, regardless of their position within the distribution of wealth, during periods of sustained growth than during periods of economic stagnation.

The role of comparison with one's own situation and of potential gains or losses in decision making was approached from a different perspective by Kahneman and Tversky in their seminal 1979 work on Prospect Theory. With the support of laboratory experiments, the authors re-elaborated the dynamics of decision making into a new theory in which individuals do not assign values to final assets but on potential gains and losses relative to their current situation. The function they describe is concave for gains and convex and steeper for losses. Thus, people are risk-averse and, in taking their decisions, they value more potential losses than potential gains. This leads to the conclusion that people develop discontent if their current situation is worse now than in the past and such a negative perception is stronger than the positive perception would be in case of upward improvement.

However, the role of economic growth and economic improvement in determining people's satisfaction was partially discarded by another seminal work, that of Easterlin (1974), in which he analyzed the relationship between economic growth and human happiness. Analyzing the link between trends in economic growth and happiness reported in surveys from 19 countries, the author concluded that personal satisfaction is only weakly associated with economic growth in absolute terms. People from poorer countries do not show an overall lower level of personal satisfaction than people in richer ones. He also found that economic growth occurring within one country during a specific period do not seem to improve the overall rate of personal satisfaction within the country. At the same time, the results show that personal satisfaction is strongly associated with individuals' position within the income distribution of their own society. People that are richer within their society are happier than those located in the lower part of the income distribution, regardless of the country's absolute level of wealth. Easterlin explains his findings by recurring to Duesenberry's (1949) theory on relative-status considerations in determining people's

perceptions of happiness: “in judging their happiness people tend to compare their situation with a reference standard or norm, derived from their prior and ongoing social experience”. Since people within one society share similar experiences and cultural references, their norms will tend to collide more with each other than with those of people from other countries.

Easterlin’s use of Dusenberry’s theory has led to a new current of literature analyzing the dynamics of consumption and their relationship to social satisfaction or discontent. For example, Carrol (1998), Dynan et al. (2004), and Lillard and Karoly (1997) have showed that households with higher income have an averagely higher propensity to save and, therefore, a lower average propensity to consume. Hence, according to this approach, consumption works as a compensating activity, in a dynamic popularly known as “keeping up with the Joneses”. Following this line, some scholars have proposed theories of consumption alternative to the traditional neoclassical approach of Modigliani and Brumberg’s Lifecycle Theory of Consumption (1954) and Friedman’s Permanent Income Hypothesis (1957). Bagwel and Bernheim (1996) propose a utility–theoretic model based on the concept of conspicuous consumption. According to the authors, certain goods perform a signaling function to make others know about the subject’s wealth. Palley (2008) constructs a new relative–permanent income model of consumption harmonizing the insights of Friedman’s mainstream theory of consumption with the insights provided by Duesenberry and his relative income theory. In Palley’s model, consumption decisions depend both on the permanent income of the household but also on her comparison of her income to that of the other members of the society i.e., households’ decisions are determined by their “relative permanent income”.

Easterlin’s findings ameliorate and order previous theories regarding the role of economic conditions in determining individual happiness. While they confirm the positive role of upward

changes in one's condition, they also frame these changes within the social order surrounding the individual. If a person's condition improves in relative terms compared to that of most other members of the society, her perception of satisfaction will tend to improve. However, if her situation improves in absolute terms but stays the same in relative terms, her perception will tend to remain the same.

At the same time, the findings of Kahneman and Tversky regarding individual risk aversion show a different dynamic in the presence of losses. Even absolute losses that do not represent a relative worsening of one's position in the society may result in a lower level of personal satisfaction. This is due to another term of comparison not related to the contemporary norms of the society but with the previous experience of the individual or with intergenerational comparisons.

The different strands of literature regarding social discontent tend to converge in the interlacing importance of absolute and relative changes in the situation of single individuals in determining their level of personal satisfaction. Absolute changes interact with two dimensions of comparisons in influencing individual perceptions: 1) an "intertemporal dimension", in which the individual compares her current status with her past and/or the experience of previous generations, and; 2) an "interpersonal dimension", in which the individual compares her situation with that of the other members of her society. The presence of these two dimensions also has significant effects in determining varying levels of satisfaction among different social groups. In fact, two groups located at the same level of the income distribution may have significantly different intertemporal references that determine different levels of satisfaction between their members.

For example, groups that used to be located in a lower part of the distribution may show more satisfaction than a group currently located at the same level, but which saw its position worsening.

In multi-ethnic societies, this is apparent in the different levels of satisfaction recorded among social groups of native-born and those with foreign origins. The latter, often initially located at the bottom of the distribution, may show increased satisfaction when they reach a higher level, although still located in the lower half of the distribution. In contrast, native-born members of the society that see people previously located below their status reaching the same level of wealth and life-style may perceive this change as a relative deterioration in their own status and thus record lower levels of satisfaction. This can have important effects in electoral terms. In fact, groups located at the same level of the income distribution may translate their different perceptions of social upward or downward mobility into support for status-quo candidates or for more critic or even anti-systemic ones.

Another example is given by the difference in personal satisfaction between first and second-generation immigrants. In fact, the reference points of people who immigrated to another country as adults will generally remain those of the society of origin. While their initial position in the new society will be at the bottom of the distribution, any improvement will be judged mostly in comparison with the past experiences and norms of the country of origin. In contrast, second-generation immigrants, born and raised in the country where their parents came as adults will tend to assimilate the locals' norms of comparison. Thus, their location at the lower part of the distribution may easily result in lower levels of satisfaction compared to their parents. This mismatch between first and second generations of immigrants in Western societies has been observed analyzing patterns of radicalization, especially among immigrants and citizens of Muslim origins. For a long time, the problem of radicalization has been associated with low rates of social integration, a problem usually more spread among first generation immigrants, who struggle to learn the language, the traditions, and the behavioral institutions of the new country. However,

recent reports show how radicalization is much more a problem of second and third generations, who usually result significantly more integrated in the society (of which they are often citizens) than their parents (Lyons-Padilla et al. 2015). The intergenerational change in reference points may be at least partially responsible of different levels of personal satisfaction.

In sum, personal expectations are primarily constructed around two comparative dimensions, intertemporal and interpersonal, which concur in shaping individuals' expectations. Proximity, common experiences, and common cultural heritage will facilitate the convergence of individuals toward similar benchmarks and similar levels of perceived satisfaction.

2.2.1. A tridimensional approach to expectations: Life-Course Theory

In the framework of this paper, individual discontent (or satisfaction) is socially determined through mechanisms of comparison that can be roughly classified into two main types: intertemporal comparisons and interpersonal (and intergroup) comparisons. Both these types concur in determining the formation of life-long expectations that are continuously renegotiated. With "intertemporal comparison" we intend the comparison an individual enacts between her current situation, her experience in the past, and the experience of previous generations she has been in direct contact with (for example, her parents). Growing up, a person tends to become accustomed to a certain life-style, and to consider it normal. Furthermore, such a life-style is usually based on the experience of older individuals – mostly family members – who were her primary care givers, and whose experiences become benchmarks for the construction of her own expectations.

The psychology literature on life-course provides some theoretical depth to this approach (for a review see Elder et al. 2003). It concludes that the cultural context in which an individual is raised

provides her with a set of life-long expectations. In every culture some socially recognized phases of each individual's life – such as childhood, maturing to adulthood and becoming a parent – are present. The moments in which a person crosses from one phase to another are usually marked by symbolic rituals, such as marriage, or taking on what is considered a respectable job (or both). Furthermore, such passages are usually expected to occur within a certain age. When practical obstacles hinder a person from achieving such passages, she usually comes to perceive herself (and to be perceived by others) as having failed the parameters that makes her an acceptable member of the society.

In the model presented in this paper, personal discontent is a key element. It is defined here as the mismatch between an individual's expectations – constructed using both interpersonal and intertemporal parameters – and her experienced reality. Such a mismatch may arise from any number of sources. They can be isolated to the single individual or can be the product of wider shocks that impact her society more broadly. In every society, at any point in time, there exist people experiencing discontent. However, such discontent becomes collectively and politically relevant when it involves a significant share of the society's members at the same moment, usually due to exogeneous or endogenous shocks, such as economic crises or conflicts. In the simulations of the model carried out in the next sections we introduce in our generated networks periodic "shocks of discontent" in order to observe, depending on the specific characteristics of the simulated society, how such shocks influence the radicalization of domestic politics.

2.3. The relative value of benefits and costs

In standard models of rational decision making, each available option is evaluated employing schemes to compare benefits and costs (for a review see Medina 2007). In some cases, such benefits and/or costs are treated as equal for all the players involved while in others they vary according to the specific characteristics of each player. In network game-theory models, such as the one proposed in this paper, it is normal to set some parameters – for example, the potential gains of undertaking a course of action instead of another as varying depending on the player considered, while keeping other parameters static and equal for all. Variations are necessary in order to analyze different reactions in different parts of the network while static values serve the necessary parsimony of the model. In models of collective action and rebellion, benefits are usually taken to vary, while costs (associated, for example, with the level of state repression) are treated as equal for all players (see, e.g., Epstein 2002).

2.3.1. The relativity of benefits

In the model proposed in this paper, benefits vary according to the single player considered. Each collective political entity that is present in the society – political parties, formal or clandestine movements, etc. – exerts different levels of appeal according to the person. Some people, for example, may find the message of a certain political movement particularly attractive since it resonates with certain familiar cultural elements which may not be shared with other members of the society. In other cases, the rhetoric of a political party or movement may be addressed specifically to the people sharing some precise characteristics, such as belonging to a certain social class, ethnic group or geographic origin. Their ideological framework may accord a privileged place to these groups to the detriment of those who do not share those specific characteristics.

Obviously, in this case it is highly unlikely that the messages of those without said characteristics will be found attractive.

Another possible factor making a certain political identity more or less effective depending on each individual is the language that underpins its frames. For example, the leaders of certain political parties sometimes employ rather sophisticated rhetoric, rendering their messages—in theory, intended for all citizens – too difficult to be fully understood by poorly educated sectors of the society. If the benefits of a certain political option cannot be identified by some players, for these players they are practically non-existent. In the model presented in this paper, each ideological master frame active in the society in the form of the form of a party, a movement, or a more or less clandestine organization exerts different degrees of attraction on the individuals who approach it depending on their specific characteristics. This means, for example, that if in a society there is only an active opposition group and this group's rhetoric openly discriminates against a certain ethnic group, that group's members are certain not to connect with the opposition even in periods when they are very discontent with the prevailing regime.

2.3.2. The relativity of costs

In the model proposed in this paper it is not only the benefits associated with each option that vary from individual to individual. Costs also assume different values according to the "relative position" of each individual within the society. By "relative position" we mean the location of each individual within the "power distribution", which can be roughly approximated as the distribution of wealth in the society. In the approach we employ, the higher the position of an individual in the "power distribution", the more her perceived costs for getting closer to an alternative political identity are discounted. This understanding of the relationship between relative power—

approximated as position along the wealth/income distribution – and the costs of joining confrontational political behaviors is inspired by Frederick Solt's (2008, 2015, 2012) work on the effects of inequality on political behavior. In his quantitative research on several sets of countries, he has found a positive correlation between one individual's position in the wealth distribution and the possibility that she joins several forms of contentious political action. Solt explains his findings by pointing to the increased influence that the relatively richer can exert on their society's political processes. This higher degree of political power (conferred by higher levels of relative wealth) finds different concrete translations according to the kind of society analyzed. In a Western democracy, for example, it may translate into access to superior education, better jobs, more free time and skills to understand and join protests and other contentious political activities. In more authoritarian societies, it may be explained by enhanced access to resources to dodge state repression, such as the possibility to bribe of to use privileged contacts with powerful political actors to avoid the costs associated with contentious activities. Furthermore, Solt found that the effect of relative position is positively correlated to general level of inequality characterizing the society. In more equal societies the effect is weaker, while it increases with inequality rates.

Therefore, in the model proposed in this paper costs associated with adhering to a certain movement/party are discounted by two parameters: one related to the individual's relative position within the "power distribution" and the other related to the general level of inequality characterizing the society.

2.3.3. From episodic to continuous collective action: the process of political radicalization

In several traditional approaches to contentious politics (for a review see Medina 2007), it is the origins and dynamics of collective action emerge as the core features that explain contentious

phenomena. In such approaches, collective action is treated as an episodic event, enacted and developed when the right circumstances occur. In Olson's model and its derivations (Olson 1965), collective action is said to occur when the individual moves from a "static situation" (no action) to an "acting situation" (joining a collective endeavor). Here, the individual's decision to move from one state to the other follows a benefit-cost calculation (Olson 1965; Schelling Thomas 1960; Riker and Ordeshook 1968; Tullock 1971; Medina S. 2007). However, the modern approach to contentious politics dismisses the focus on collective action as the core of contention as too narrow to satisfactorily explain the various cognitive, environmental, social mechanisms occurring before, during, and after such episodes (McAdam et al. 2001). In this approach, contentious collective action is treated as a subset of a wider set of interconnected collective actions that characterize one individual's existence within her society and that are influenced by her socially determined values and beliefs. The radicalization or deradicalization of such beliefs and values can occur during non-contentious social interactions as much as during contentious ones, which emerge as simple consequences of other phenomena determining a contentious stance.

The model presented in this paper aims to explain the mechanisms that lead single individuals to take a contentious stance, regardless of whether such mechanisms occur during periods of contentious collective action (protests, sit-ins, rebellions, terrorism attacks, etc.), non-contentious collective action (political party gatherings, electoral campaign events, etc.), or simply during daily "routine politics", i.e., collective interactions with other members of the community on political topics. We aim to distinguish our work from the classic literature on collective by moving away from the conception of contention as an "episodic" series of events linked to the occurrence of collective actions. Instead, we adopt a conception of contention as an *ongoing process*—a "continuous" stream of collective interaction and personal re-elaboration. Therefore, the

mechanisms described by the model are assumed to be going on, at all times, even when the absence of external shocks, episodes of contention, or other visible domestic changes make their existence invisible to the public eye: in such cases they can be simply considered in "equilibrium". In particular, this paper focuses on the circumstances in which such a continuous flux of collective interactions and re-elaborations of personal identities within a community leads a significant share of its members to adhere to anti-systemic ideological master frames and assume a contentious stance toward the prevailing regime. We call this process the "radicalization of politics". Although in the last decades the term "radicalization" came to be utilized mainly to describe the process leading individuals to embrace some specific violent anti-systemic ideologies, such as Jihadism or right-wing terrorism, in this paper the term is entirely neutral, normatively speaking. In this context, "radical" is any political entity that seeks to subvert – partially or completely – the current political order, be it a democracy, a dictatorship, an absolute monarchy, or whatever. In the case of a society ruled by a theocratic autocracy, a secular movement aiming to establish a democratic regime is "radical", and the same can be said of a movement aiming to substitute a democratic regime with a totalitarian dictatorship. This paper is not concerned analytically with the content of the ideological master frames underlying the dominant or the alternative political entities (parties, movements, and so forth) confronting each other. Rather, we seek to analyze the causes and the dynamics underlying the collective process leading individuals to gradually modify their political identities and withdraw their support from a prevailing regime in favor of (partially or completely) anti-systemic political entities.

3. The model

Our model represents a society in which the population can choose to support either one of two organized political entities: one initially majoritarian, called "the regime", and one initially minoritarian, called "the opposition". We limit the number of political entities to simplify the political space and render as clear as possible the dynamics the model describes. However, the model does not exclude the possibility of integrating more than two political entities, especially when describing multiparty systems such as liberal democracies.

Both the regime and the opposition are characterized by their own ideological master frame i.e., a coherent collection of explanatory frames allowing the people who adopt them to make sense of their surrounding society and their role in it. Differences between regime and opposition can emerge in diverse fields, from socioeconomic concerns to value preferences e.g., orientation toward redistribution policy (see, e.g., Acemoglu and Robinson 2005), secular versus religious ways of life (see, e.g., Inglehart and Welzel 2005), and so on. The regime needs the support of the majority of the citizens; when it ceases being majoritarian, a regime change occurs, and the opposition becomes the new ruling party. At the onset, most citizens support the regime, but, depending on changes in economic and social conditions, a number of citizens may change their beliefs and begin to support the opposition.

The **political space** is a 0–1 segment, in which positions closer to 0 represent the regime's stance, and points closer to 1 represent the opposition supporters. It is possible to interpret the binary as reflecting the classic left–right divide, but alternatively simply as a preference for a set of frames that better serve people's need to explain the current reality they live in.

The position of the regime's master frame is in point $x = 1/3$. Any point close to 1/3, but not exactly on 1/3, reflects positions in which the ideological frames of the regime are prevalent, but which contain also elements from other master frames e.g., that of the opposition. The opposition master frame is located in point 1. At the onset, point 1 is the most radical position present in the society.

Each individual has her own personal level of satisfaction, which is the product of a comparison between her socially constructed expectations and her current situation, as detailed in section 2.2. An individual may find her personal discontent, when present, readily explained by elements in the regime master frame. Thus, her discontent will not translate into opposition to the prevailing order. Or, it may find better explanation and potential solutions in the opposition master frame, in which case her discontent will be directed against the current regime. The appeal of each master frame depends on several factors analyzed in section 2, such as cultural resonance and/or preexisting beliefs.

This personal stance may not find direct expression in the public position of individuals, especially if we are dealing with non-democratic regimes. Furthermore, a person may be surrounded by people who do not share the same position regarding the regime or the opposition. In such a case, a person may be influenced and led to behave differently from what she would do in isolation. In the long run, interactions with non-likeminded people may even lead a person to slowly align her private position with that expressed prevalently by her net of social relationships, a process defined as "cognitive adaptation". Therefore, we assume that an individual's political position is expressed by two interdependent variables: her private and her public position.

The agent's position in the **private political axis** is affected by the "objective" economic and social conditions in which she lives and the attraction exerted on her by the existing ideological

master frames. The outcome is a private psychological stance that can be more or less coherent with the agent's actual public behavior.

In fact, public behavior is determined by each person's position on the public political axis, which represents how the private position is translated and revealed by the person's public actions. It can be the case that an individual behaves as he thinks, so that the public and the private positions overlap, but it can also be the case that the public is different from the private stance, especially when people live in a social context populated mostly by non-likeminded people. Thus, the individual's public position within the society's political continuum is not only determined by her private stance but also by the "network effect" i.e., by the expressed positions of her friends, parents, or colleagues.

Finally, a person's public position translates into political behavior, which in this model can take the form of support either for the regime or for the opposition. Hence, support for regime or opposition is a binary variable. We elaborate each citizen's political behavior considering which political parties/movements active in the society is the closest to the individual's public stance. In fact, while a person in her daily life may express positions and ideas that are not necessarily perfectly overlapping with any of the available options, when she is called to formally take one side she will have to join the available political organization that she feels as the closest to her ideas. Thus, in this case, she can choose only between the regime and the opposition.

What we described so far is the simple dynamic guiding one's choice of political behaviors solely in function of one's personal stance and social surrounding. However, exhibiting certain political leanings in some societies can be costly and dangerous. We define these characteristics as the

society “repressive degree”. In our model, such repressive degree is modeled as the costs of adhering to political organizations that are opposing the dominant one. These costs have different effects for each individual, depending on their position within the “society hierarchy”. The social hierarchy is a 0–1 segment which represents the individual position in the distribution of wealth, income, media control, and so on; with points close to 0 standing for lower class positions and the ones close to 1 being the upper class positions. In general, the social class hierarchy reflects each citizen’s different degree of access to power. We define this hierarchy as the “power distribution” of the society, and it can be approximated to the distributions of wealth and/or income. Each citizen’s position within the power distribution reflects into her capability to bear the cost of repression or elude it, taking advantage of wealth or personal connections, according to the theory presented in section 2.3. The effect of the power distribution is stronger in more unequal society while is mitigated in more equal societies.

The main social outcome of the model for each agent is switching from supporting the regime to supporting the opposition (or the opposite). We consider the **public political** space and we calculate the number of regime’s and opposition’s supporters. If the latter are more numerous than the former, then the current regime falls, and the opposition becomes the new regime.

Such an outcome is determined by changes in citizens’ private positions, which are reflected in changes in their public positions. Changes in public positions can be caused by both changes in the private stance and in the composition of their social surrounding. Each citizen has the faculty to gradually modify her network of social relationships and, thus, build a social neighborhood populated by persons having public positions that are closer to her private one. The influence of

the network effect on each person's public position and her faculty to create new social links or cut old ones depend on two specific characteristics of the society under analysis:

- **Interconnectivity**: the maximum distance possible for the formation of a connection between two persons. Such a distance may be geographical or social. In a scarcely interconnected society, people not physically living close or belonging to rather different social groups may find it hard to even meet each other. In contrast, in a highly interconnected society it is easier for people to be in contact with individuals who are physically distant and/or socially diverse (Tufekci 2018).

- S**ocial openness**: the degree of rigidity of and the influence exerted by social ties in a society. The network effect can vary in strength depending on the degree of tolerance that people show for diverse opinions and behaviors. Conservative, traditional societies may be less tolerant leaving people in them subject to stronger network effects. Analogously, such societies tend to make it more difficult for a person to reshape her network of social relationships by cutting old ties – often established on a family or kin-ethnic basis – and creating new ones – especially with people from different social environments. Additionally, in scarcely tolerant societies people may be pushed to cognitively adapt faster to their social surrounding's average opinions in order to feel accepted. In contrast, more open societies show superior tolerance for diverse opinions and behaviors and tend to make it easier for people to reshape their social ties.

3.1. Variables and parameters of the model

Agents (citizens) V are represented as nodes of a graph $G(V,E)$, with arcs $(i,j) \in E$ (for $i,j \in V$) representing links between the agents. Each citizen is characterized by two fixed parameters and three variables whose values change with time.

The two fixed parameters are:

- Position within the power distribution: It is represented by a value ranging between 0 and 1. Values closer to 0 stand for lower class positions, while points closer to 1 represent upper class positions.
- A physical position within the a 10x10 square representing the society. Such a position influences the connections that each person creates at the beginning of her life. Each society is characterized by different levels of interconnectivity, which represent the maximum distance within the 10x10 graph allowing two individuals to "see" each other and, potentially, to create a link.

Furthermore, each citizen $v \in V$ is characterized by a status vector $=(x_{v,t}, y_{v,t}, h_{v,t})$, where $x_{v,t}$ represents the private political identity of agent v in time *t* and $y_{v,t}$ represents its public political stance in time *t*: her political identity once influenced by her surrounding network of relationships. $h_{v,t}$ represents its position within the power distribution, ranging between 0 and 1.

- The private political identity of the individual *i* at time *t* can be written as:
  - $x_{i,t} = f(\beta, \alpha, \lambda, \overline{y}_{G_i,t-1})$ (1)

where $x_{i,t}$ represents the individual's position in isolation, as a point on the political line. It is a function of parameter β, that represents the individual's attraction for the opposition's political

master frame and it works as "multiplier" of the individual's dissatisfaction with the dominant regime. According to the theory exposed in section 2.1.3, β varies according to the opposition master frame's capability to be resonant and attractive to each individual. α represents dissatisfaction, which goes from 0, meaning no dissatisfaction (her expectations are perfectly matched by regime reality), to a positive value. There is dissatisfaction when agent's expectations do not match her actual status. Finally, $\bar{y}_{G_i,t-1}$ represents the average public stance at time t-1 of her social neighborhood ($G_{i,t-1}$) while λ is the friction parameter regulating the convergence of the individual's private stance toward the average stance of her social neighborhood (its functioning is illustrated in equation 7).

- The political identity of individual *i* once influenced by her surrounding network of relationships can be written as:
    - $y_{i,t} = x_{i,t} + \delta(\bar{y}_{G_i,t} - x_{i,t})$ (2)

  where $y_{i,t}$ represents the individual's position as a point of the political line once influenced by its network of social relationships; $\bar{y}_{G_i,t} - x_{i,t}$ represents the difference between the individual i's private stance and the average public stance at time t of her social neighborhood ($G_{i,t}$) i.e., the people whom individual i has a social link with. $\bar{y}_{G_i,t}$ can be written as:
    - $\bar{y}_{G_i,t} = \frac{1}{N_{G_i}} \sum_{j \in N_{G_i}} y_{j,t}$ (3)

  Finally, $\delta$is the friction parameters determining the level of influence exerted by the network effect on each individual's private stance.

- The political behavior of individual *i* is a function of her public political stance – i.e., her political identity once influenced by her social neighborhood – and of the available political entities she can join according to her stance. This can be written as:
    - $z_{i,t} = f(y_{i,t}, a, b, ...)$ (4)

where $z_{i,t}$ represents the final choice of individual *i* among the available political entities. $z_{i,t}$ is binary variable taking value 1 if in time *t* individual *i* is supporting the opposition or taking value 0 if *i* is supporting the regime. With respect to the political space, the individual supports the closest alternative available, once discounted by the political cost of supporting the opposition. In repressive societies, the choice to support a political entity that is not the dominant regime is often subject to repressive measures. However, such measures do not affect all citizens in the same way. As explored in section 2.3, the cost of repression for each citizen vary according to the citizen's position within the power distribution. Hence, costs are different for each citizen and are regulated according to the following rule. Let *m* be a parameter describing the repression level of a society, with *m* = 0 the society is fully democratic (no repression cost), *m* < 0 the society is repressive.[4] The supporting rule is:

$z_{i,t} = 1$ if $y_{i,t} > mh_{i.t} - m + 2/3$ (5)

$z_{i,t} = 0$ otherwise. (6)

[4] *m*= –1/3 is the last level in which any citizen *i* can support the opposition having a value of $y_{i,t} \leq 1$ i.e., the poorest citizen ($h_{i.t} = 0$ supports the opposition if $y_{i,t} = 1$). With values smaller than –1/3 poorer citizens support the opposition only if their public stance is bigger than 1 ($y_{i,t} > 1$).

It can be seen that, if $m < 0$, then people of the lowest class, e.g. when h is close to 0, are less keen to support the opposition than the people of the upper class, e.g. h close to 1. The rationale of the formula is explained in Appendix I.

At each time t individuals can cut ties with other individuals whose stance is far from theirs and establish new links with individuals more likeminded. Furthermore, at each time t a person's personal stance will converge toward her social neighborhood's average stance due to the dynamic of cognitive adaptation. We can write the cognitive adaptation dynamic as:

- $x_{i,t+1} = x_{i,t} + \lambda(\bar{y}_{G_i,t} - x_{i,t})$ (7)

where $x_{i,t+1}$ is the private stance of individual i at time t+1 and λ is the friction parameter regulating the convergence of the individual's private stance toward the average stance of her social neighborhood.

The velocity and the degree of the changes occurring within the network $G(V, E)$ are determined by an algorithm regulating the dissolution of old links and the creation of new ones (see Appendix II) and 5 fixed parameters which vary according to the society under analysis. We rewritten this as:

- $G^{t+1} = H(G^t; \delta, \lambda, d, p, c)$ (8)

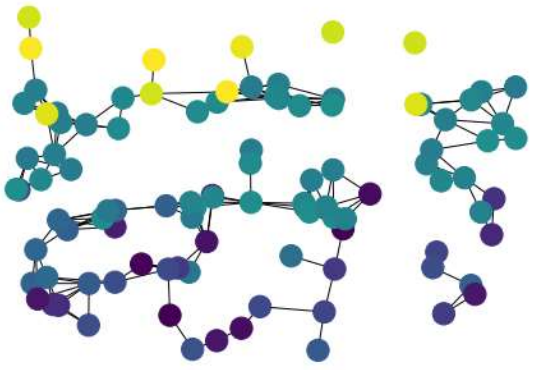
where G^{t+1} represents the network at time t+1; G^t represents the network at time t; and H represents the algorithm regulating the dissolution of old links and the formation of new ones; δ is the friction parameter determining the influence of the network effect of each individual's public

stance; λ is the friction parameter regulating each individual's cognitive adaptation; d is the maximum distance allowing for the formation of a link between two citizens; p is a parameter ranging between 0 and 1 describing the probability that a person is able to cut an existent edge with a not-likeminded member of her social neighborhood or to establish a new edge with a likeminded person who is not yet part of her social neighborhood; finally, c represents the costs that the individual may occur in if she choices to support a political entity opposed to the dominant regime (the functioning of this parameter is explained in Appendix I).

3.2. Example

We can visualize a network of 100 nodes immediately after its creation, as shown in Figure 1. Each node represents one citizen. The tonality of each citizen's color is linked to their position within the power distribution: the darker its color, the lower the node's position within the distribution. The nodes are located in the graph depending on their position in the power distribution: poorer citizens are located at the bottom, while richer people are located in the higher positions. This geographic distribution is meant to better simulate real societies where usually people live closer to other people having similar socioeconomic conditions.

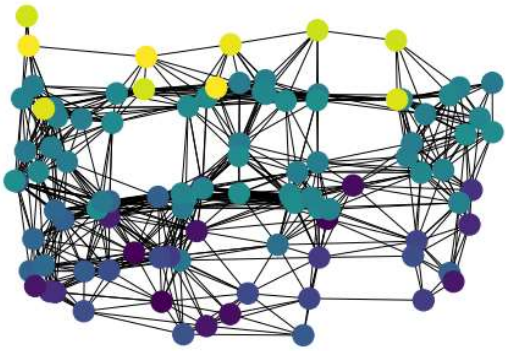
Figure 1. Representation of the network according to each node's power position



Notes: The nodes are colored according to their power position value: the higher its value, the brighter the color.
Source: Authors' own elaboration.

The quantity of edges between nodes depends on the parameter d representing the maximum distance allowing for the formation of a link between two nodes. For example, if we double the value of d we obtain the following network:

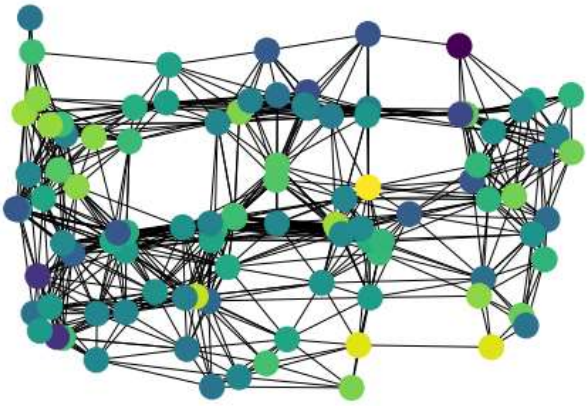
Figure 2. The network after augmenting the value of *d*



Notes: The nodes are colored according to their power position value: the higher its value, the brighter the color.

We can visualize the same network also according to the public stance of each citizen:

Figure 3. The network visualized according to each node's public stance



Notes: The nodes are colored according to their public stance value: the higher its value, the brighter the color.

At this point, which can be defined t=0, the number of edges in the network is solely determined by the value of parameter d: if the maximum distance allows for it, two persons have an edge.

However, in the current situation most people have edges also with not-likeminded individuals. Therefore, with time they may choose to cut ties with such individuals and establish new ties with likeminded people until their social neighborhood reflects more closely their private stance. At the same time, while they try to delineate their social neighborhood according to their private stance, their social neighborhood gradually shapes their private stance through the dynamic of cognitive adaptation. The result is a double dynamic of convergence: on one side, people reshape their social neighbors by cutting ties with non-likeminded individuals and forming ties with likeminded ones; on the other, each individual's social neighbor shapes gradually her private stance.

We say that a society is in equilibrium when the distance of each citizen's private stance and the average public stance of her neighbors does not exceed 0.01. At this point no citizen has reasons to further modify her neighborhood. It is possible to write this condition of equilibrium as:

- $|x_{j,t+x} - \bar{y}_{G_j,t+x}| \leq 0.01$ (9)

  for every node $j \in G$ at time $t + x$

Once this condition is satisfied the system stops changing, so that:

- $G_{t+x} = G_{t+x+1}$ (10)

At this point, in order to spur a new dynamic evolution within the system we need to introduce a shock i.e., a sudden change in the private stance of a significant share of the population. This could be the result of a significative exogeneous or endogenous event, such as an economic crisis or a conflict. The effects of such a shock may be highly variable: a greater or lesser part of the population may be affected, and the characteristics of those citizens more (or less) impacted by the shock may differ (for example, in terms of relative wealth and income).

As an example, we can introduce a shock in any time *t* that impacts a random half of the population and increases the personal stance value of each by 0.3. To understand how such shocks impact the value of x_i we must consider the parameters illustrated in equation 1. Since λ is a constant, $\overline{y}_{G_i}$ does not change when the system is in equilibrium, and we keep the value of β constant for each citizen, the shocks that we introduce impact each citizen's α value, which represents the mismatch between a person's expectations and her actual situation. Hence, socioeconomic shocks widen such mismatch, worsening the individual's current situation. Further, we can stipulate that this increase of 0.3 is discounted for each citizen according to her position within the power distribution i.e., richer people suffer relatively less than poorer people from the shock. We can write this as:

- $x_{s,t+1} = x_{s,t} + 0.3(1 - h_s)$ (11)

  for citizens *s* drawn with probability $p = 0.5$ from the whole population,

At this point, the system is no longer in equilibrium, since now for numerous citizens $| x_{j,t+x} - \overline{y}_{G_j,t+x} | > 0.01$. Thus, these citizens will start cut ties with not-likeminded neighbors while attempting to establish new ties with likeminded individuals until a new equilibrium is reached. In reshaping their neighborhoods and adapting cognitively to the prevalent political positions existing in them, citizens may be led to change their public positions and switch their support from the regime to the opposition (or the opposite). A significant number of shifts from regime to opposition would lead to an increased share of opposition supporters and – when such a share is greater than 50 percent of the population – to regime change.

4. The simulations

This section presents the results of the simulations conducted after translating the model presented in the previous section into Python code. The simulations were carried out using different parameter settings to generate diverse social contexts. Two main benchmark societies were created:

- The first characterized by a socially closed, repressive and scarcely interconnected social system, which is here defined as "dictatorship";
- The second characterized by an open, virtually non-repressive and highly interconnected system labeled "open democracy".

This section proceeds as follows. The first subsection details the methodology employed for the simulations. The second presents the results of the simulations on the two benchmark societies in their different versions.

4.1. Methodology and mechanics of the Python simulations

Appendix III contains the Python code of the simulations built on the theoretical model presented in section 3. This subsection highlights some main specific features and assumptions underlying the Python version of the model.

4.1.1. Preliminary assumptions

We make three preliminary assumptions in developing this model. The first—presaged in the theoretical explanation of the model in section 3 – is that systems evince only two political master frames. Thus, in all the simulations in this paper we have a dominant master frame (that of the

regime), which at the beginning is embraced by most citizens, and an opposition master frame, which at the beginning is embraced only by a fringe but grows after system shocks. In each society, these master frames are assumed to be manifested by different types of organizations. For example, in multiparty democracies the relevant entities will be political parties, social movements, or clandestine groups. In a dictatorship, the master frame will be propagated by the ruling party or clique (which will claim a monopoly on political organization and action) and the opposition master frame will be circulated subversively by a clandestine (or semi-clandestine) movement that is seeking to topple the regime.

This assumption simplifies reality in the interest of analytical parsimony. For example, the presence of only two active master frames is particularly problematic in the simulation of open democracies, which are usually characterized by the presence of many parties and movements. The decision to restrict the number of active master frames to two was motivated by the desire to keep the simulations and their results as simple and comparable as possible. In fact, having only two entities contending for the favor of the population allows us to directly compare the results and better appreciate the dynamics at work. In the case of democracies, a useful simplification is to collate within the dominant master frame all those pro-status quo perspectives/agendas, even when they manifest through parties electorally competing against one another. Similarly, the opposition master frame can usefully represent the agenda of all those parties and movements that aim at destabilizing the power balance within the system to various degrees. Their target may be to change the institutional framework entirely, for example by installing an authoritarian regime (if the current regime is a democracy), or they may aim to modify the dominant system in a more limited way, by discarding from power the parties currently dominating the political scene, as many modern populist parties do.

Our second theoretical assumption relates to the independence of the two ideological master frames specified from the political environment. We assume that they are impervious to the changing political sentiments of the population. In other words, in the simulations conducted in this paper, the content of both dominant and opposition master frames does not change with shifts in political sentiment occurring among the population. This is obviously a theoretical simplification of reality. In everyday politics, we expect political parties and personalities to modify their positions when they perceive that popular sentiment is moving in a certain direction. In fact, their success often depends on their ability to interpret such changing sentiments and adapt accordingly. We have seen this in several contexts. In the Arab world, for example, several autocratic regimes previously characterized by strictly secular ideologies modified their rhetoric during the 1980s and 1990s by including more religious symbolism in order to limit the attraction that political Islam was increasingly exerting on Arab societies (see, e.g., Wolf 2017). Analogously, although in a rather different context, the recent surge of populist movements in Western countries led many so-called mainstream parties to modify their rhetoric by including populist themes.

However, since the primary aim of our model is to analyze the dynamics of change in the political beliefs and behavior *within a population*, the master frames active in the society – and their organizational manifestations (movements, parties, etc.) – are kept fixed in order to focus solely on the dynamics at the population level. Needless to say, the evolution of active master frames and their interaction with evolving political positions within the population will certainly be the focus of future research and will possibly inspire extensions of the present model.

Third, we assume that system shocks have differing effects on various segments of the population, the poorest being hit the most. In most simulations conducted in this paper the shocks were kept

unequally distributed in two ways. First, we limited those impacted by each shock to exactly one-half, and each time that one-half was randomly selected by the software. Second, the citizens hit by a shock are affected unequally by it, according to the position of each individual within the power distribution: the poorer a citizen the more she will be affected by the shock. On the opposite, richer people are relatively less hit. This differentiation is introduced to make the simulations more realistic: when economic crises, or conflicts, occur, usually poorer people are more directly affected by their effects, while richer people can more easily avoid the worst effects of these events (see equation 11). We remark that being subject to shocks may make citizens' private and public stance surpass the threshold of 1, that has been fixed at the beginning as the extreme position of the radical movement.

4.1.2. The parameters under analysis

The purpose of our simulations is to test the effects of shocks introduced into different kinds of societies on the political stance and behavior of people living in them. These different societies are differentiated by diverse values on these parameters, which are set at the beginning as follows:

- *Level of repression*: parameter c in equation 8 is a negative value (the maximum is 0 and potentially it goes to minus infinity) representing the repression exerted by the regime against people adhering to an anti-systemic master frame, with 0 representing no repression (for the mathematical rational behind these values see Appendix I).
- *Level of social openness*: Social openness is described by three parameters. The first parameter, p in equation 8, falls between 0 and 1 (0=no probability, 1=100% probability) and represents the chance that each citizen will break one edge with a neighborhood node (one whose political identity is far from her) and to create an edge with another node, currently not in her

neighborhood, but whose political identity is close. The second, δ in equation 2, falls between 0 and 1 and it represents the level of influence that the social neighborhood exerts on a node political identity (0=no influence, 1=maximum influence). In close and intolerant societies people are forced to show a high level of compliance with the average political position of neighbors. Conversely, the compliance level decreases in open and tolerant systems. The third parameter, λ in equation 7, represents the friction of cognitive adaptation. It falls between 0.001 and 0.01 and describes how fast one person's private stance is affected by her neighbors. When societies are not tolerant for diverse opinions, this parameter is big, while it is smalle1r for open and tolerant societies. In our simulations, we let p be free between 0 and 1, then δ = 1—p, $\lambda = \delta$ /10.

- *Level of interconnectivity:* Parameter *d* in equation 8 is the maximum distance within which an edge between two nodes can be established. When this parameter is low, it means that each node can only get in contact with other nodes located close to it in the graph. On the opposite end, when this value is high each node can also get in contact with nodes located far from its position in the graph. Our simulations are run on nodes located in a 10x10 grid square, so we found reasonable values for *d* ranging from 1.0 to 5.0.
- *Level of inequality*: Inequality in this paper is constructed according to the results of the work of Gabriel Palma (2011), who claimed that the elite is defined as those in the upper 10% of the income scale, the working class is the bottom 40%, and the middle class between the 40% quantile and the 90% quantile. To account for societies with different level of inequalities, as, for example, measured by the Gini index, we must vary the percentage of the population belonging to different classes. More formally, we considered three classes:
  - The elite, corresponding to a fraction f_e of the population;

- The middle class, corresponding to a fraction f_m of the population;
- The poor, corresponding to a fraction f_p of the population;

We impose $f_e = 0.10$, while vary f_m and f_p vary according to different values of the Gini index, namely values: 0.30, 0.38, 0.40, 0.42. For example, the Gini index of 0.30 corresponds to a society characterized by mild inequalities (like Western Europe) with class fractions $f_p = 0.40$ and $f_m = 0.50$.

4.1.3. The dynamics of the simulations

Once the network, with its nodes and edges, has been created, a first round of simulation is launched to bring the simulated society to its first state of equilibrium.

Each iteration *t* is characterized by four actions carried out simultaneously by each node:

- *Neighborhood reconfiguration*: at each reiteration each node has the possibility of establishing a new edge with a node outside its neighborhood whose public stance is close to its private one ($|x_{v1,t} - y_{v2,t}| < 0.5$) and whose position is within the distance set by the level of interconnectivity. If potential neighbors with these characteristics are present, the node has a chance of establishing an edge with one of them. This chance is determined by the level of social openness. The system extracts randomly a value between 0 and 1 and if the value extracted is smaller than the first subparameter of the level of social openness set at the beginning, the edge is established. Analogously, at each reiteration each node has the possibility of breaking one edge with one neighbor whose political identity is far from its ($|x_{v1,t} - y_{v2,t}| > 0.5$).

- *Cognitive adaptation*: at every reiteration each node's level of personal discontent adjusts at a slow pace toward the value given by the average public stance of its neighbors. The pace of the adjustment is determined by the **cognitive adaptation** and **social openness** parameters.
- *Political stance reconfiguration*: at every reiteration each node recalculates the value of its public stance according to the changes that have occurred in its neighborhood and in its private stance. The influence of her neighborhood on an individual's stance is determined by **social openness** parameters.
- *Political behavior reconfiguration*: Once its political stance has been reconfigured, each node adjusts its public behavior (support for the regime or for the opposition) accordingly.

Reiterations continue until the system reaches a state of equilibrium. The state of equilibrium is determined by a situation in which the difference between every node's private stance and the average public stance of its neighbors is less than 0.01 ($|x_{v,t} - \overline{y}_{G_v,t}| < 0.01$). In this situation there is no mismatch between the individual's public stance and the political position she would adopt in isolation – it is no longer the case that any node needs to reconfigure its neighborhood and to cognitively adapt.

4.1.4. Two benchmark societies: "dictatorship" and "open democracy"

Since the parameters included in the software are numerous, hundreds of different combinations become testable in our Python simulations. However, to respect principles of clarity, parsimony, and adaptability to real-life examples, we elect to start our experimentations by pinpointing the characteristics of two, opposite benchmark scenarios: dictatorship and democracy. We depart from

these two benchmarks – constructing different configurations of the parameters under examination – to isolate the role played by each parameter in determining the robustness or the fragility of a specific society when tested by subsequent shocks of diverse sizes. In order to appreciate directly the effects of each parameter, we conducted multiple tests within one configuration varying the values of one or two parameters while keeping the others unchanged. Each time, we begin testing the two benchmark scenarios of dictatorship and democracy and then move to hybrid configurations. Table 1 reports the initial parameters of both societies.

Table 1

	Dictatorship	Democracy
Chances to change neighbors	0.2	0.8
Network effect friction parameter	0.8	0.2
Cognitive adaptation friction parameter	0.08	0.02
Interconnectivity	1.5	4
Inequality (Gini Index)	0.30	0.30
Repression level	-0.5	1

As reported in Table 1, in both the initial settings of dictatorship and democracy we kept inequality equal, at 0.30. This is because, although dictatorships tend to be more unequal, inequality is often correlated with high levels of per capita income, which nowadays is mostly a characteristic of democracies. Repression levels are not brought to the extremes in both cases to render the two benchmarks more realistic: democracy is kept at 0.1 (and not 0) because differences in terms of access to power between rich and poor citizens are not only caused by repression. As proved by Solt (2008, 2015), rich people have greater access to politics due to other factors such as superior education levels, more time to dedicate to political activities, or more resources to make their voices heard in the political debate (for example, by owning a newspaper or a TV station). In the dictatorship the repression level is set at 0.5. In this scenario people in the bottom and the bottom–

middle classes would not join the opposition even if the value of their public political stance was 1. To persuade them to join the opposition their values must be higher than 1 (for the mathematical rationale of the repression level parameter see Appendix I).

We used these two model societies as benchmarks to test the role of each parameter on the robustness to shocks of different configurations of the other parameters. In the next section we present the most salient results for each parameter.

4.2. The results

In this section, we present the main results emerging from the simulations we conducted translating the model presented in the previous section into Python code. We created networks of 100 nodes characterized by diverse configurations of parameters varying according to the aspects under analysis.

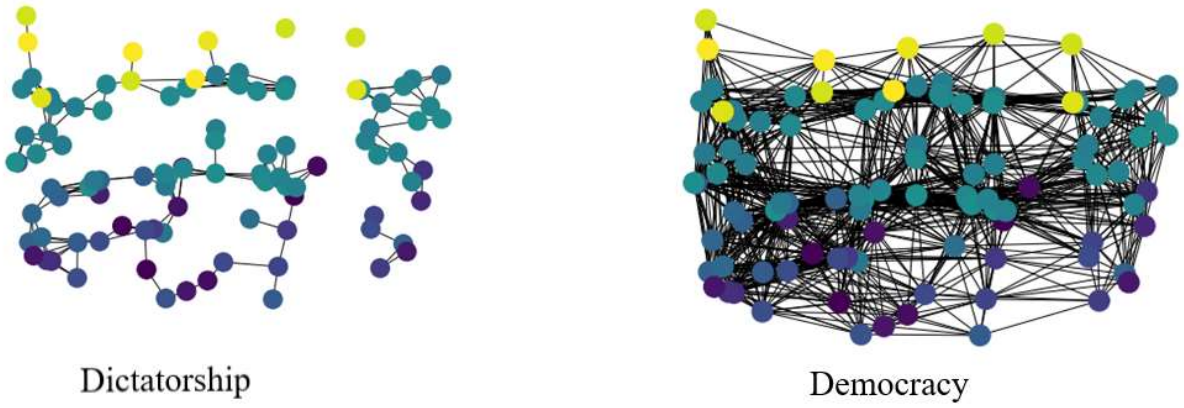
In each simulation, the networks' nodes are assigned initial values determining their private stance, public stance, political behavior, position within the power distribution (power position), and geographical position within the graph. The values of private stance and power position are randomly assigned. The geographical position within the graph depends on the node's power position value – with the richest located in the upper part of the graph, the middle class in the center part and the poor in the lower part – while the public stance value and political behavior value depends on the node's private stance and the average stance of its neighbors in the graph. The initial number of edges between nodes depends on the interconnectivity level set at the beginning. Once the network is created, the simulation runs until a first equilibrium is reached. At this point we introduce random exogenous shocks, as described in equation 11. After each shock we let the simulations run until the network reaches a new equilibrium. Then, we proceeded

analyzing the main changes that occurred within the society after the shock. We repeat introducing new shocks until the number of opposition supporters became majority, which means that the regime changed. In some cases, for comparative reasons, we kept introducing shocks also beyond this point.

4.2.1. Dictatorship vs democracy

We now proceed to discuss the tests of the two benchmark societies according to the configurations outlined in Table 1. We start by creating two networks and letting the simulations run until two equilibria are found. In both these initial equilibria all citizens support the regime. Figure 4 shows the two resulting networks, colored according to the position of each node within the power distribution.

Figure 4. Connections and power distributions under dictatorship and democracy

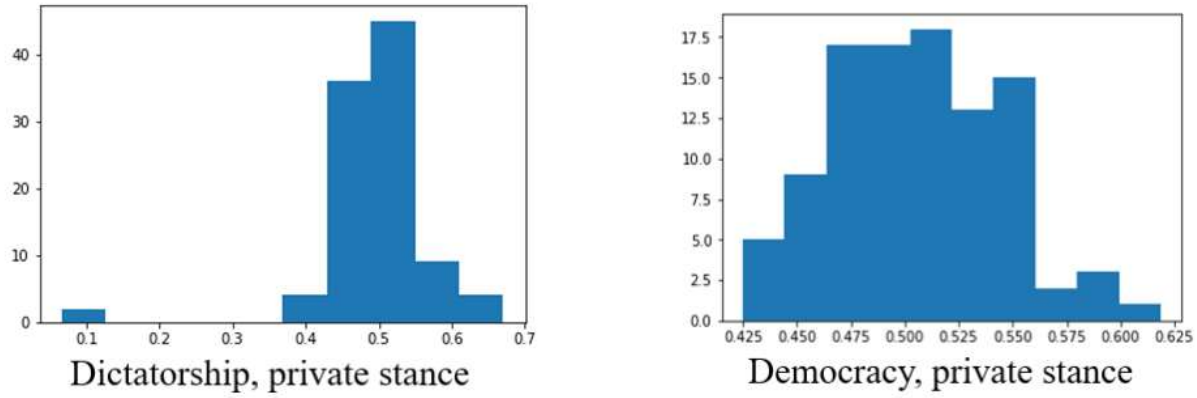


Notes: The nodes are colored according to their power position value: the higher its value, the brighter the color

The main difference between democracy and dictatorship is the different interconnectivity levels. The low level of interconnectivity in the dictatorship (1.5) means the system has a rather low number of edges (321). This means that citizens will be more easily isolated into small cliques and interconnected with individuals located closer to them both geographically and socioeconomically.

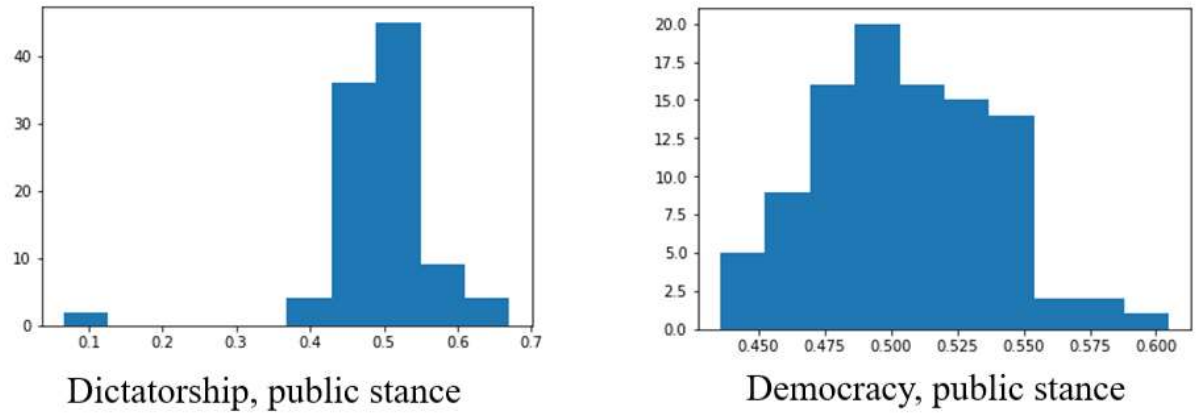
Figure 5 and 6 show the distributions of the public and private political stance in the two systems, respectively.

Figure 5. Private stance distributions under dictatorship and democracy



Notes: The x axis represents the range of private stance values while the y axis represents the number of citizens (on a total of 100)

Figure 6. Public stance distributions under dictatorship and democracy



Notes: The x axis represents the range of public stance values while the y axis represents the number of citizens (on a total of 100)

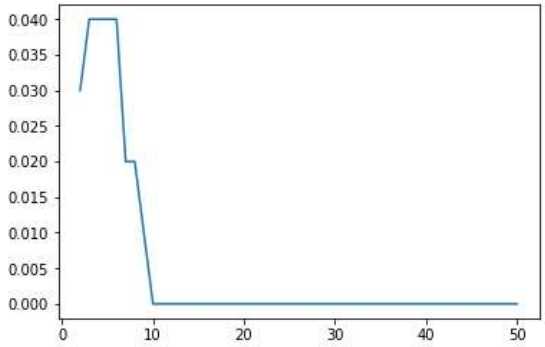
As can be seen from Figures 5 and 6, the equilibria distribution of private and public opinions under the two regimes are remarkable. Democracy led discontent to a narrow range of political opinion, while the same range under dictatorship is wider. In both cases, the averages are similar. The fact that under dictatorship the opinion distribution is spread more broadly reflects the lower level of interconnection among citizens. In contrast, in the democracy all citizens' stances are

positioned within a rather small interval. This is due to the higher level of interconnectivity, which allows for more exchanges across the entire network and, thus, a convergence toward a narrower range of viewpoints.

First shock

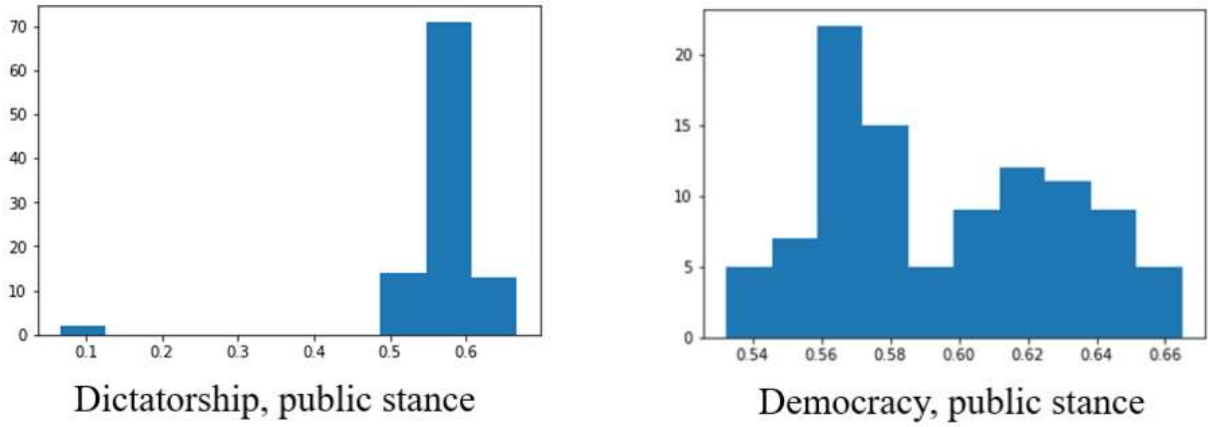
We now proceed to discuss the results from the introduction of the first shock. The new equilibrium is reached after 32 iterations in the dictatorship and 49 in the democracy. In both equilibria all citizens still support the regime, but in the democracy during the iterations we observed a spark of protests at the beginning of the period that was later reabsorbed, as shown in Figure 7.

Figure 7. Trend of opposition support in democracy after the first shock



Notes: The x axis represents the progression of the iterations while the y axis represents the share (between 0 and 1) of citizens supporting the opposition

Figure 8. Public stance distributions after the first shock



Notes: The x axis represents the range of public stance values while the y axis represents the number of citizens (on a total of 100)

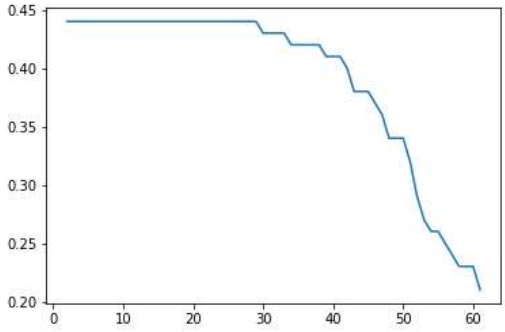
Figure 8 shows the new distributions of the public stance values in the two systems. Note that the wider opinion range observed under dictatorship remains. In both systems the average public stance is rather close to the 0.66 threshold that would trigger a shift of political behavior in favor of the opposition. In the democracy, the threshold was briefly surpassed by a few citizens, who were reconducted into the regime camp by the network effect.

Second shock

Having introduced a second shock into the two systems, we can discuss the findings. The new equilibrium is reached in 38 iterations in the dictatorship and in 60 iterations in the democracy. In Figure 9 we can see the trend of opposition support in the democracy after this second shock. Soon after the shock, 44% of the citizens are supporting the opposition, but the network has the effect of taming down their political stance, so that at the end only 21 citizens are for the opposition. As has occurred after the previous shock, opposition support was partially reabsorbed before reaching the new equilibrium. It is noteworthy that, although the two shocks were identical, the effect of the second on the citizens' political behavior was much greater. Although not leaving significant

traces on the public behavior of the citizens, the previous shock caused the system to become more fragile to new shocks. Figure 6 shows the changes occurred in number of opposition supporters during the 60 iterations.

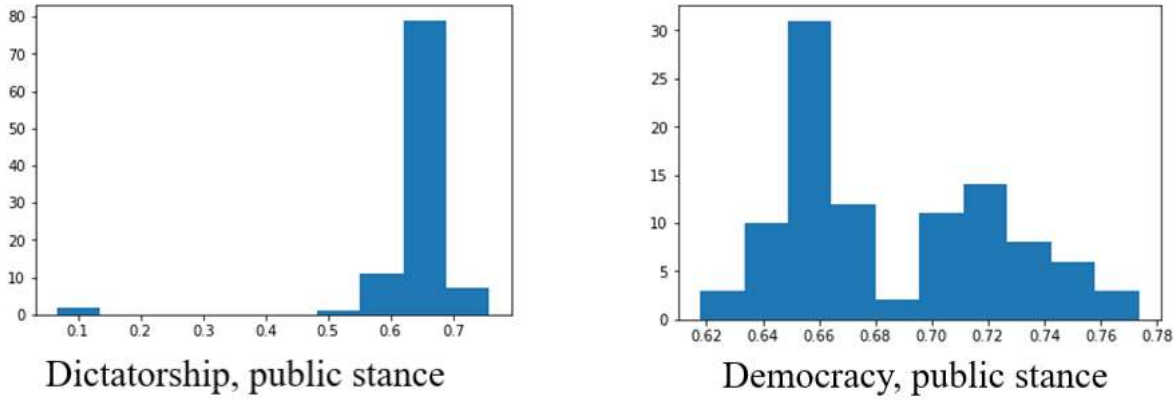
Figure 9. Opposition support in democracy after the second shock



Notes: The x axis represents the progression of iterations; the y axis represents the number (on 100) of opposition supporters at each iteration

Figure 10 shows the current distributions of the public stance values in the two systems.

Figure 10. Public stance distributions after the second shock

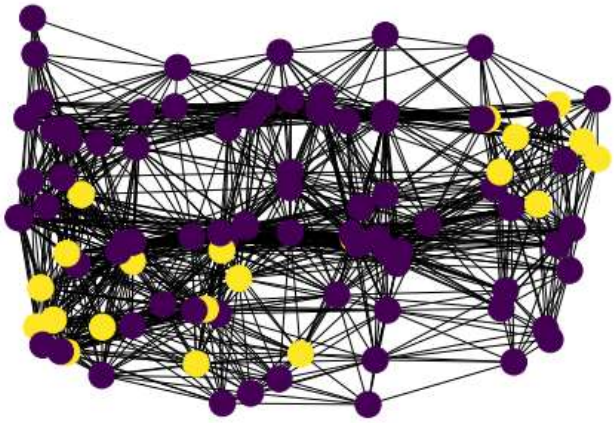


Notes: The x axis represents the range of public stance values while the y axis represents the number of citizens (on 100)

In both cases, a significant share of the population is close, or even beyond, the 0.66 threshold, which is the level at which, in a society with no repression, a citizen would switch from supporting the regime to the opposition. This property is not fully reflected in the share of citizens supporting the opposition because most of them are from the bottom of the income scale and repression and

low levels of social openness prevent rebellion. In contrast, in the democracy opposition supporters are located at all levels of the power distribution, as shown in Figure 11.

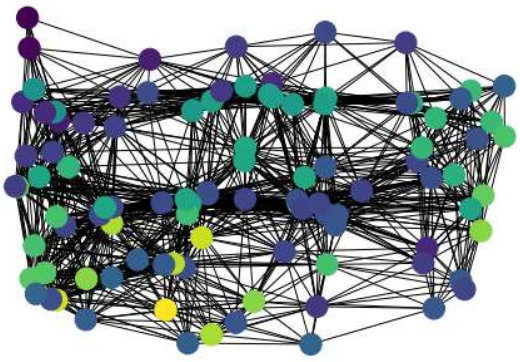
Figure 11. Geographic distribution of opposition supporters in the democracy after the second shock



Notes: Citizens supporting the opposition are colored in yellow, while those supporting the regime are violet

The low cost of expressing support for the opposition allows for both rich and poorer people to act. However, their level of discontent is not the same, as shown in Figure 12. Poorer people to act need to cumulate more discontent because they need to overcome bigger relative costs.

Figure 12. Geographic distribution of discontent in the democracy after the second shock

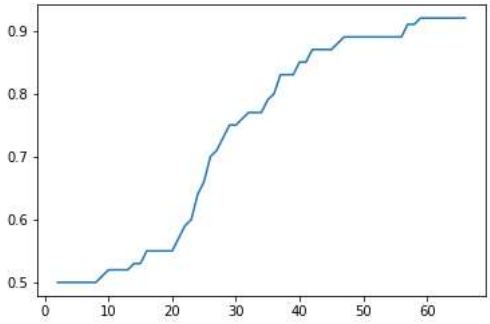


Notes: Nodes are colored by their level of discontent: the brighter, the higher their private stance value

Third shock

We proceed now to discuss the results after the introduction of the third shock. The effects on the democracy are radical: at the end of the 65 iterations necessary to reach the new equilibrium, 92% of the citizens have become supporters of the opposition. Figure 13 shows what occurred in the system while reaching the new equilibrium.

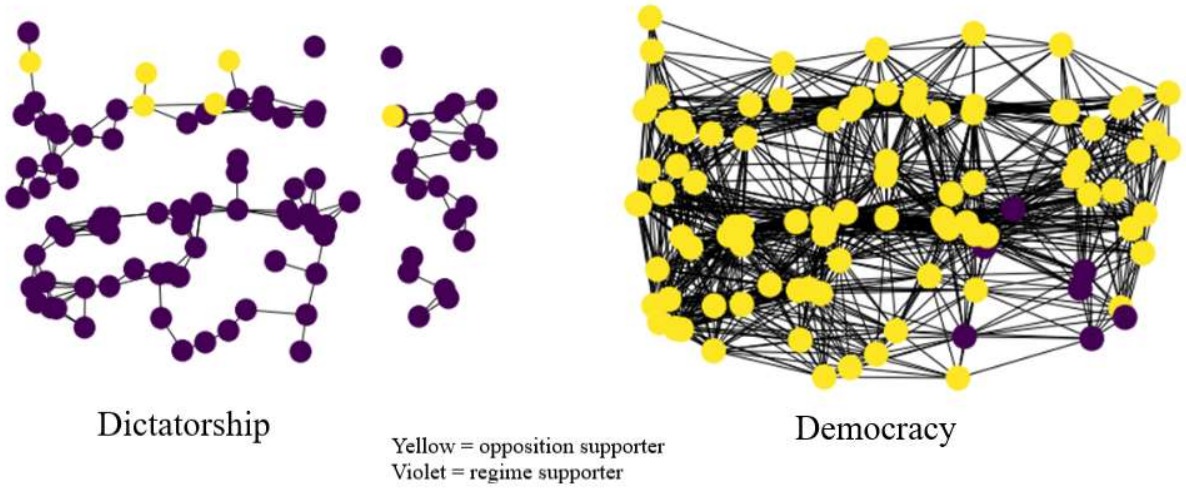
Figure 13. Trend of opposition support in the democracy after the third shock



Notes: The x axis represents the progression of iterations; the y axis represents the number of opposition supporters (on 100 citizens) at each iteration

This time no reabsorption of the discontent occurred. Support for the opposition kept increasing until 92%. In the dictatorship also, we can observe the first signs of discontent. At the end of the 39 iterations necessary for the new equilibrium 6 citizens out of 100 became supporters of the opposition. Figure 14 compares the situation in the two systems after the last three identical shocks.

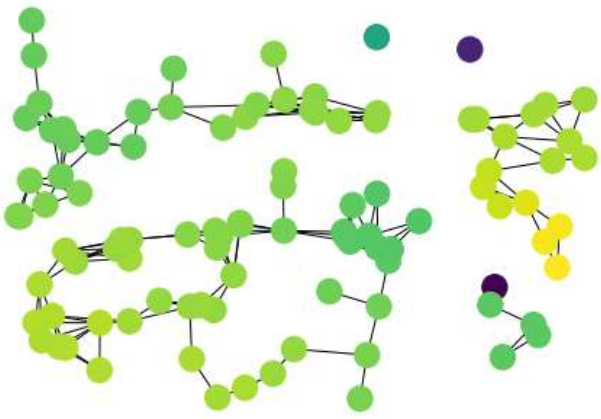
Figure 14. Geographic distribution of opposition supporters after the third shock, the democracy and the dictatorship compared



Notes: Citizens supporting the opposition are colored in yellow, while those supporting the regime are violet

It is noteworthy that the first outbreak of discontent in the dictatorship is concentrated in the area were the richer nodes are located. Especially in the dictatorship, where the level of repression is high, this does not mean that the highest levels of discontent are concentrated where support for the opposition is expressed, as shown in Figure 15. As expected, the brighter nodes are those located in the lower and in the middle part of the graph.

Figure 15. Geographic distribution of discontent in the dictatorship after the third shock

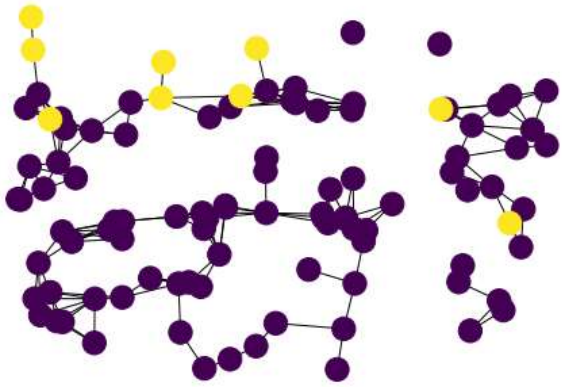


Notes: Nodes are colored according to their private stance: the brighter the node, the higher its private stance value

Fourth shock

Here we discuss the results from a fourth shock, this one introduced only into the dictatorship system. It took 38 iterations to reach the new equilibrium. Opposition supporters increase slightly, from 6 to 9. Figure 16 shows the network in the post-shock status.

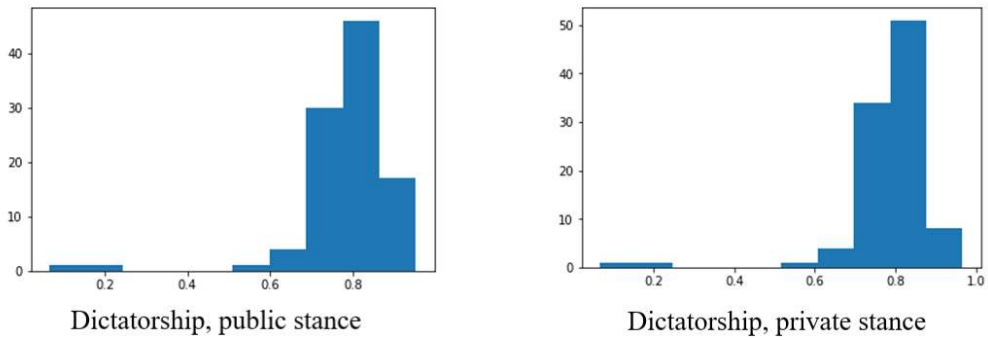
Figure 16. Geographic distribution of opposition supporters in the dictatorship after the fourth shock



Notes: Citizens supporting the opposition are colored in yellow, while those supporting the regime are violet

Although support for the opposition remains limited, average public and private stances are at alarming levels for the incumbent regime, as shown in Figure 17.

Figure 17. Distribution of public and private stances after the fourth shock



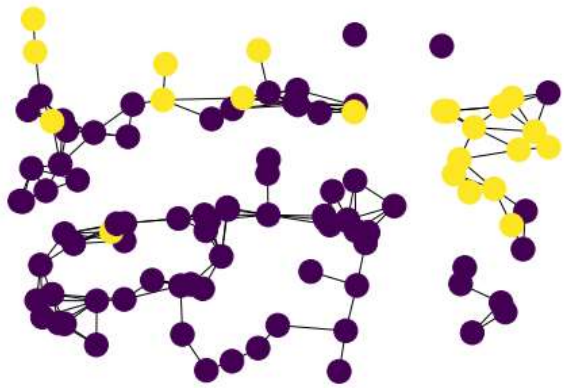
Notes: The x axis represents the range of public stance values while the y axis represents the number of citizens (on 100)

Both distributions show significant shares of the population surpassing the 0.66 threshold, with a clear – albeit minority – share of the population approaching 1. Hence, although the level of publicly expressed discontent is still low, the system is characterized by increasing fragility and is kept stable only by the high level of repression.

Fifth shock

We now proceed to discuss the effects of a fifth shock, which was applied only on the dictatorship. The system takes 39 iterations to reach the new equilibrium, at the end of which 22% of the people support the opposition. Although the shock was identical to the previous ones, the number of opposition supporters increased four-fold in this iteration. As shown in Figure 18, opposition supporters are now located also in the middle of the graph.

Figure 18. Geographic distribution of opposition supporters in the dictatorship after the fifth shock



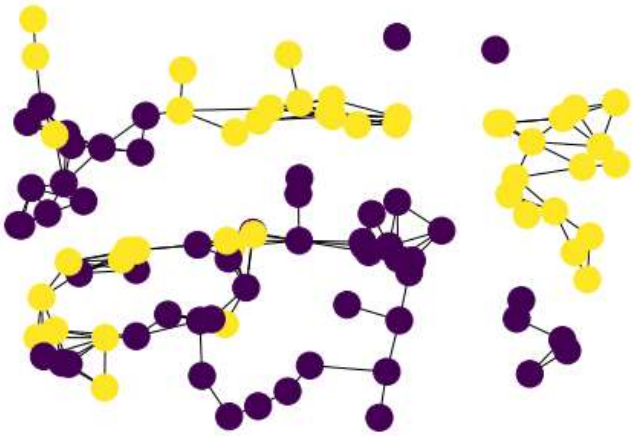
Notes: Citizens supporting the opposition are colored in yellow, while those supporting the regime are violet

The opposition supporters cluster now in a large clique located in the right part of the graph, including both rich and middle-class nodes. Low interconnectivity has facilitated the formation of an isolated group displaying anti-systemic behavior.

Sixth shock

We now proceed with the results of the sixth shock. This time support for the opposition more than doubles to 45 individuals, just under half the population. As shown in Figure 19, opposition supporters are now located also in the lower part of the graph, although poor people still constitute a minority of those publicly supporting the opposition.

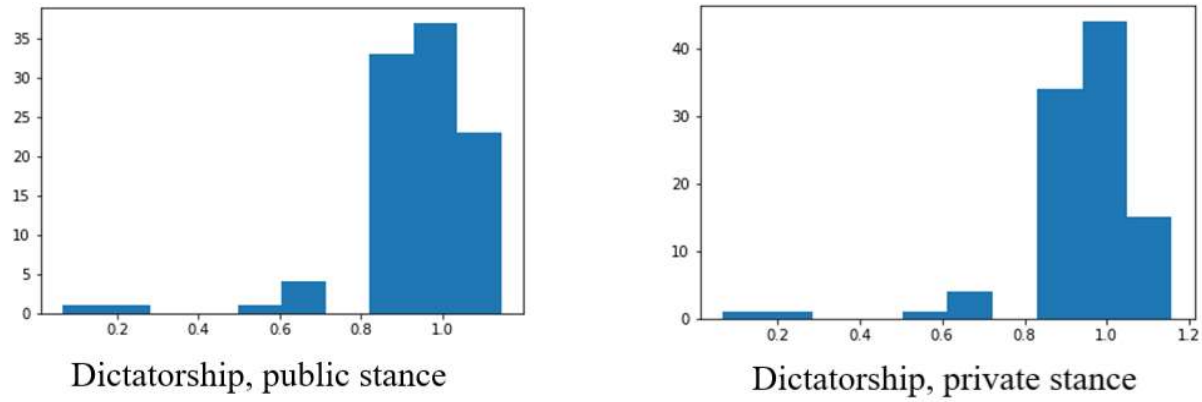
Figure 19. Geographic distribution of opposition supporters in the dictatorship after the sixth shock



Notes: Citizens supporting the opposition are colored in yellow, while those supporting the regime are violet

It is worth noting that, although most of the population still support the regime, public and private stances surpass 1 in many cases, as shown in Figure 20.

Figure 20. Distributions of public and private stances after the sixth shock



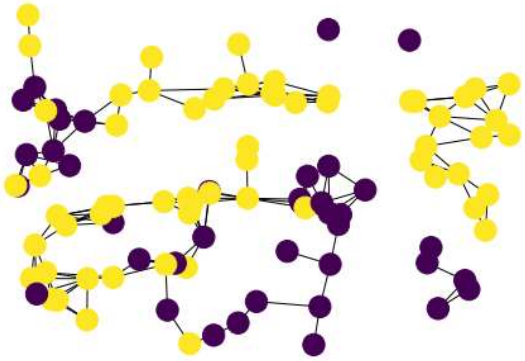
Notes: The x axis represents the range of public stance values while the y axis represents the number of citizens

It is also noteworthy the creation of smaller poles of opinion closer to the regime away from the main concentration of the distribution. They are mainly the effect of the presence of scarcely interconnected cliques isolated from each other.

Seventh shock

We now introduce the results of the seventh, and final, shock. At the end of the 38 iterations that were necessary to reach the new equilibrium, 61 people support the opposition, which has become the majoritarian force in the simulated society. At this point, our simulation is over: after a sequence of cultural/economic shocks a regime change has occurred.

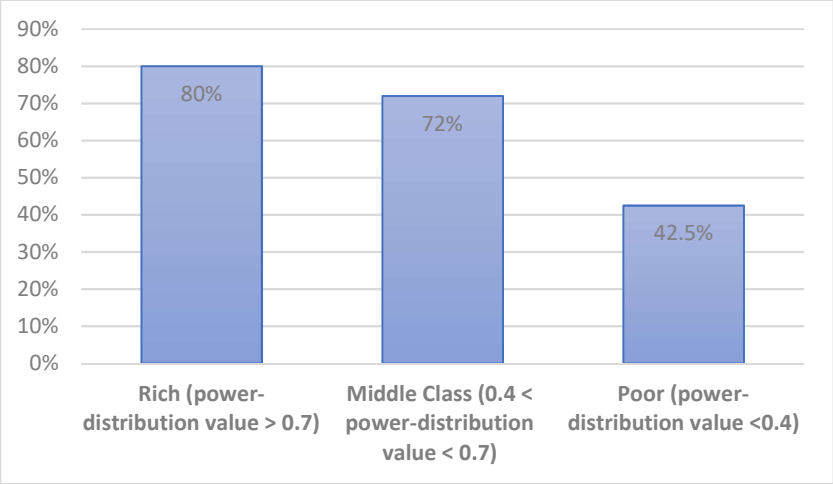
Figure 21. Geographic distribution of opposition supporters after the seventh shock



Notes: Citizens supporting the opposition are colored in yellow, while those supporting the regime are violet

Figure 21 shows the network after this last shock. It is worth noting that support for the opposition is widespread among all classes, but the largest slice of support from within the entire population for what has become the new dominant master frame is from the rich. In Figure 22 we report the percentages of new regime support among different classes. In spite of the fact that shocks mainly affected the bottom class, the regime change is supported more by the elite groups. The reason is that discontent is lowered by repression, that hit the working class more than the elites.

Figure 22. Share of opposition supporters within each social class



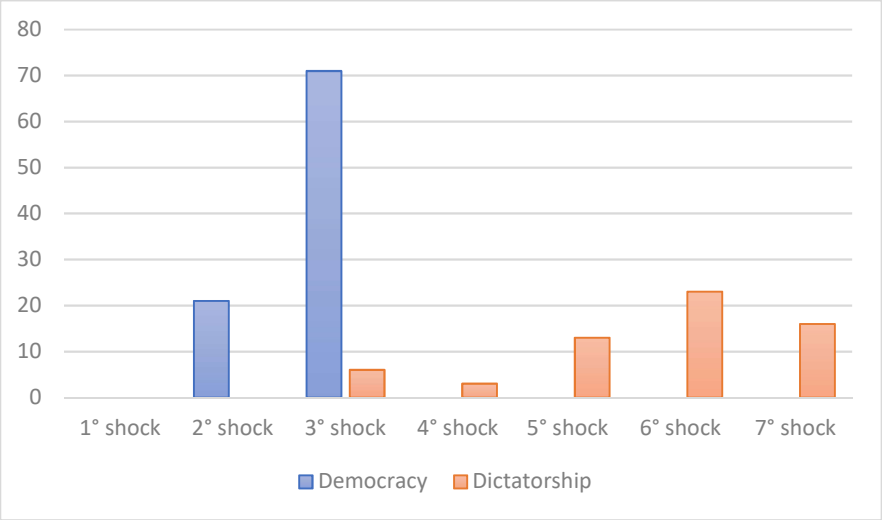
Notes: The x axis represents the population divided in three classes: rich, middle class, and poor. The y axis represents the ratio of each class that joined the opposition

Another interesting element emerging from these simulations is the cumulative effect of shocks on public behavior. Subsequent shocks of identical size were shown to have an incremental effect, making the systems more fragile at each turn and thus rendering the system's reaction to the following shock greater than for the previous one. But, while democracy soon reacts with a regime change, in dictatorship more than one shock is needed for a regime change. This can explain why regimes appear stable for a long time, but then suddenly break down after a seemingly minor downturn. It is the cumulative effect of shocks that were previously repressed that explain this fragility and sudden collapse.

Elite support, system fragility and democratic upturn is enhanced by interconnectivity. In a democracy, connection between citizens works as a multiplicator of political discontent, because citizens are free to cut links with those who think differently and to form links with likeminded people. Conversely, in dictatorship, when discontent affects one single individual surrounded by regime supporters, then it is soon absorbed by conformist public behavior. As shown in Figure 23, in democracy the increment of opposition supporters was shown to be rather strong, while it is less

pronounced in the dictatorship. This is due to the scarce interconnectivity in the latter. Less interconnectivity means that changes in public stance spurred by new shocks spread less efficiently in the system, often remaining within close, limited cliques.

Figure 23. Number of new opposition supporters after each shock



Notes: The x axis represents the progression of shocks while the y axis represents the number of citizens joining the opposition

Finally, it is interesting to note that in this simulation democracy emerges as more flexible than dictatorship. In other words, the system can more readily indicate and reflect rising (or decreasing) discontent among the population that under dictatorship. In our simulations this leads the democracy model to encounter regime change much sooner than the dictatorship model, which remains relatively steadfast after a succession of rather large shocks. However, such a conclusion may be misleading. A better way to understand these results is to assume that democratic societies react to socioeconomic shocks more quickly and radically than autocratic, closed societies. The political systems of democracies are compelled to evolve accordingly, adapting to the new realities. However, the analysis of the evolutionary dynamics regulating this adaptation is beyond the scope of this model which, in order to make the simulations as comparable as possible, does

not allow for existing master frames to evolve, moving within the political space, or for new master frames to emerge.

In contrast, the reconstruction of dictatorships' domestic dynamics emerging from our simulations is more realistic. In particular, our model provides an explanation for the apparently unexplainable timing that sometimes characterizes the spark of protests. For example, many advanced this analytical problem talking about the timing of the so-called Arab Spring wave of protests in 2010–2011. Why – this argument goes – did these movements emerge in 2011, years after the introduction of the most draconian economic measures that had significantly worsened the quality of life for many citizens of Arab countries? Why was the emotive reaction to the self-immolation of a Tunisian street vendor successful in spurring public outrage while previous major economic reforms and public-sector cuts failed? The question may be, as showed by this simulation, in the cumulative effect of socioeconomic shocks, which do not immediately reflect in public behaviors, but which may render the regime more and more fragile with time.

In conclusion, the system dynamics emerged by comparing our two benchmark configurations are characterized by:

1) The relative flexibility (speed of change) of democracy. In a democratic society, discontent generated by socioeconomic shocks is reflected faster and across a wider spectrum of social classes;
2) Revolts sparked by an apparently negligible event are usually the result of the cumulative effects of previous shocks that increased the fragility of the system without causing immediate increases in opposition support;

3) Under dictatorships, when regime change occurs the share of the elite supporting the new government is significantly greater than those of the medium and poor classes.

4.2.2. The effects of inequality, social openness, interconnectivity and repression on stability

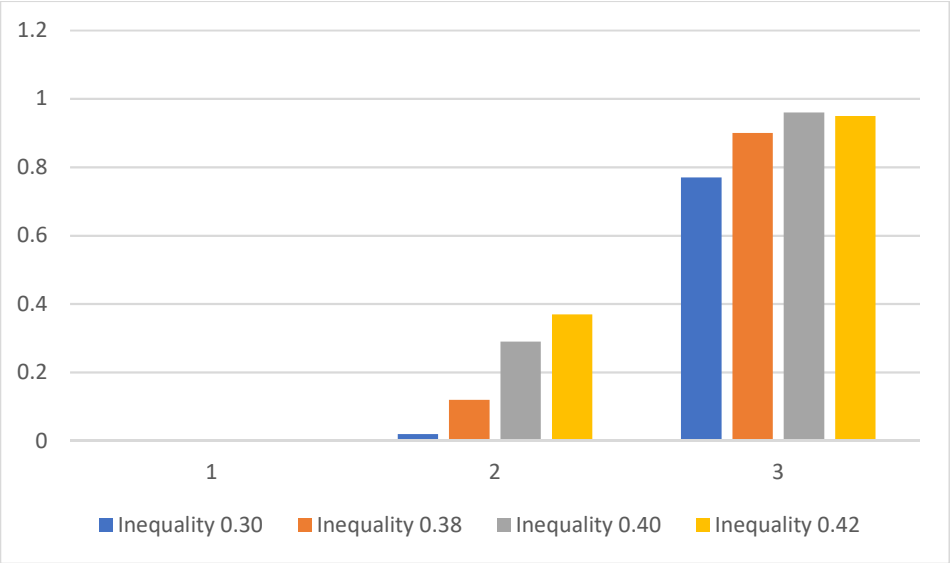
In this section, we vary the configurations characterizing democracy and dictatorship (see Table 1) to isolate the effect of each specific parameter.

4.2.2.1. *Inequality*

We repeated the previous simulations utilizing four different values of the Gini index (0.30, 0.38, 0.40, 0.42). As mentioned in section 4.1, the difference among these Gini values is due to different shares of poor and middle classes. We obtain higher Gini values by increasing the share of the poor relatively to the middle class. We introduced subsequent identical shocks of size 0.3 into various configurations of the dual benchmark systems. We found that the higher the inequality level, the sooner the opposition gains majoritarian support. However, this effect is more or less stark depending on the configuration of the other parameters. The relationship between inequality and regime resilience is more regular in democracies than in dictatorships. This is due to the lower level of repression characterizing democracies. Since more inequality means a larger number of poor people, a lower level of repression allows more poor and disgruntled people to be free to act against the regime. In contrast, the high level of repression in dictatorships discourages a greater number of poor people to act, leaving the initiative mostly to the citizens in the middle and at the top of the income distribution. This reflects into the effects of the first shocks we introduce: in dictatorships, higher inequality translates in smaller numbers of citizens switching to the opposition after the first shocks. The proportion, however, is subverted after a certain number of shocks (from 4 to 5) – at this point higher inequality is associated with bigger numbers of citizens switching in favor of the opposition. Thus, higher inequality makes dictatorial regime more

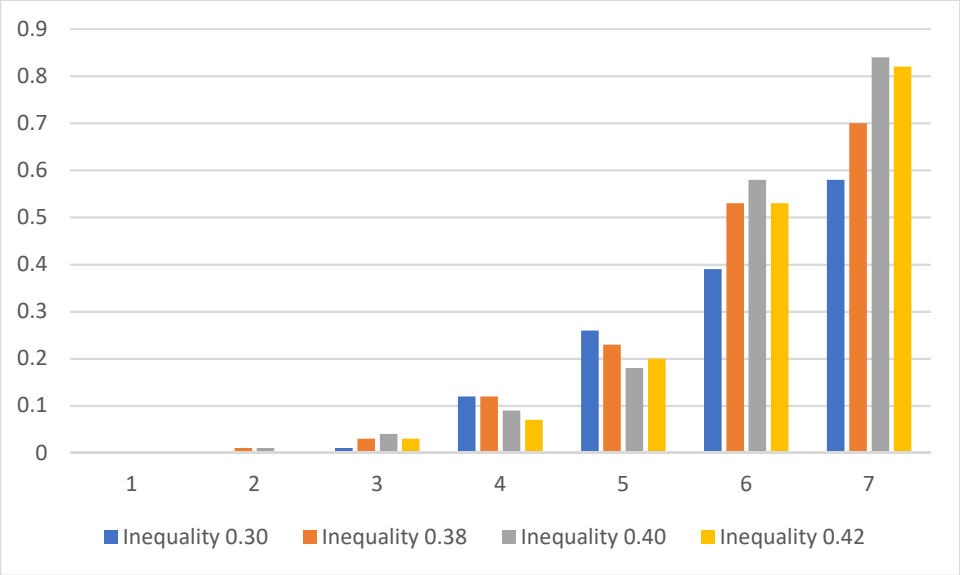
resilient to the first shocks, while, analogously to democracies, it makes them suddenly more fragile after a sufficient number of shocks. Figure 24 and 25 show the results for the democracy model and the dictatorship model, respectively. The number of shocks introduced in the former is 3 while it is 7 for the latter due to the different numbers of shocks necessary to reach regime change.

Figure 24. Level of opposition supporters after each shock in democracy



Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of inequality

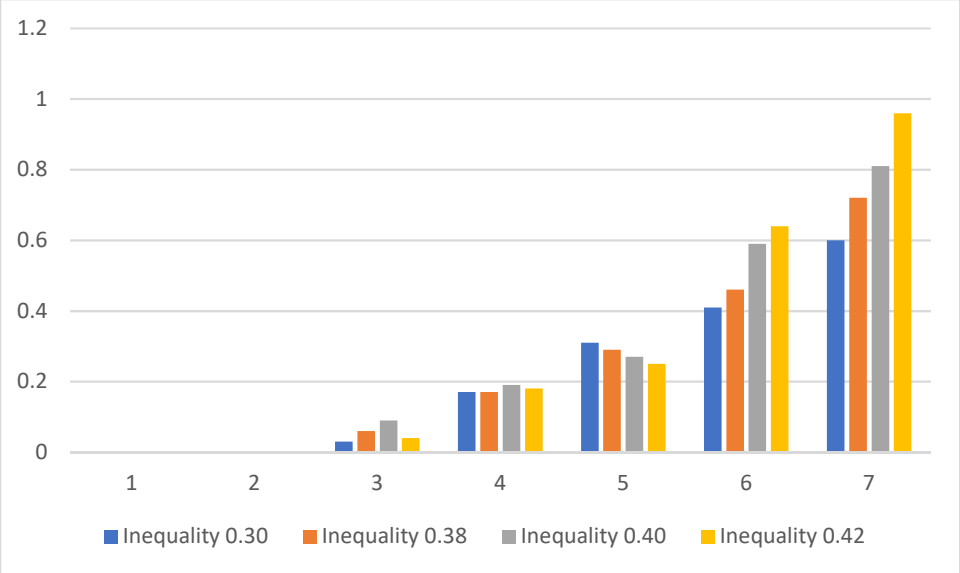
Figure 25. Level of opposition supporters after each shock in dictatorship



Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the for each tested level of inequality

Then, we tested the same four levels of inequality on a variant of the dictatorship configuration having a great degree of interconnectivity (2.5 instead of 1.5). Figure 26 shows the results.

Figure 26. Level of opposition supporters after each shock in the first dictatorship variant

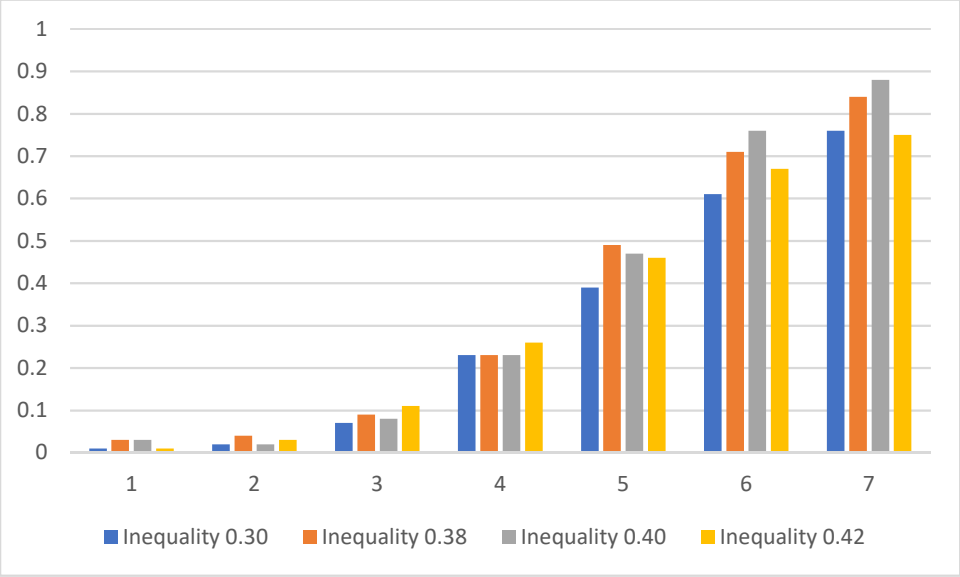


Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of inequality

When we compare Figure 26 to Figure 25, we can see that the level of interconnectivity combines clearly with the level of inequality. More interconnectivity translates into more regularity and predictability of the inequality effects. More inequality is no longer associated with more regime resilience during the first shocks; until the fifth shock, the results are now more mixed.

The results are partially confirmed also when simulating the same chain of shocks on another variant of the dictatorship configuration having the social openness parameter augmented from 0.2 to 0.8. Figure 27 shows the results produced in this simulation.

Figure 27. Level of opposition supporters after each shock in the second dictatorship variant



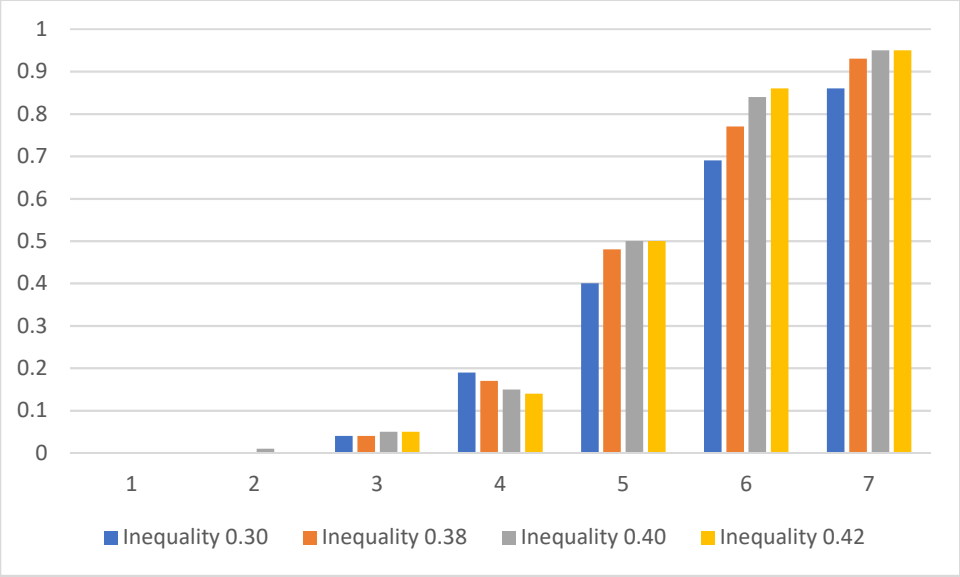
Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of inequality

Mixed results extend now along the entire graph. Medium values of inequality are associated with more regime fragility while the maximum level of inequality (0.42) is associated with levels of opposition support similar to those of the lowest level (0.30).

Finally, we run the simulation on another dictatorship variant in which we enhanced both social openness (from 0.2 to 0.8) and interconnectivity (from 1.5 to 2.5), resembling a situation that, apart

from the level of repression, is more like the democracy benchmark. We find again a slight positive effect of inequality on regime resilience until the fourth shock, while for the remaining shocks this relationship reverses, with more people switching allegiance to the opposition the higher the level of inequality, as shown in Figure 28.

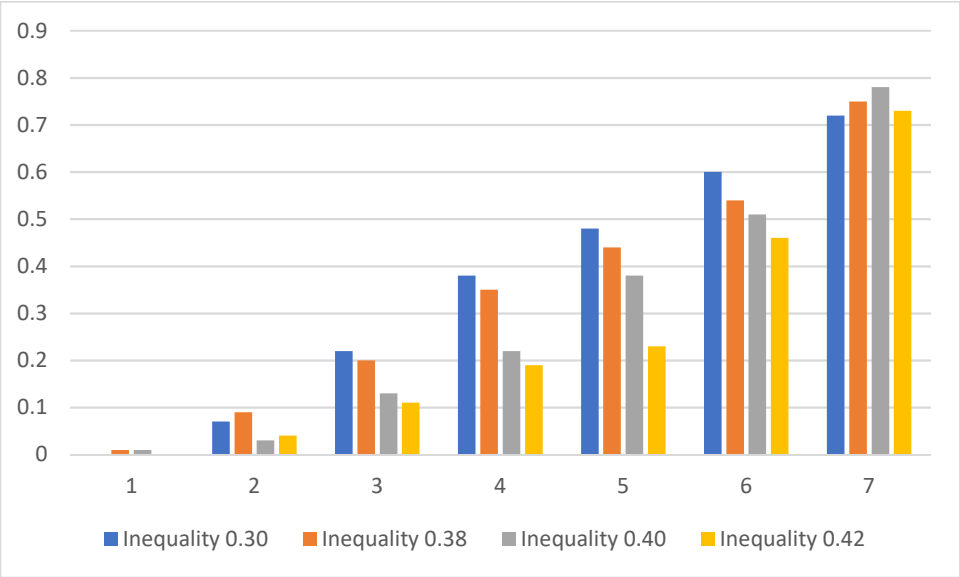
Figure 28. Level of opposition supporters after each shock in the third dictatorship variant



Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of inequality

Finally, it is worth highlighting, once again, that these results are produced by shocks that hit poorer people proportionally harder and less so the rich. Shocks of a different nature – for example economic crises hitting harder the interests of medium and upper classes – might produce different results. This is true especially for dictatorships. We introduced in the dictatorship model the same number of shocks, but this time of a smaller size (0.2) and damaging equally the all the people hit i.e., not discounting the shock by each citizen's power position. The results are rather interesting: if all people are hit equally by shocks, increasing inequality enhances the regime's robustness after almost all shocks, as shown in Figure 29.

Figure 29. Level of opposition supporters after each shock after changing the impact of the shock



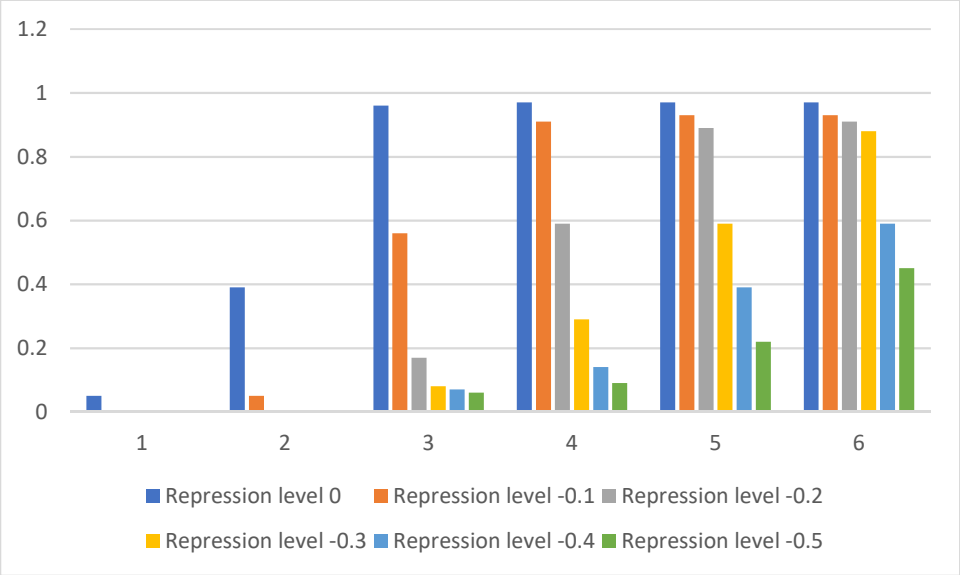
Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of inequality

These results are particularly significant when set against contemporary debates on the impact of inequality on regime stability. Most observers assume almost automatically that increasing inequality has destabilizing effects on ruling regimes. However, according to the dynamics outlined by our model, the effect of inequality is strictly linked to the specific characteristics of the society and the nature of the socioeconomic shocks occurring in it.

4.2.2.2.Level of repression

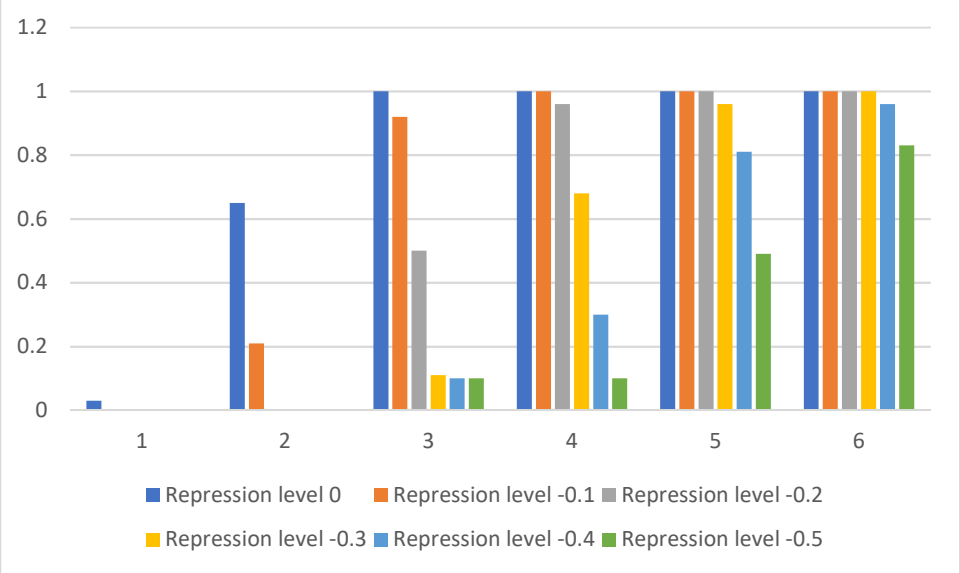
We tested five levels of repression: 0 (corresponding to no repression), –0.1, –0.2, –0.3, –0.4, –0.5. As explained in Appendix I, for values smaller than –0.33 an increasing share of poor never revolt for values of $y \leq 1$). As expected, the level of repression has a fundamental role in enhancing the stability of the ruling regime. However, identical levels of repression produce quite different results according to the configuration of the other parameters. Figure 30 shows the results produced by the standard dictatorship model, while Figure 31 shows those of the democracy model.

Figure 30. Level of opposition supporters after each shock in dictatorship



Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of repression

Figure 31. Level of opposition supporters after each shock in democracy



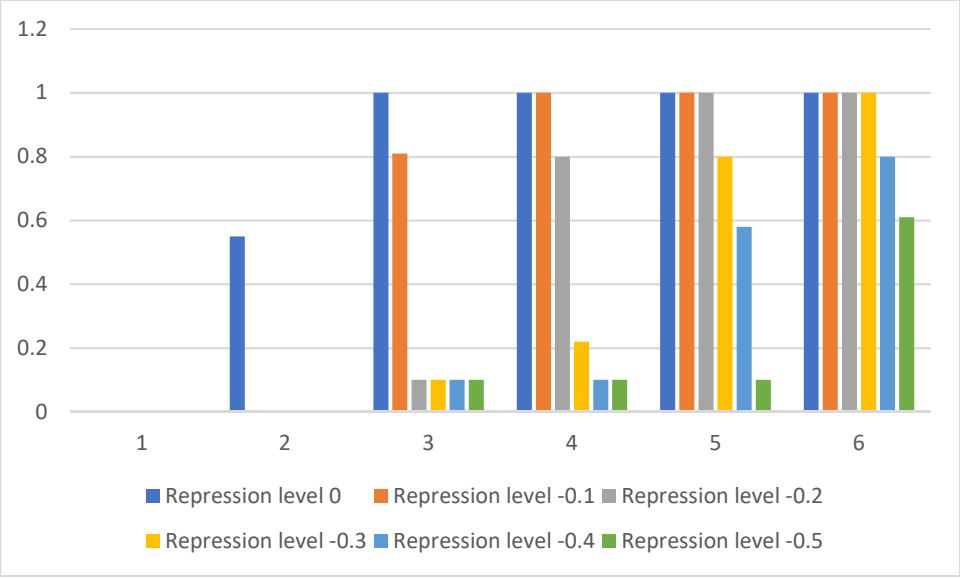
Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of repression

First, for the same repression levels and number of shocks we observe larger shares of citizens switching to the opposition in the democracy than in the dictatorship. Indeed, even when the level of repression is as high as in the dictatorship, the democracy model still emerges as more reactive

to increasing discontent. Second, after each shock, the increase in the share of opposition supporters is more gradual in the dictatorship than in the democracy.

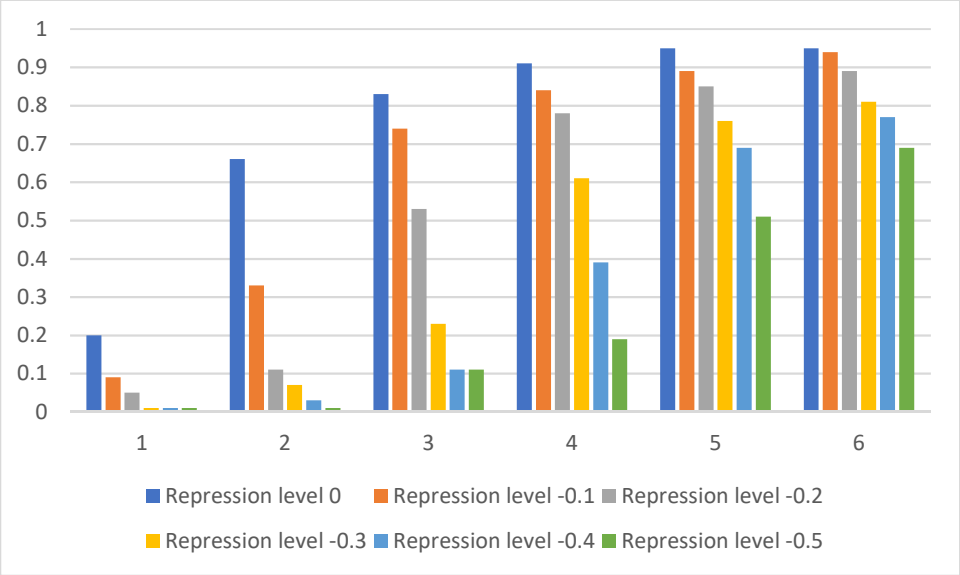
In order to figure out whether it is connectivity and/or social openness causing higher fragility of the democracy model, we tested two variants of the dictatorship: one having an interconnectivity level of 3 (instead of 1.5) and the second having democracy's social openness level of 0.8 (instead of 0.2). Figures 32 and 33 show the results.

Figure 32. Level of opposition supporters after each shock level in the first dictatorship variant



Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of repression

Figure 33. Level of opposition supporters after each shock in the second dictatorship variant



Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of repression

Both interconnectivity and social openness play a role. Interconnectivity is associated with both less gradualness of opposition-share increases and with augmented fragility i.e., for the same level of repression and after the same number of shocks the share of opposition supporters is bigger. Social openness causes more fragility, but gradualness is comparable to the standard dictatorship. Thus, democracies tend to generate more contentious politics not only due to their significantly lower levels of repression. According to our model, enhanced interconnectivity and social openness also play a crucial role in determining the efficacy of repressive measures.

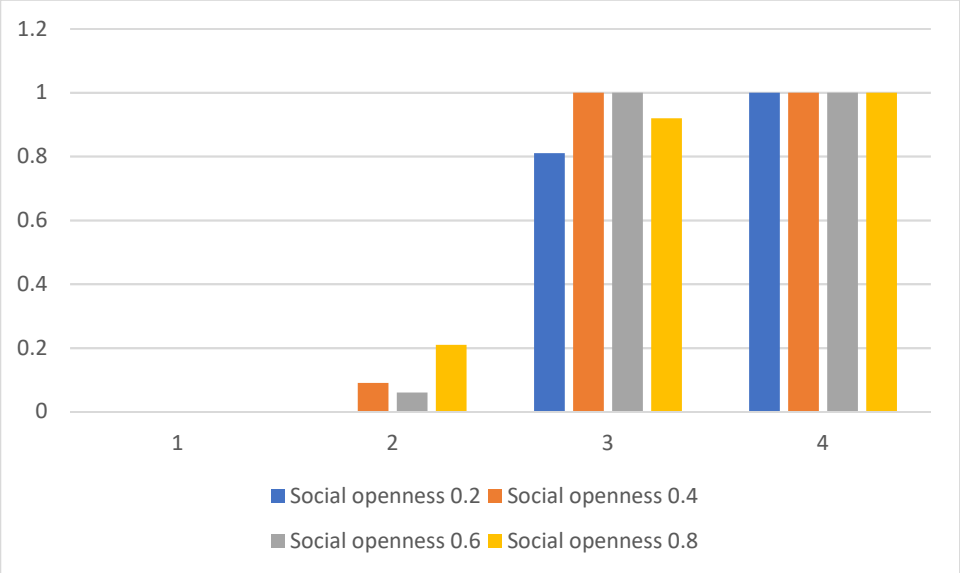
4.2.2.3.Social openness

We tested diverse parameters of social openness, which corresponds to the three subparameters of "Chances to change neighbors", "Network-effect friction parameter" and "Cognitive-adaptation friction parameter" in Table 1 and explained in section 4.1. For simplicity, to indicate the whole social openness level we use only the value of the first subparameter: "Chances to change

neighbors". The other two subparameters change accordingly to the value of the first, as explained in section 4.1. We tested four social openness levels: 0.2, 0.4, 0.6, and 0.8.

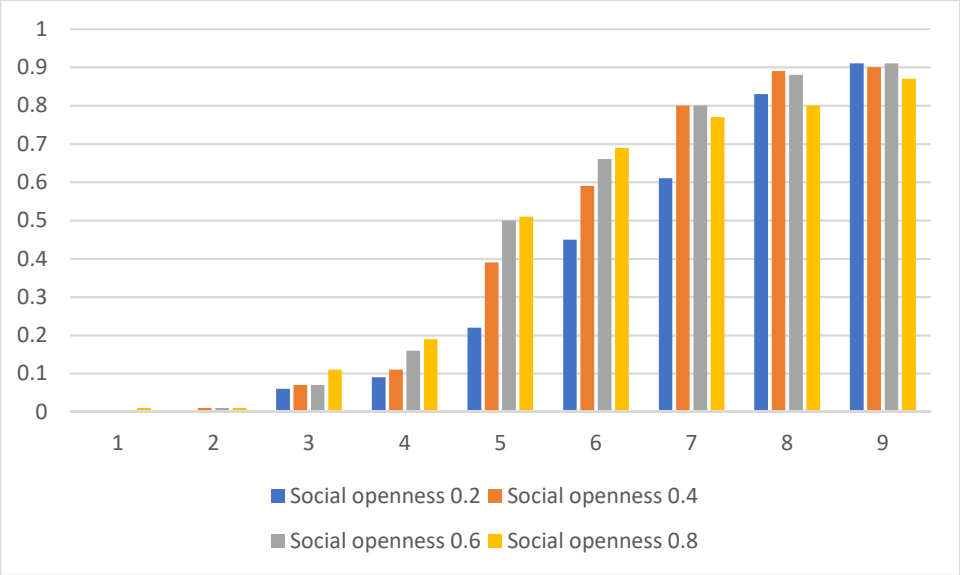
We found that openness has a less clear effect on system stability than the other parameters. In general, increased social openness seems to favor more responsiveness to shocks, resulting in a greater share of opposition supporters after each shock. However, this effect does not seem neither robust nor coherent throughout the simulations. For all the tested configurations, higher values of social openness are associated with bigger shares of population switching to the opposition after the first shocks. Yet, the effect disappears and sometimes reverses when introducing more shocks into the system. Figure 34 and 35 show the results respectively for varying social openness values within the democracy model and the dictatorship model. Figure 36 shows the results for a democracy model with low interconnectivity (2), which makes it an intermediate configuration between democracy and dictatorship.

Figure 34. Level of opposition supporters after each shock in democracy



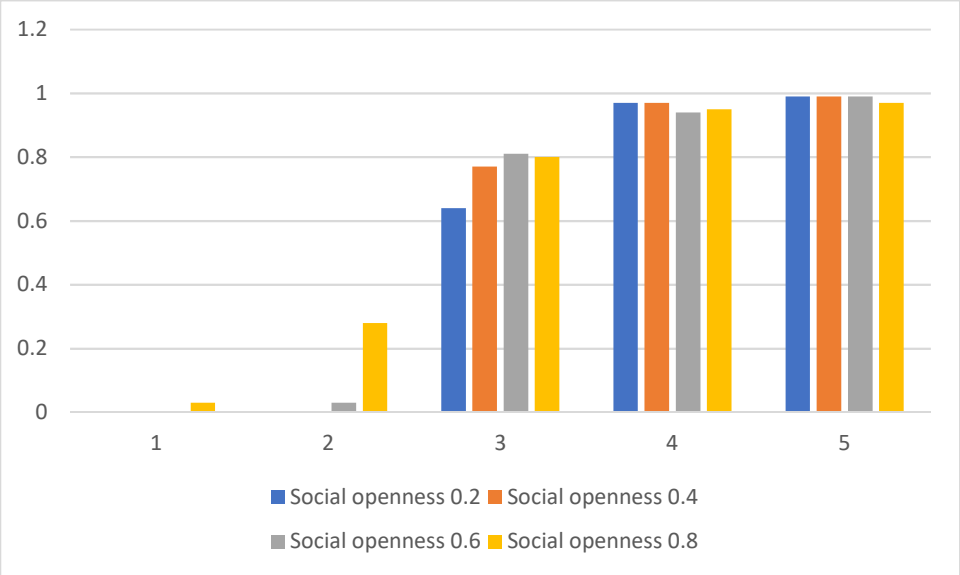
Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of social openness

Figure 35. Level of opposition supporters after each shock in dictatorship



Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of social openness

Figure 36. Level of opposition supporters after each shock in the first dictatorship variant



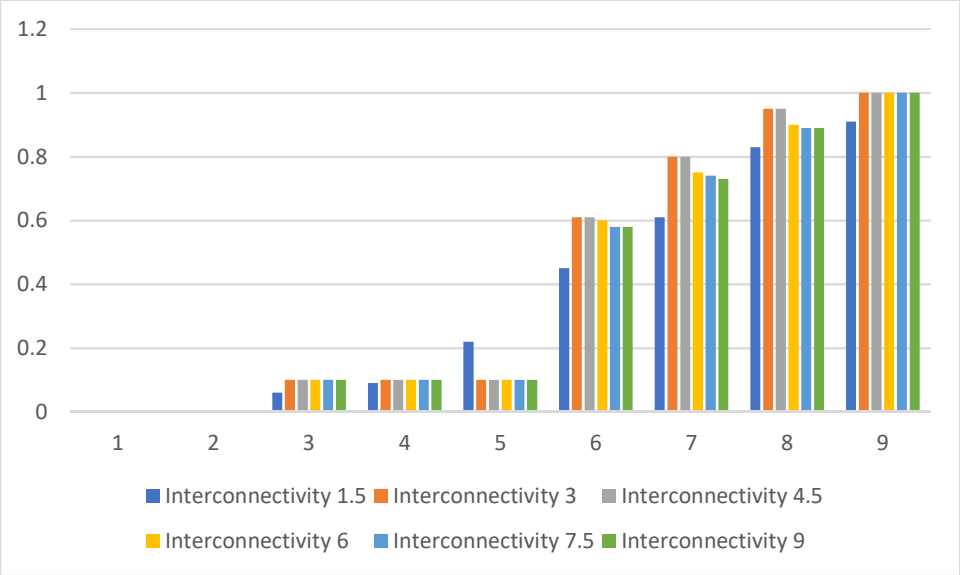
Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of social openness

4.2.2.4.Interconnectivity

We tested five values of interconnectivity: 1.5, 3.0, 4.5, 6.0, 7.5, 9.0. We found that interconnectivity has mixed effects on regime resilience. When it is low, interconnectivity favors the incumbent regime: shocks cause an increase in discontent each time they are introduced.

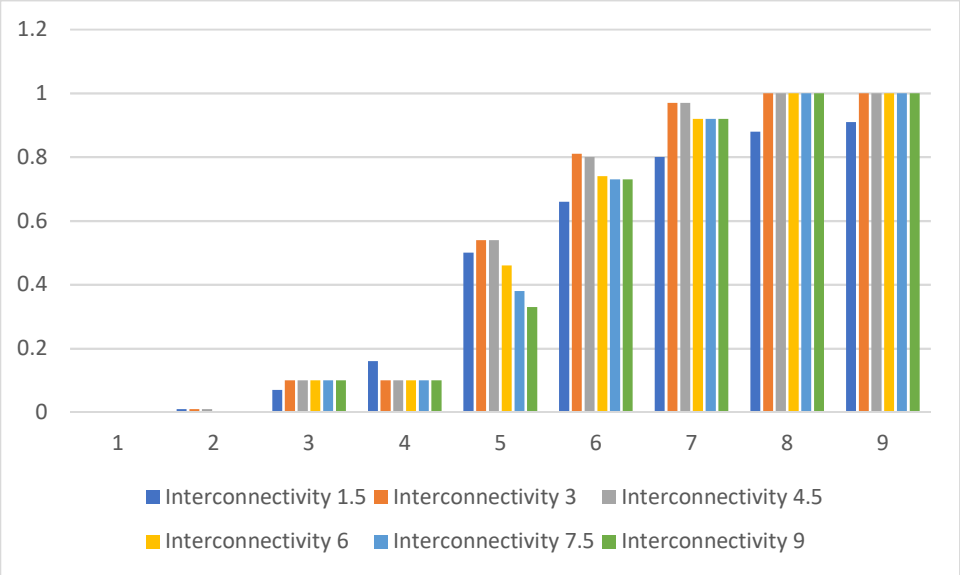
However, such an increase is relatively moderate, and the number of opposition supporters increases gradually, without large gaps between one shock and the next. When we start increasing the levels of interconnectivity this gradualness tends to disappear and shocks tend to impact the ruling regime harder, with wider gaps between the impacts of each shock. Thus, initially, interconnectivity seems inversely correlated to regime resilience. However, when we further increase the interconnectivity level we observe a moderate reduction of the impacts of the shock on the incumbent regime. Very high interconnectivity is still associated with higher regime fragility than in configurations where interconnectivity is low (1.5–2), but such increased fragility is lower than it is for medium values of interconnectivity (3–4.5). Hence, while low levels of interconnectivity are associated with enhanced regime resilience, medium levels maximize the regime's fragility. However, augmenting interconnectivity to the maximum level curbs such as effect, leading to a slight increase of the regime resilience. We observe these dynamics for both dictatorship and democracy, and for hybrid configurations of the two models. Figure 37 shows the results emerged after testing the dictatorship for nine subsequent shocks; Figure 38 shows the results for a dictatorship model having a social openness level of 0.6; Figure 39 shows the results for the democracy model (this time the number of shocks introduced is six).

Figure 37. Level of opposition supporters after each shock in dictatorship



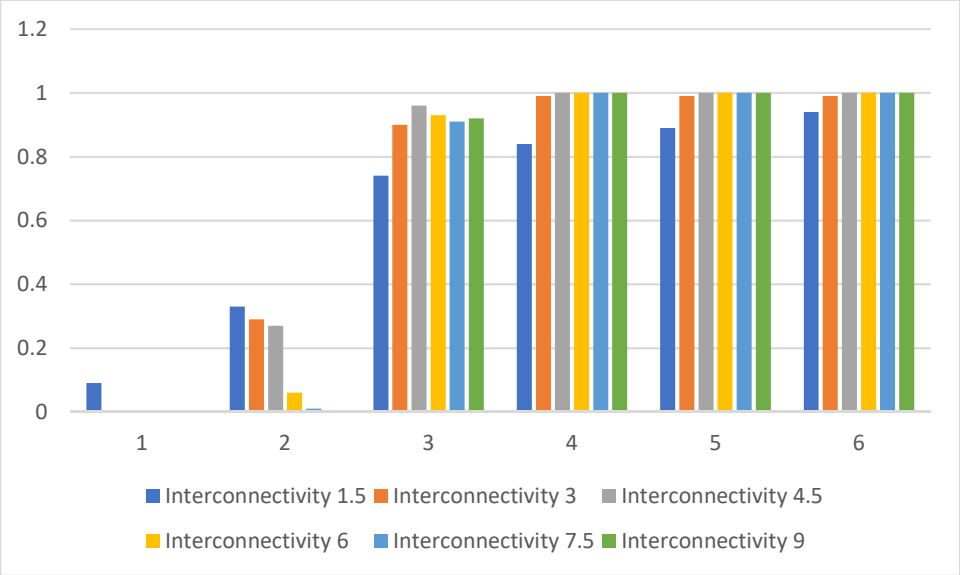
Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of interconnectivity

Figure 38. Level of opposition supporters after each shock in the first dictatorship variant



Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of interconnectivity

Figure 39. Level of opposition supporters after each shock in democracy



Notes: The x axis shows the shocks in incremental order; the y axis shows the shares of population supporting the regime for each tested level of interconnectivity

These findings confirm the hypothesis, supported by those who argue new digital technologies have a disruptive effect (see, e.g., Ayres 1999), that higher interconnectivity facilitates contentious politics and chances for democratic change (in dictatorial regimes). However, the simulations also show that interconnectivity boosts a sort of conformist view, in the sense that opinions are pushed to converge toward a common average. This is true both when most citizens' stances lean toward the regime or when, after several shocks, they start leaning toward the opposition. Therefore, we can outline two effects of interconnectivity. In the first place, it makes the spread of new ideas easier, because people can meet and exchange worldviews. At the same time, interconnectivity leads to higher conformism, mainly caused by the great dimensions of each person's neighborhoods that continuously influence individual stances, leading most people to gradually converge toward similar compromising stances.

Conclusion

This paper makes three critical contribution to the field of contentious politics. The first – and most crucial one – is the provision of a rationalistic framework taking into account aspects, such as the psychological mechanisms generating discontent, that were previously mostly treated through qualitative and discursive approaches. Rational and deterministic techniques are often dismissed within the scholarship of contentious politics due to their assumed inability to reflect the complexity of the human mind. Deterministic models, the argument goes, ignore the variety of potential human behaviors, failing to incorporate the possibility of radical behavioral and ideological changes. According to this view, human behavior is too unpredictable and sophisticated to be framed into rational models.

However, in our view this argument is fallacious in two ways. First, its proponents often generalize the failure of rational approaches in the neoclassic economic literature, which pinpoints potential economic benefits as the sole factor explaining human behavior, as indicative of rational approaches writ large. This view ignores the significant developments achieved by rational approaches in explaining human behavior in recent decades, which nowadays take into account far more sophisticated factors than simple economic gains, including some of the intrinsic irrational biases of the human mind (see, e.g., the seminal articles of Kahneman and Tversky 1979; and Epstein 1999). Second, this drastic critique of rational approaches fails to distinguish between the relatively difficult task of accurately explaining and predicting the behavior of a single human being, and the rather different kind of challenges posed by the analysis of collective dynamics. While the possibility of building a model accurately explaining the specific behavior of each human is limited due to the richness of the unique factors involved, macro dynamics guiding big collectives of human beings are far more predictable once we take into account some of the specific

elements characterizing humans as social animals. In our view, the seminal work of McAdam et al. leans toward this same direction in its detailing of the difference between *episodes*, *processes*, and *mechanisms*, aiming at isolating the specific elements characterizing collective human behaviors which recur during every contention episode. This paper has contributed to this fundamental task by providing a framework that puts some of these mechanisms at work together to generate collective outcomes.

A second important contribution of this paper is to highlight the neutral role of the diverse factors involved in the dynamics of contention. Interconnectivity, social openness, and inequality do not always play the same role in favoring or hindering the emergence of contention. They may favor it in some contexts, or hinder it in others, depending on the configuration of other important parameters. This finding is significant, since the literature on revolts and democratization often tends to look for factors that are meant to always ignite (or hinder) the spark of revolts or the transformation of dictatorial regimes into more democratic systems. For example, over the last years we have witnessed, at first, the great hopes generated by the introduction of new digital technologies such as the internet and social media. The overwhelmingly opinion argued that these create more interconnections among people and thus make democratic political change easier. However, as demonstrated by the evolution of the 2011 Arab revolts or the illiberal turn witnessed in several European countries, this has not been always the case (for a review of the development of this debate see Tufekci 2018). Analogously, in recent years the association between increasing inequality and revolts has grown in popularity, leading to a widespread belief that high inequality leads inevitably to more contentious actions, populist politics, and uprisings. This assumption has

been repeatedly rejected by empirical research, as demonstrated by Solt (2008, 2015). In our model, also, it emerges as valid only under specific conditions.

Hence, an important merit of this paper is to debunk the notion that there are factors always facilitating (or hindering) contention politics. All new technological or organizational innovations in human societies must deal with complex systems characterized by diverse cultural paths, whose combinations lead to mixed outcomes. The same can be said about the intrinsic features of each human society such as, for example, the distribution of wealth among its members. Unequal distributions – even when perceived as unfair by most citizens – are not necessarily positively correlated with more contention. In some cases, more inequality may even lead to more stable regimes.

It is important to remark that the dynamics produced by our model and that emerged during the simulations will translate on the ground in rather different ways depending on the specific characteristics of the context where they occur. For example, the apparently unpredictable occurrence of protests and revolts after relatively minor shocks can be explained, especially for dictatorial regimes, by the cumulative effect of subsequent socioeconomic shock which do not produce immediately significant effects in the people's political behaviors; a dynamic resembling the occurrence of episodes such as the 2011 Arab revolts. Such a dynamic, clearly isolated by our model, provides reasons to look for alternative indicators to measure the robustness of regimes, more effective than the simple observation of the degree of contention occurring after some socioeconomic shock. Analogously, the sudden rise in popularity of populist forces in the West can find explanation in the non-linearity of the network effect outlined in this paper. Before a certain number of shocks, the network effect favors the ruling regime – which for democracies

may be approximated as the mainstream parties. However, after more shocks are introduced networks begin to dramatically favor the opposition. In this scenario, high levels of interconnectivity – a feature characterizing especially modern democracies – play a fundamental role in curbing the gradualness of change and in making such sudden switches in political behavior more massive.

In sum, the third contribution of this paper is the provision of a model systematizing the following three key dynamics of contentious politics:

- *A conceptualization of the "double-edged nature" of the network effect*. After the first socioeconomic shocks, especially in very interconnected societies, the network effect compacts the average political behavior in favor of the ruling regime, making it look robust and stable. Then, after a sufficient number of shocks, the same network effect compacts the public opinion in favor of the opposition, causing a sudden and dramatic rise in the number of its supporters. This conceptualization is useful to understand the sudden fall in popularity of political forces considered the "mainstream" and the equally sudden rise of forces previously considered fringe parties;
- *A dynamic explanation for the "hidden fragility" of regimes*. Many revolts, such as the 2011 Arab uprisings, occurred in reaction to apparently minor events, leading to grave instability and in some cases toppling the incumbent rulers. Such events raised fundamental questions, since the same rulers had survived socioeconomic shocks in the past that were far graver than the 2011 circumstances. Our model provides a dynamic explanation for these episodes;

- *The complex role of inequality in generating contention*. Inequality emerges from our simulations as a factor having diverse effects on the stability of dominant regime depending on the specific characteristics of the context and of the socioeconomic shocks introduced into the system. We observed that often intermediate levels of inequality cause more contention than very high levels and, when shocks hit homogeneously rich and poor citizens, lower levels of inequality generate more support for opposition parties than higher ones;
- *The systematization of the factors influencing participation in contentious actions*. As shown by Solt (2008, 2015), contention is enacted relatively more easily by members of the elite than by members of poorer classes, despite the latter often suffering relatively more from socioeconomic shocks. Our model systematizes this phenomenon within a wider set of mechanics describing participation in contention.

Obviously, the findings of this paper do not exhaust the potential for new research in contentious politics utilizing the techniques of agent-based modeling.

For instance, in the description of our model and in the following simulations we did not consider characteristics of human societies that may lead to the formations of clusters not based purely on affinity of opinions or social class – as in our model – but also on other elements, such as geographical barriers, or ethnic and/or sectarian divisions. Furthermore, in our investigation we did not consider typical aspects of network analysis such as centrality measures, cliquishness, clustering, path lengths, and so forth. Future expansions of the model may consider alternative social divides and utilize analytical tools typical of network analysis neglected in this current work.

A second crucial factor not explored by our model is the importance, in any political space, of the presence and the variety of alternatives to the ruling regime. The presence of a range of options is

essential for generating contentious politics. In our model, when there is no alternative master frame – or there exist only master frames located far from the people's average political stance – discontent generated by socioeconomic shocks is not sufficient to spark changes in political support. The resilience of the ruling regime, therefore, relies not only on repression but also on the presence of alternatives.

Also, ruling regimes and opposition forces may evolve with time, adapting their master frames to the changing characteristics of people's political stances: ruling regime may include frames previously utilized by the opposition, the opposition may moderate its stances to attract support from regime supporters, or completely new political entities may emerge within the political space. Our model does not allow for any of the aforementioned situations to realize. New models, or new expansions of this model, may aim to analyze such circumstances.

Moreover, agent-based modeling can be utilized to explore the internal structure of master frames and their evolutionary dynamics. Some innovative works have focused already on the structure of political beliefs in order to isolate those cognitive frames that seem to play a major role in the formation of the others (see, e.g., Boutyline and Vaisey 2017). This strand of literature can be further developed and integrated into models of contentious politics in order to evaluate the effects that diverse political contexts have on the mutation and evolution of political ideologies.

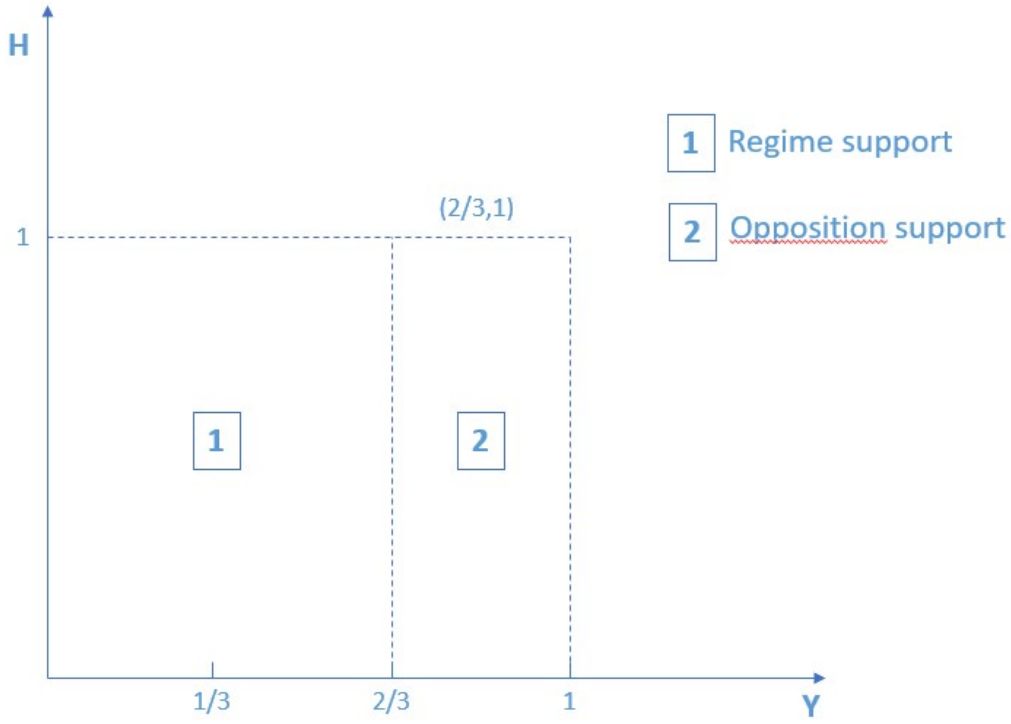
Finally, models such as ours can be practically applied to, or indeed may build upon, real episodes of contention, with the aim of isolating and filtering the general mechanisms of contentious politics at work from all the other elements characterizing the specific context where those episodes occur.

Appendix I—Dynamics of repression

The standard model of political decision under democratic regimes assumes that individual *i* will support the closest political alternative, e.g. the regime or the opposition. In our case, this implies that $z_{i,t} = 1$ if $y_{i,t} > 2/3$, $z_{i,t} = 0$ otherwise, given the regime position $y^r = 1/3$, the opposition position $y^o = 1$, and *i*'s public political position $y_{i,t}$. In our case, we introduce the possibility that political systems range from democratic to dictatorial. The authoritarian control in a dictatorial regime makes citizens more vulnerable to political repression if they support the opposition, and the more they are located at the bottom end of the scale, the more they suffer repression cost. To view the relation between political position, $y_{i,t}$, social class position, and decisions $z_{i,t}$, the Euclidean diagram Y,H is helpful.

Case 1: No repression. In this scenario, all citizens, without any regard of their social class, will support the closest alternative. To see this, consider the diagram in Figure 40, in which the Euclidean space Y-H is drawn. The position 1/3 and 1, respectively the government and the opposition, are pointed on Y axis. The median point between the government and the opposition is y=2/3: Citizen such that $y_{i,t} > 2/3$ will support the opposition, all others support the government. The square (0,1)x(0,1) is divided by the line y = 2/3 into two regions. Region 1 contains regime supporters, region 2 contains the opposition ones.

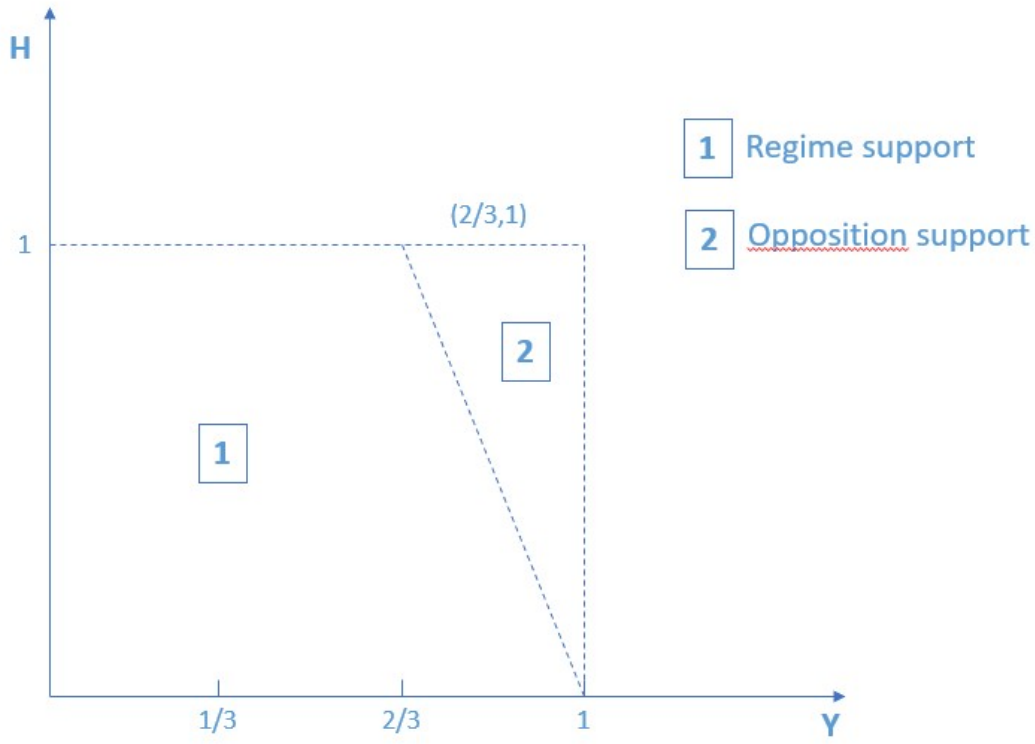
Figure 40. Regions of regime/opposition support in a non-repressive context



Case 2: Repression. In this scenario, people from the lowest class are less keen to support the opposition, as they face the full cost of potential repression. Conversely, the richer people are less vulnerable to repression, as they can take advantage of their class position to shield themselves. We model this issue assuming that the individuals positioned at the bottom of the power distribution will never join the opposition, so that, if $h_{i,t} \simeq 0$, $z_{i,t} = 1$ if and only if $y_{i,t} > 1$. Conversely, an individual in the highest social position is always free to join the closest alternative, that is, if $h_{i,t} = 1$, then $z_{i,t} = 1$ if and only if $y_{i,t} > 2/3$. For people of intermediate social position, the repression cost is inversely proportional to their position. We assume a linear boundary between regime and opposition supporters (see Figure 41). Region 2, lying on the right of the line connecting point (2/3, 1) and (1,0), contains the opposition supporters. Elementary mathematics show that, given the position $h_{i,t}$ between 0 and 1, then $z_{i,t} = 2$ if and only if $y_{i,t} > -(1/3)\ h_{i,t} + 1$.

Thus, any repression value smaller than –1/3 will increase the share of people who would join the opposition only if $y_{i,t} > 1$.

Figure 41. Regions of regime/opposition support in a repressive context

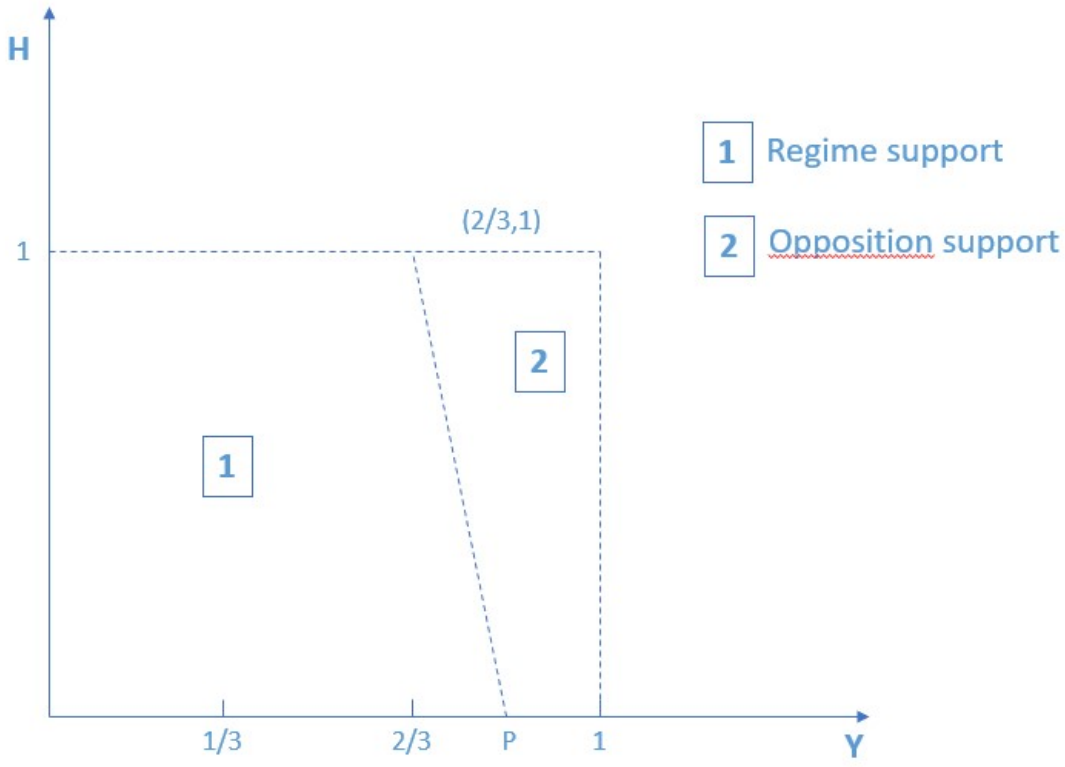


Case 3: Low level of repression. This scenario mirrors most modern democracies in which repression for joining contentious actions is minimal but in which differences in social class still play an important role in determining whether people will join acts of contention (Solt 2008; 2015). Graphically, as in Figure 42, this can be explained by varying the slope of the border line between the regime and the opposition zones. We assumed that the wealthiest are always free to choose, therefore any border line must pass for point (2/3, 1). Conversely, considering the poorest for which $h = 0$, then he will support the opposition if $y > p$, for some p such that $2/3 < p < 1$. Straightforward computation reveals that the region supporting the opposition is:

$z_{i,t} = 2$ if and only if $y_{i,t} > m\ h_{i,t}$—$m + (2/3)$,

with m varying from $m = -1/3$, the case of dictatorship, and $m = 0$, the case of democracy.

Figure 42. Dynamics of regime/opposition support in a moderately repressive context



Appendix II—Algorithm of social neighborhood reconfiguration

At each time t each agent i can establish new links and delete old ones. The factors determining the removal of old links and the formation of new ones are: each agent's private and public political stances, each agent's geographical position within the graph, the level of interconnectivity and the level of social openness characterizing the society. At each time t, each agent i will try to establish a new link with an agent whose public stance is close to its private stance and to cut an old link with an agent whose public stance is far from its private stance.

Formally, let $G = (V,E)$ be the network. Let V_i be the vertex set to which i is connected. Agent i is disposed to cut a link with k, k in V_i, if $|x_y - y_k| > 0.5$. That is, if the observed political behavior of j is strongly different from i's private stance. Let D_i be this vertex set of different agents. Conversely, let $\underline{V}_i = V — V_i$ be the vertex set to which i is not connected. Agent i is disposed to establish a new link with j if $|y_i - x_j| < 0.5$. That is, if the observed political behavior of j is quite similar to i's private stance. Let S_i be this vertex set of similar agents.

Establishing new links and cutting old ones is a process that is ruled by some random variables. Firstly, one vertex of D_i is picked up at random. Then, the link is cut with a probability p_c. Secondly, a vertex of S_i is picked up at random. If the geographical distance to i is smaller than a parameter d, then a new link is established with probability p_n. In the paper, parameter d represents the level of interconnectivity, while parameters p_c and p_n represent the level of social openness.

First, for each agent i we define vertex $\underline{V}_i$ containing all agents with which i does not have a link. Then, within $\underline{V}_i$ we isolate those agents $j \neq i$ for which $x_i — y_j < 0.5$. We name them "likeminded not-neighbors". Within the likeminded not-neighbors we isolate those agents that are reachable, i.e., whose geographical distance from i is lower than d. We can write this as:

$(|corY_i - corY_j|) + (|corX_i - corX_j|) < d$, where corY and corX represent the coordinates of the agents *i* and *j* on the X axis and the Y axis of the graph. At the same time, we define vertex V_i containing all agents with which *i* has a link. Within V_i we isolate those agents $k \neq i$ for which x_i—$y_k > 0.5$. We name them "not-likeminded neighbors".

At each time *t* the agent *i* chooses randomly one reachable likeminded not-neighbor *j* to establish a link with. The possibility to establish successfully the new link depends on the level of openness characterizing the society (p_n). The system extracts a number between 0 and 1. If this number is lower than p_n then the new link between *i* and *j* is established.

At the same time, each agent *i* carries out an analogous operation with one randomly extracted not-likeminded neighbor *k*. The system extracts another number between 0 and 1. If this number is lower than p_c then the link between *i* and *k* is cut.

Appendix III – The Python code of the simulations

This Appendix contains the Python code used for generating the simulations ordered by types of simulations conducted.

Subroutines creation

```
import networkx as nx
import numpy as np
import matplotlib.pyplot as plt
import random
import statistics as st

class citizen:
    def __init__(self, disc, opinion, opinion2, action, gini, pos=(0,0)):
        self.disc = disc
        self.opinion = opinion
        self.opinion2 = opinion2
        self.action = action
        self.gini = gini
        self.pos = pos
    def __str__(self):
        return(str(self.disc),str(self.opinion), str(self.opinion2), str(self.action), str(self.gini))

def rand():
    d_rand = np.random.uniform()
    return d_rand


def state_of_nation(c, p, distance, step, seed):
    g = nx.Graph()
    np.random.seed(seed)
    n1 = round(100*p[0]) # lower class
    n2 = round(100*p[1]) # middle class
    n3 = round(100*p[2]) # upper class

    for i in range(n1):
        disc = np.random.uniform(0.0, 1.0)
        gini = np.random.uniform(0, 0.4)
        pos = (np.random.uniform()*10, np.random.uniform()*5)
        opinion = disc
        opinion2 = 0
        action = 0
        g.add_node(citizen(disc, opinion, opinion2, action, gini, pos))

    for i in range(n2):
        disc = np.random.uniform(0.0, 1.0)
        gini = np.random.uniform(0.4, 0.9)
        pos = (np.random.uniform()*10, np.random.uniform()*4 + 4)
```

```
            opinion = disc
            opinion2 = 0
            action = 0
            g.add_node(citizen(disc, opinion, opinion2, action, gini, pos))

        for i in range(n3):
            disc = np.random.uniform(0.0, 1.0)
            gini = np.random.uniform(0.9, 1.0)
            pos = (np.random.uniform()*10, np.random.uniform()*3 + 7)
            opinion = disc
            opinion2 = 0
            action = 0
            g.add_node(citizen(disc, opinion, opinion2, action, gini, pos))


        for p1 in g.nodes():
            for p2 in g.nodes():
                Dist = np.abs(p1.pos[1]-p2.pos[1]) + np.abs(p1.pos[0]-p2.pos[0])
                if Dist<=distance:
                    g.add_edge(p1,p2)

        #Allineo Opinion2 ed Action

        for n in g.nodes():
            neighbors = list(g.neighbors(n))
            opinionNeighbors = []
            for neighbor in neighbors:
                opinionNeighbors.append(neighbor.opinion)
            # avg action value
            averageOpinionNeigh = sum(opinionNeighbors)/len(list(g.neighbors(n)))
            n.opinion2  = n.opinion + step*(averageOpinionNeigh - n.opinion)


        for n in g.nodes():          # -1/3 < c < 0, c=-1/3 dittatura, c = 0 democrazia
            if n.opinion2 <= c*n.gini - c + 0.66:    # l'azione dipende dall'azione
                n.action=0
            else:
                n.action=1
        return(g)

    def evolution(g, c, step, step2, b, distance, minit, maxit, seed):
        edges=[]
        opinionmean=[]
        opinion2mean=[]
        actionmean=[]
        time=[]
        timestep = 0
        fine = False
        np.random.seed(seed)
        while fine == False:
    # for timestep in range(500):
```

```
        timestep = timestep +1
        time.append(timestep+1)
        print("Iterazione", timestep)
        for z in g.nodes():
            # define group of nodes
            neighbors = np.random.permutation(list(g.neighbors(z)))
            notneighbors = np.random.permutation([n for n in g.nodes() if n not in neighbors])
            differentneighbors = np.random.permutation([l for l in neighbors if abs(z.opinion - l.opinion2) > 0.5
])
            likemindednotneighbors = np.random.permutation([m for m in notneighbors if abs(z.opinion-
m.opinion2) <= 0.5])

            if len( list ( likemindednotneighbors ) ) > 0:
                s = likemindednotneighbors[0]
                Dist = np.abs(z.pos[1]-s.pos[1]) + np.abs(z.pos[0]-s.pos[0])
                dice = rand()
                if dice < b and Dist < distance:
                    g.add_edge(z,s)
                    # print("edge added between same minded")

            if len( list(differentneighbors) ) > 0:
                d = differentneighbors[0]
                dice = rand()
                if dice < b:
                    g.remove_edge(z,d)
                    # print("edge removed")

            if len(list(neighbors))==0 and len(list(likemindednotneighbors))>0:       # i lonewolf
                e = likemindednotneighbors[0]
                Dist = np.abs(z.pos[1]-e.pos[1]) + np.abs(z.pos[0]-e.pos[0])
                dice = rand()
                if dice < b and Dist<distance:
                    g.add_edge(z,e)
                    # print("edge added")

        for v in g.nodes(): #Blocco effetto di network
            if len(list(g.neighbors(v)))>0:
                neighbors = list(g.neighbors(v))
                opinion2Neighbors = []
                for neighbor in neighbors:
                    opinion2Neighbors.append(neighbor.opinion2)
                    averageOpinion2Neigh = sum(opinion2Neighbors)/len(list(g.neighbors(v)))
                v.opinion2  = v.opinion + step*(averageOpinion2Neigh - v.opinion)


        for v in g.nodes():    #Blocco cognitive adaptation
            if len(list(g.neighbors(v)))>0:
                neighbors = list(g.neighbors(v))
                opinion2Neighbors = []
                for neighbor in neighbors:
                    opinion2Neighbors.append(neighbor.opinion2)
```

```
            averageOpinion2Neigh = sum(opinion2Neighbors)/len(list(g.neighbors(v)))
            v.opinion  = v.opinion + step2*(averageOpinion2Neigh - v.opinion)


        for v in g.nodes():
            if v.opinion2 <= v.gini*c-c+0.66:    # l'azione dipende dall'azione
                v.action=0
            else:
                v.action=1


        #time.append(timestep)
        # statistiche di stato:
        opinions=[n.opinion for n in g.nodes()]
        opinionmean.append( st.mean(opinions) )
        opinions2=[n.opinion2 for n in g.nodes()]
        opinion2mean.append(st.mean(opinions2))
        actions=[n.action for n in g.nodes()]
        actionmean.append( st.mean(actions) )
        edges.append(len(list(g.edges())))


        opinions = [n.opinion for n in g.nodes()]
        opinions2 = [n.opinion2 for n in g.nodes()]
        actions=[n.action for n in g.nodes()]
        delta = abs(np.array(opinions) - np.array(opinions2))

        if (max(delta) < 0.015) or (timestep > maxit):
            fine = True
        if (timestep < minit):
            fine = False
    return(opinionmean, opinion2mean, actionmean, time, edges, delta)

def system_shock(g, seed, prop, shock):
    np.random.seed(seed)
    for v in g.nodes():
        if np.random.uniform(0,1)<prop:
            v.opinion = v.opinion + (1 -v.gini)*shock
    return(g)
```

Dictatorship/Democracy simulation

```
b = 0.2 #Probabilità di trovare persona fuori dal proprio vicinato
p = [0.4, 0.5, 0.1] #Livello di ineguaglianza gini = 0.3
p = [0.5, 0.4, 0.1] #Italia gini = 0.38
p = [0.6, 0.3, 0.1] #Brasile gini = 0.40
p = [0.7, 0.2, 0.1] #Estremo gini = 0.42
c = -0.5 #Costi
step = 0.8 #Friction effetto di network
step2 = 0.08    #friction parameters cognitive adaptation
distance = 1.5 #Distanza minima iniziale per avere una edge
```

```
seed = 10
g = state_of_nation(c, p, distance, step, seed)

minit = 0
maxit = 5000
evl = evolution(g, c, step, step2, b, distance, minit, maxit, seed)
##################################################################
###########
#TESTS
opinionmean = evl[0]
opinion2mean = evl[1]
actionmean = evl[2]
time = evl[3]
edges= evl[4]
delta=evl[5]

plt.plot(time,opinionmean,"g-")
plt.show()
plt.plot(time,actionmean)
plt.show()
plt.plot(time,opinion2mean, "g-")
plt.show()
plt.plot(time,edges)
plt.show()

print(len(list(g.edges())))
actions=[n.action for n in g.nodes()]
plt.hist(actions)
print(st.mean(actions))
opinions = [n.opinion for n in g.nodes()]
plt.hist(opinions)
plt.show()
print(st.mean(opinions))
opinions2 = [n.opinion2 for n in g.nodes()]
plt.hist(opinions2)
plt.show()
print(st.mean(opinions2))

pos={}
for n in g.nodes():
    pos[n]=n.pos
nx.draw(g,pos=pos, node_color=[n.action for n in g.nodes()])
plt.show()

pos={}
for n in g.nodes():
    pos[n]=n.pos
nx.draw(g,pos=pos, node_color=[n.opinion for n in g.nodes()])
plt.show()

pos={}
```

```
for n in g.nodes():
    pos[n]=n.pos
nx.draw(g,pos=pos, node_color=[n.opinion2 for n in g.nodes()])
plt.show()

pos={}
for n in g.nodes():
    pos[n]=n.pos
nx.draw(g,pos=pos, node_color=[n.gini for n in g.nodes()])
plt.show()

rich = [t for t in g.nodes() if t.gini>=0.7]
action_rich = [n.action for n in rich]
plt.hist(action_rich)
print(np.mean(action_rich))

medium = [t for t in g.nodes() if t.gini>=0.4 and t.gini<0.7]
action_medium = [n.action for n in medium]
plt.hist(action_medium)
print(np.mean(action_medium))

poor = [t for t in g.nodes() if t.gini<0.4]
action_poor = [n.action for n in poor]
plt.hist(action_poor)
print(np.mean(action_poor))
##########################################################################
############
#Shock
system_shock(g, 10, 0.5, 0.3)
```

Inequality, Grievances and Participation in Protests: The Case of the Arab Awakenings

Abstract
This paper analyzes the socioeconomic trends that characterized three Arab countries – Tunisia, Egypt, and Jordan – during the decade that preceded the 2011 uprisings, as they emerged in the HIECS surveys conducted in this time-period, and the social characteristics of those citizens who participated in the subsequent protests, as they emerged in the 2011 wave of the Arab Barometer surveys. It shows that, contrary to the mainstream narrative on the Arab uprisings, the biggest and most effective revolts happened in those countries that had seen overall impoverishment but decreasing inequality rates over the previous decade: Tunisia and Egypt. Moreover, it finds a direct relationship between household incomes and likelihood of participation in the protests: the richer the household the more likely members would participate in the protests. This fact contradicts the main narrative on the 2011 revolts and supports the recent theory on the influence of inequality on political behavior espoused by Solt.

Introduction

Why do people mobilize against their ruling government? Why do regimes that looked stable for decades suddenly fall following mass protests or armed uprisings? What are the social, economic and political factors that are more likely to spur such protests? And who are the social groups that are more likely to participate in them?

These questions have been a source of research and debate for a much of human history. They regularly remerge in the aftermath of momentous, often unpredicted, destabilizing events. Modern history is replete with examples. Consider the French Revolution, the numerous waves of protests that erupted across Europe throughout the nineteenth century, the 1917 Russian Revolution—as well as the twentieth century's notable uprisings and revolts across post-colonial Asia and South

America, and, after 1989, Eastern Europe. Most recently, such questions have remerged in the aftermath of the "Arab Spring" or "Arab Awakening". This wave of protests and uprisings in 2011 and after, which shook the political order of many Arab countries to a greater or lesser extent, therefore rekindled debate about mass mobilization and regime change.

In its aftermath, politicians, journalists, writers, and scholars have tried to provide explanations. Why did people mobilize in 2011 and not before, despite several decades of authoritarian and repressive rule in most of these countries? What social, economic and ideological factors caused people to take to the streets against their rulers? And, finally, who are the people who participated in the protests? What were their primary aims?

In the dense debate that followed the events of the Arab Spring, a prevailing mainstream narrative emerged in both the public and academic discourse. This was that decades of corrupt, repressive rule and economic mismanagement had produced widening economic inequalities and increasing grievances among the middle and most deprived socioeconomic groups within many Arab societies, especially among the youth. The introduction of neoliberal economic policies sponsored by Western countries and the major international economic organizations, such as the International Monetary Fund (IMF) and the World Bank, was posited as the main source of the policies producing these economic effects. In 2011, following the example of the protesters in Tunisia, who had successfully toppled the 24-year long rule of Zine El-Abidine Ben Ali, these social classes rose up against their rulers in most Arab countries, with different degrees of intensity and success. The aims of these people, so the conventional wisdom goes, were primarily socioeconomic – addressing inequalities and obtaining redistributive policies – and political – obtaining more political and social rights and freedoms. The objectives of these movements were thus summed up by the slogan "Bread and dignity" (Dunne 2013), according to the standard accounts.

Undoubtedly, this narrative contains much that is true. For instance, as this paper shows, in several Arab countries—despite positive economic growth rates in the decade preceding 2011 – living conditions had deteriorated significantly due to increasing prices and a lack of job opportunities. Available data from almost all Arab countries show how the policies adopted in the decades prior to the Arab Spring failed to create sufficient employment opportunities, especially for young newcomers to the labor market. Second, most of the surveyed individuals who participated in the uprisings cited socioeconomic grievances as the major factor that led them to the streets (Arab Barometer 2011). Third, repression and the lack of respect for civil liberties were also referenced as major factors in the protests.

However, this paper points to two pieces of intriguing evidence that contradict the prevailing narrative. First, data on consumption and income from several Arab countries – including Tunisia and Egypt, the two archetypal cases of regime change – from the decade preceding the uprisings show *no trend of increasing inequality*. In contrast, they show a significant reduction in inequality in both consumption and income. Second, the available surveys conducted among the participants in the uprisings show an average income significantly above the general mean income of the overall population. Furthermore, age does not emerge as an effective explanatory factor in determining protest participation. In contrast, other variables – such as income and education – are positively correlated with participation.

These findings, which debunk the core of the mainstream narrative on the 2011 Arab uprisings, are analyzed through the lens of the three key strands in the literature that address the question of the impact of inequality on political behavior: grievance theory, resource theory, and relative power theory. Grievance theory (see, e.g., Gurr 1970) suggests that inequality spurs social discontent among the poorer and most deprived sections of the population, leading to protests

demanding redistribution. Resource theory (see, e.g., Verba, Schlozman, and Brady 1995) describes engagement in protest activities, such as demonstrations and sit-ins, as a function of the particular resource endowment of each individual: the more endowed (with money, time, etc.) a person is, the more likely it is that she is able to join protest activities. Finally, relative power theory (Solt 2008; 2015) states that the ability of a person to join protests is a function of her position in the income distribution and of the general level of inequality characterizing the society. The costs of protest participation vary depending on each individual's position within the income distribution: the higher her position, the less costly it is for her to join protests. Furthermore, the more unequal a society, the easier it is for its elites to monopolize the public discourse and the repressive instruments, thus increasing the costs of participation for those positioned lower in the distribution.

As the data presented in this paper show, the 2011 uprisings occurred at the end of a decade of deteriorating living and employment conditions but also falling economic inequality. People participating in the protests belonged primarily to the wealthiest social groups and in most cases, income is not negatively correlated with participation – as the mainstream narrative would suggest – but is actually positively correlated.

In light of these findings, this paper provides a different narrative of the dynamics that led to the 2011 Arab uprisings. According to this narrative, falling inequality – coupled with a general deterioration in people's life conditions – were decisive factors in the occurrence of the 2011 upheavals, as well as their success or failure. Furthermore, their participants belonged primarily to highest and upper–middle socioeconomic groups.

The paper is based on two main data sources. The first is the income and expenditure surveys conducted by the central statistics institutes of several Arab countries during the decade preceding

the 2011 wave of protests. The second is the 2011 wave of the Arab Barometer, which, for timing and completeness, is the best source of information about the participants in the 2011 protests.

The analysis focuses primarily on three countries: Tunisia, Egypt, and Jordan. This choice is due to both theoretical and practical considerations. The theoretical considerations concern the preference for countries characterized by similar economic structures and income levels. All three countries are low–medium income economies, with few natural resources, and characterized, to different extents, by the presence of low value-added industrial sectors and a still significant agricultural sector. Furthermore, all three countries witnessed significant economic reforms in the two decades preceding 2011, which spurred the growth of the service sector and the gradual liberalization and privatization of the economy. Although such characteristics are common also to other Arab economies, such as Morocco or Syria, the availability of data reduced the choice to these three countries. In fact, Tunisia, Egypt, and Jordan are the only countries with such characteristics whose national income and consumption surveys are publicly available, and that are also present among the countries surveyed by the 2011 Arab Barometer wave.

Finally, these three countries are theoretically interesting for two further reasons. First, while Tunisia and Egypt saw a significant decrease in inequality measures during the decade preceding 2011, Jordan witnessed a significant increase. Second, all three countries witnessed protests in 2011; however, while protests in Tunisia and Egypt involved massive demonstrations that ultimately led to the toppling of Zine el-Abidine Ben Ali and Hosni Mubarak, protests in Jordan remained limited in the numbers of people involved and saw a limited use of fully anti-regime, revolutionary slogans. Furthermore, the data presented in this paper show that, while the previous decade had seen a general deterioration of life conditions in all these three countries, in Tunisia

and Egypt this deterioration hit the middle to upper income groups especially while in Jordan lower strata were the most affected by the economic downturn.

The paper is divided in three parts. The first considers the main strands in the literature on the political consequences of inequality and analyzes the available data on inequality, income, and consumption in the countries under investigation. The analysis consists principally in the development of Growth Incidence Curves (GICs) showing the distribution of the changes that occurred in income and consumption during the decade preceding 2011. Data are disaggregated according to different variables such as the urban–rural divide and diverse kinds of consumption items to provide the most complete information.

The second part focuses on the available information on those who participated in the protests in 2011 provided by the second wave of the Arab Barometer surveys. Multiple logit regressions are run to explain participation or non-participation in the protests through the main demographic variables available in the survey. Exploratory data analysis techniques analyze the distribution of income and other demographic characteristics of participants, non-participants, and the general population in order to highlight the socioeconomic differences among the social groups that participated in the uprisings in comparison to the rest of the population.

Finally, the third part provides conclusive remarks unifying the results of the two previous sections. The findings debunk the predictions of grievances theory, which underlies the mainstream narratives on the Arab Spring. And it seems to confirm the expectations of both resource theory and relative power theory, although no conclusive finding emerges confirming which one is the most fit to describe events. At the end of this final part an alternative narrative of

the 2011 wave of protests in the Arab countries is provided, based on the most recent literature on inequality, media, and civic engagement, in addition to the findings of this paper.

1. Part I – Trends of inequality data from 2000 to 2010

1.1. Introduction

Narratives on the 2011 Arab Awakening often describe growing inequalities as one of the main factors that led to the uprisings (see, e.g., Bogaert 2013; Dahi and Munif 2012; Achcar 2013; Joya et al. 2011). According to these narratives, perception of unfairness spreading among the most deprived groups in the population, led to the protests that spread from Tunisia and Egypt throughout almost every country in the region.

Either explicitly or implicitly, the authors adopting these narratives support one specific approach to the effects of economic inequality on the political sphere defined as the "grievances approach" (see, e.g., Gurr 1970; Acemoglu and Robinson 2005): augmenting economic inequality increases discontent and political activism among the most deprived social classes. Consequently, these classes mobilize to promote democratization and redistributive policies. Thus, the 2011 uprisings were the result of growing discontent among the impoverished strata of the Arab populations caused by the widening economic gap between them and the most advantaged social groups.

However, although still popular, in recent years the grievance approach has been criticized, especially for its lack of empirical support (for a review, see Solt 2015). Critics highlighted the results of recent studies showing that at higher level of economic inequality political activism tends to decrease instead of increasing as this literature implies. To explain these apparently contradictory findings, two strands of literature have emerged to provide a different account of the effects of economic inequality on political behavior: resource theory (RT) (see, e.g., Verba, Schlozman, and Brady 1995) and relative power theory (RPT) (Solt 2015; 2008).

Both theories share a common understanding of money as a fundamental source of political power. However, they differ on the interpretation of this concept. According to RPT, high inequality

provides the upper classes with the power to condition the country's political discourse. Through their superior economic resources, they can influence the public discourse and the political agenda so that these reflect elite interests, overshadowing those of the less well off. This does not mean that the interests of the various elite groups always overlap perfectly. Minor or major disagreements may emerge between the different blocs at the top and this may lead to an increase in political activism in some elements. However, this activism would remain focused on issues related to the elites' interests. However, if inequality decreases, the relative power of the most advantaged groups decreases, allowing also poorer citizens to engage in political activism. The fundamental idea behind RPT is, in short, that the costs of engaging in protests are not equal for every citizen but change depending on their relative position along the distribution of wealth. When inequality is higher, differences in wealth count more, while they become less relevant (but do not disappear) if inequality decreases.

On a slightly different line, RT focuses on the costs that individuals necessarily incur in undertaking political action. Political activities cost money, time and other resources, and an absolute variation of one individual's resource endowment will lead to a change in her capability to participate in political activism. Thus, if a society gets richer, although unequally so, then all the socioeconomic groups within the population will gain an increased capability to participate in political activism, although to different extents depending on the distribution of the increase in wealth. In short, while RPT focuses on the individuals' relative endowment of resources, RT tends to concentrate more on each individual's economic endowment in absolute terms.

According to RPT, political activism, especially if peaceful, will be more likely in the presence of decreasing inequality. At the same time, RT's approach is highly individualized: participation in political activism is easier the more resources an individual has access to, regardless to the level

of inequality in the society. Therefore, activism is far more likely for the members of the more affluent social groups who will be overrepresented within political movements and whose interests and views will obtain relatively higher exposure. The aim of this part is to analyze the inequality trends that took place in different Arab countries during the decade that preceded 2011. It shows that in all three countries considered – Egypt, Tunisia and Jordan – living conditions worsened during the 2000s. However, depending on each country, different social classes were hit harder by the deterioration in income and living conditions, leading inequality to decrease significantly in Egypt and Tunisia and to increase in Jordan.

It is important to note that these differences in inequality trends were not mirrored by the data on inequality perceptions carried out during the same period. In fact, in all three countries considered, perceptions of inequality increased, despite inequality measures based on microeconomic data having gone in the opposite direction in Egypt and Tunisia. To explain this mismatch, this part goes through the literature on the relationship between inequality measures and inequality perception.

This part proceeds as follows. The first section summarizes the recent literature on the effects of inequality on the political behavior of individuals and the most recent findings regarding the determinants of inequality perception. The second section describes the source of data and the methodology employed for the analysis carried out in this part. The third section goes through the available data on inequality and those on income and consumption trends in Tunisia, Egypt and Jordan and analyzes similarities and differences between the three. Finally, a concluding section analyzes the findings emerging from this part in light of the threads of literature on inequality and

political behavior, trying to pinpoint which one provides the most fitting narrative of the events occurring during the Arab Awakenings.

1.2. Inequality, political behavior, and collective perceptions: A review

Does inequality lead to social activism or inhibit it? To answer this question it is necessary, first of all, to provide a brief review on how social activism – or, as Putnam (2001) defined it, "civic engagement" – is defined and how the definitions developed until now fit the goals of this paper. In fact, most of the literature that has analyzed the concept of civic engagement has focused on democratic systems and, especially at the beginning, used election turnouts as the main indicator of the level of civic engagement in a society (for a review see Ekman and Amnå 2012). However, more recently some authors have attempted to provide more nuanced classifications of the various types of activities that, according to the most utilized definition elaborated by Tourell et al. (2007), "encompass actions or activities by ordinary citizens that in some way are directed toward influencing political outcomes in society" (Teorell et al. 2007 quoted in Ekman and Amnå 2012). Among them, that of Barnes and Kaase (1979) became the benchmark for several subsequent works. They proposed a distinction between conventional and unconventional types of political participation: the first embedded structurally in the political system and the second that are to be considered non-institutionalized. Building on the work of Barnes and Kaase, Ekman and Amna (2012) have added a further type, that of "latent" forms of participation, which includes all those activities that are not properly "political" but that have a social dimension, and that can become properly "political" under the right circumstances. The authors define them as "pre-political", or "latent", and admit that, although their study is fundamental to fully grasp the potential for political action within a society, this type is the most difficult to measure through traditional surveys.

It is useful to stress that such classifications were developed using democratic Western societies as main case-studies. Hence, they do not fit perfectly systems and societies that are not fully democratic. For instance, although some sort of political participation is allowed in Arab dictatorships – with significant differences among Arab countries – its extent and capability to influence political decisions is not properly institutionalized and depend on the contingent and arbitrary concessions of the ruling government. In some circumstances, for example, ruling the regimes encourage people to engage in civil society organizations having specific and limited scope – such as those engaged in women rights issues or environment protection. Such organizations are usually directed, founded and supported by regime members and to some extent reflect policies that the government has already decided to adopt. However, this kind of top-down civil engagement is not of interest for the subject of this paper. We investigate participation in proper contention actions aiming to influence political decision from the bottom-up, when not to change the political system all-together. We pick participation in street protests as main indicator for two reasons: the first is that, until now, street protests have been the main visible form of contentious politics utilized in most of the world, including Arab countries. Second, participation in street protests is easily measurable thanks to the presence of *ad-hoc* questions in surveys such as the Arab Barometer. Furthermore, although in some cases they are tolerated or "scarcely" repressed by local regimes, street protests are hardly legal in most Arab countries, with few exceptions. Also, even when on paper the law allows for demonstrations to take place, they are usually organized informally anyway, without going through the proper formal procedures, in order to avoid alerting the authorities. Hence, according to the classification of Barnes and Kaase, street protests in the Arab world should be defined as "unconventional forms" of participation. Such as a definition, however, does not really fit the societies under investigation in this paper

since most Arab countries lack proper, institutionalized forms of participation able to effectively influence political decisions. The elaboration of a new classification fitting non-democratic systems exceeds the scope of this paper but should be the focus of future research.

Once we have clarified what we intend as social activism in this paper, we proceed to answer the initial question: does inequality encourage of inhibit it? During the last decades, different theories have given opposite answers to this question. According to Yizhaki (1979), feelings of deprivation among a population are directly connected to the level of economic inequality. The higher the inequality, the higher the discontent among the people located in the lower part of the income distribution. Meltzer and Richard (1981) use the same logic to explain the dynamics of political engagement in democracies. According to their model, when the distance between the median and the mean income increases, those located below the mean have an interest in exerting political pressure to reduce this distance. Since they represent the majority of the population, in a democratic system their interests would always prevail.

A similar approach is adopted by Acemoglu and Robinson in their book "Economic Origins of Democracy and Dictatorship" (2005), to explain the transition from autocratic systems to democracy. The two authors present a model in which the probabilities for a population to revolt against the country's dictator augment with increasing inequality.

This approach, which Solt gathers under the label of "grievances theory", has enjoyed great popularity for long time. In fact, journalistic and folky narratives on civil strife and protests often utilize this frame due to the popular "David vs Goliath" dynamic that it implies. However, the direct and positive relationship between inequality and political activism, especially among the most deprived strata of the population, does not find strong empirical evidence. Solt (Solt 2015)

show how acts of political activism tend to diminish with increasing inequality. Goodin and Dryzek (1980) and Boix (2003) find a negative and strong correlation between inequality and electoral turnout. In another paper, Solt (2012) goes further, showing how positive attitudes toward authoritarianism increase in societies characterized by high levels of inequality. The author explains these findings by affirming that high and protracted inequality rates cause people to start considering such a condition "normal", activating a mechanism defined as "cognitive protection", which implies the development of positive sentiments toward inequality as just and "natural".

In fact, also the early account of Alexis de Tocqueville on the development of American democracy depicts a negative relationship between political participation and inequality. According to de Tocqueville, the steady and linear development of democracy in the United States was primarily due to the great degree of economic equality within the society. Equality gave every citizen similar means to participate in politics and nobody had enough power to impose her own agenda or inhibit the others'.

The idea that economic resources matter in determining one's propensity to participate in politics is at the base of a second approach to inequality and political behavior, which Solt (2015) has usefully categorized for us as 'resource theory' or RT. Verba et al. (1995) in their study on participation in politics in the US found a direct relationship between an individual's economic endowment and her propensity to participate in political activities. In the framework that the authors develop to explain their findings, political activism is treated as any other good on the market. It has a cost in terms of resources, time, and personal efforts, and each person, depending on her interests and her personal resource endowment, decides her own degree of participation in political activities. In this framework, an increase in the absolute quantity of the resources at the person's disposal corresponds to an increase of each person's propensity to engage in politics.

Although in this approach inequality does not enter directly as a determinant of political activism, it retains an indirect role. In fact, since participation depends on resources, richer people will tend to participate more. However, if economic conditions improve across all the society and resource endowment increases for each citizen, people's political engagement would increase regardless to each person's position along the income distribution.

A third approach to the influence of inequality on political behavior that during the last years has found solid empirical support is the theory of relative power or RPT (Solt 2015; 2008; Goodin and Dryzek 1980). Similar to RT, RPT maintains that money endowment plays a decisive role in determining political participation. However, while RT considers money endowment in absolute terms, RPT approaches it in relative terms. In their seminal work, Goodin and Dryzek (1980) use a rational theory approach to explain the concept of relative power. They affirm that one's position along the income distribution influences her capacity to influence political decisions. In a very equal society, where resources are mostly equally distributed, people will perceive that they have the same chance as everyone else to make their voice heard. In contrast, when resources are very unequally distributed, people located in the lower part of the distribution will perceive the cost to get their voices heard as relatively higher than for those positioned in the upper part due to the inferior economic resources (and consequent political access) at their disposal. In other words, costs for political participation vary across the distribution: they are relatively low for those located in the upper part and become progressively relatively high for those located in the lower part. At the same time, those located at the lower part of the income distribution in a very unequal society may have more reasons to make their voice heard – to ask, for example, more distributive policies – than those located in the upper part. According to Goodin and Dryzek, these two contrasting

factors – higher costs for political participation and a greater interest in redistribution for poorer people in contrast to lower costs for political participation but smaller (if none) interests for redistribution for richer people – compose the utility function for political participation. Thus, the central concept of their theory can be summarized as "'Don't play if you can't win.' More precisely, those for whom political victory is certain, or very important, or very cheap have bigger reasons (speaking strictly rationally) for participating. For the rest, it is perfectly rational to refrain from participating" (Goodin and Dryzek 1980).

The implications of RPT are two-fold. First, the theory implies a negative correlation between inequality and political participation: the lower the inequality in a country, the higher the rates of political participation among its citizens. Second, people located in the upper part of the distribution face lower relative costs for participating and, with decreasing inequality, more people will find participation convenient, starting from the upper part of the distribution. In other words, while in the presence of high inequality only relatively richer people find political participation convenient, with decreasing inequality the extent of people who may find it convenient to engage in politics rises progressively downwards along the income distribution.

One of the cornerstones of the models at the base of grievances theory – such as Meltzer and Richard's or Yizhaki's – is that the actual level of inequality measured through standard econometric methods, such as the Gini index, corresponds to the level of inequality perceived by individuals. This approach is in the spirit of classic rational theory applied to economics, in which the perfectly rational "homo economicus", endowed with complete information, manages always to calculate her rational interest given the current circumstances. If this is true, those societies whose measures of inequality are relatively high would be the most subject to protests and upheavals in favor of redistributive policies. At the same time, more equal societies would enjoy

stability and a relative higher level of satisfaction among their populations. Also, following this line of though people always perceive inequality and its increase as something negative for their society. However, the literature on the topic seems to contradict this approach.

Several recent studies have investigated the relationship between inequality levels calculated on microeconomic data and levels of inequality perception. Corneo and Gruner (2000) find that the "homo economicus effect" is of explanatory value only if aggregated with other effects such as the "social rivalry effect" and the "public values effect". They find, for example, that differences in perceptions on inequality in former Eastern European socialist countries and in Western countries are more conditioned by diffused public values than by the actual measured levels of inequality. In their analysis of the US and other Western countries, Alesina and Giuliano (2011) find that several subjective determinants compose individuals' perceptions toward inequality. Women, youth and African-Americans emerge as stronger supporters of redistributive policies compared to the rest of the population.

Similarly, personal beliefs on what drives economic success in one's society and beliefs about other people's intentions emerge also as important determinants of the taste for redistribution. Gimpelson and Monusova (2014) conduct a cross–country analysis using microdata provided by the International Social Survey Program from 1999 to 2009 and the Life in Transition Survey for 2010 which gathered data from 26 countries in the West, Eastern Europe, Asia and Oceania. The authors compare the measured inequality indexes and the surveyed attitudes toward inequality, finding surprising results. For example, in Scandinavian countries, where inequality is generally low, and in Anglo-Saxon countries, where it is generally high, people share the same low level of negative feelings toward inequality. In contrast, in former socialist countries and in southern European countries more than half of the population think that inequality in their society is "too

large". They point in particular the case of France, which is at the same time one of the countries with the lowest inequality rate and one of the countries with the largest share of people perceiving inequality in their society as too high. In general, the authors find only a weak correlation between actual levels of inequality and its perception. In the second part of their paper, the authors check whether perceptions are associated with other indicators, for instance the level of perceived social mobility. They find strong proof in support of this hypothesis – when people perceive that they are provided with opportunities to improve their status their perception toward inequality improves while it worsens if they perceive that they are stuck in their situation with no chance to reach a higher level in the social hierarchy. They also find strong correlation with other surveyed perceptions regarding ways in which social mobility is experienced. If "hard work" emerges as a perceived strong determinant of mobility the attitude toward inequality seems to improve while status-based and corruption-based inequality emerge as less tolerated. Thus, beyond perceptions of opportunity availability, perceptions of "fairness" seem to play an important role in determining the attitude toward inequality, whatever its actual measured level is. Furthermore, what emerges from most of the literature on the topic is that negative attitudes toward inequality are associated with perceptions of high levels of inequality in the society while positive attitudes are associated with low levels of perceived inequality i.e., people who do not like inequality in general perceive it to be higher in their society than those who have a positive attitude toward it.

Brunori (2017) conducts a similar analysis on the perceptions of inequality of opportunity. Indexes of inequality of opportunity measure the different levels of access to job and career opportunities across a population. Like Gimpelson and Mosusova, Brunori also finds that the measured and perceived levels of inequality of opportunity are only weakly correlated. In contrast, perceptions emerge as significantly correlated with other country-level variables, such as widespread social

values regarding equality, and with intergenerational social mobility. Once again, social mobility emerges as a much more important determinant of inequality perceptions than actual measures. This finding is in line with the classic theory on inequality perception proposed by Hirschman and Rothschild in 1973 and commonly known as the "Tunnel Effect" theory. To explain different attitudes toward inequality, the authors use the metaphor of people stuck in traffic inside a tunnel who start seeing other cars passing ahead of them. If they perceive that they will be stuck in their spot forever while others pass ahead their attitude toward what happens will be very negative. In contrast, if they perceive that their turn is coming relatively soon, they will accept a situation of "temporary inequality" that is going to benefit them as well. In particular, the strong correlation between inequality perceptions and intergenerational social mobility found by Brunori highlights that the perception of mobility is determined by one person's experiences and immediate references such as her family. In their study on inequality perception in Argentina, Cruces et al. (2013) show that people tend to assess the society's inequality level and their own position within the distribution using their immediate social surrounding for comparison, leading to significant mismatches. The fact that a person perceives that her situation has improved (or is going to improve) in comparison to that of her parents emerges as a much stronger determinant of her attitude toward inequality than actual measures. If this dynamic is translated to an entire population, we may expect to see changes in the general attitude toward inequality and in the perception of its level more correlated with general changes in living conditions and job opportunities than with changes in the actual level of inequality.

1.3. Methodology

This part utilizes the microeconomic data on household-level consumption and income elicited from the Household Income, Expenditure, and Consumption Surveys (HIECS) collected in

Tunisia, Egypt, and Jordan over the decade between 2000 and 2010. This kind of survey aims to gather information from a representative sample of the population regarding their consumption habits and their income level. Consumption questions are usually divided according to different kinds of goods utilizing the international classification of tradable items. Data collection methodologies are subject to international standards and interviews are usually conducted by the national statistics institutes. Especially in relatively data-poor environments such as the Arab countries, these surveys represent the most direct and complete source of data at the household level available. The data contained in this kind of surveys conducted in the Arab countries have also been subject to criticism regarding their reliability, especially due to the lack of evidence for inequality increases. One diffused critique proposes that the low levels of inequality recorded, especially in Egypt, are due to the failure of these surveys to capture the tails of the income distribution, especially the upper one. In other words, the richest members of the society are left outside these surveys causing a de-facto underestimation of inequality.

To try to address this problem, Hlasny and Verme (2016) applied two different techniques developed by Cowell and Victoria-Feser (1996a, 1996b) and Mistiaen and Ravallion (2003) to the data on Egypt. The first technique utilizes parametric shapes observed on the distribution of reliable income to replace top-income observations. The second technique infers the probability of no-response utilizing regional non-response rates and re-weights the sample correcting for top-income biases. Both these techniques result in measured rates of inequality higher than those obtained by simply utilizing the row data contained in the survey's sample. However, the difference in estimations is modest, between 1.1 and 4.1 percentage points. Using Hlasny and Verme's estimations for the bottom of the distribution, Piketty and Alvaredo (2014) utilized a parametric method integrating tax records for the estimations of the top incomes. The upward

correction they find is estimated between 1 and 14 percentage points. Finally, Van der Weide et al. (2016) used HIECS data for Egypt for the bottom 95% and house price data for the top 5%. They estimate the upward correction at 11 percentage points. Both these two last papers, however, do not find gaps that relocate Egypt's Gini index among those of the high inequality countries, and have been subject to methodological critiques themselves.[5] Egypt's Gini remains relatively low by both regional and world standards. More importantly, they do not contradict the trend emerging from the subsequent waves conducted in the 2000s, which show a significant reduction in inequality in both consumption and income. Finally, Verme et al. (2014) conduct a close examination of the methodology utilized for the collection of the HIECS surveys in Egypt, not finding any significant methodological flaw. In contrast, the latest waves appear to have witnessed a constant improvement of the methods employed.

The HIECS surveys utilized in this paper are the standardized versions provided by the Economic Research Forum (ERF), the most important regional institution dedicated on economic data collection and research. In Egypt, three waves of this of the HIECS survey were collected during the period considered and standardized by ERF: in 1999, 2005 and 2010. In Jordan, the same survey was conducted in 2002, 2005 and 2010. In the case of Tunisia only two observations are available on the ERF database, one for 2005 and one for 2010. Furthermore, the waves collected in Tunisia do not include data on income, but only on consumption.

1.4. Consumption and inequality measures in Egypt, Jordan and Tunisia (2000 – 2010)

This section presents the data regarding inequality of consumption and income for the three countries under consideration, extrapolated from all the available HIECS waves available for the

[5] Such critiques are explained at length in Giulio Verme's post on the World Bank's blog titled "Top incomes, inequality and the Egyptian case", available at the following link: http://blogs.worldbank.org/developmenttalk/top-incomes-inequality-and-egyptian-case

decade preceding the 2011 uprisings. For Egypt and Jordan, three waves are available (1999-2000, 2005 and 2010) for both income and consumption, while for Tunisia only two waves are available (2005, 2010) and only for consumption.

The first subsection presents the calculations of Gini indexes for both income and consumption for the entire populations of the three countries and the partial results for urban and rural areas. The Gini is calculated on the income and expenditures declared by the HIECS samples. The changes in the distribution of income and consumption that occurred between the two more distant waves available (1999-2000 and 2010 for Egypt and Jordan and 2005-2010 for Tunisia) are then presented in the form of Growth Incidence Curves (GIC). GICs have the advantage of giving a readily readable and clear idea of the changes occurring over the time period under consideration and along the entire distribution, divided into deciles. In this way it is possible to understand whether a decrease in the Gini index occurred because the lower deciles became richer, or because the upper deciles grew poorer (or due to a mix of both trends).

The second subsection disaggregates and analyzes the following different component of total household consumption: total food expenditures, total clothing and footwear expenditures, total housing expenditures (which include rents and bills), total medical expenditures, total education expenditures, and total cultural and leisure expenditures. This analysis is conducted to understand which kinds of consumption determined most of the changes observed in the total expenditure distribution. To conduct the analysis, the changes in each component is represented by a GIC.

The final subsection provides the results of the analysis. In the three countries, the data show stable or deteriorating life conditions for the population located in the lower part of the distribution and significantly worsening conditions at the top, especially for the medium–upper income groups. Dramatic rises in housing expenditures are the principal source of this deterioration. In all three

countries, although to significantly different extents, the decrease in the Gini index is thus caused primarily by deteriorating income and consumption levels in the middle–upper part of the distribution.

1.4.1. The Gini Index trends in Egypt, Jordan and Tunisia, 2000–2010

Tables 1 and 2 show the data on income and consumption inequality in Egypt and Jordan. Table 3 shows the data on consumption inequality in Tunisia.

Table 1—EGYPT			
Gini INDEX	**1999**	**2004**	**2010**
Total disposable income	36.3	33	31.3
Total expenditures	34.3	30.6	29.5
Total disposable income (Urban)	37.7	35.6	33.7
Total disposable income (Rural)	28.3	27.5	26.3
Total expenditures (Urban)	35.6	33	32.2
Total expenditures (Rural)	26.4	24.6	24

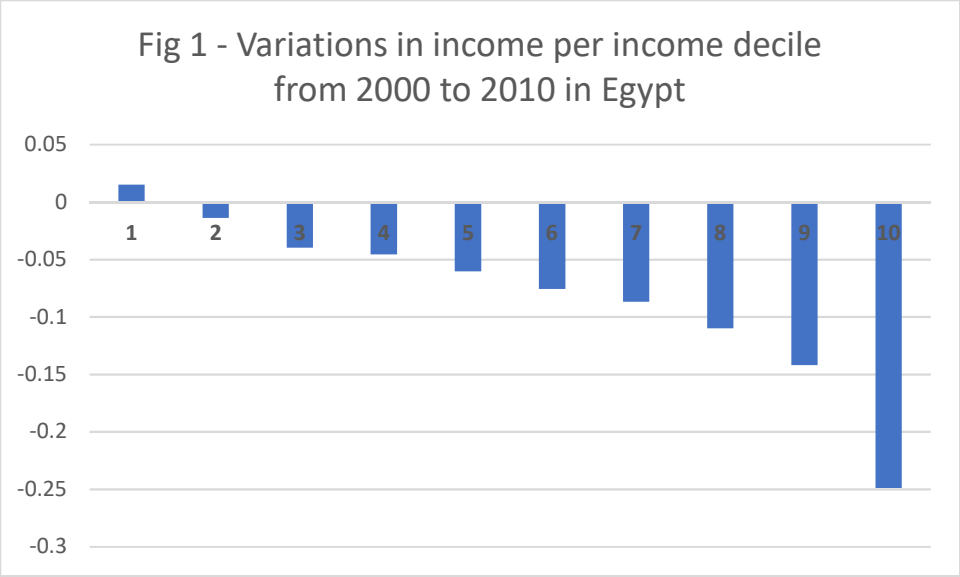
Table 2–JORDAN			
Gini INDEX	**2002**	**2006**	**2010**
Total disposable income	30.8	40.9	38.2
Total expenditures	31.1	34.2	32.2
Total disposable income (Urban)	31.5	41.6	39.2
Total disposable income (Rural)	28.9	37.1	34
Total expenditures (Urban)	31.5	34.3	33.1
Total expenditures (Rural)	29.3	31.9	28.1

Table 3–TUNISIA		
Gini INDEX	**2005**	**2010**
Total expenditures	40.2	36.9
Total expenditures (Urban)	38.5	34.7
Total expenditures (Rural)	38.8	35.9

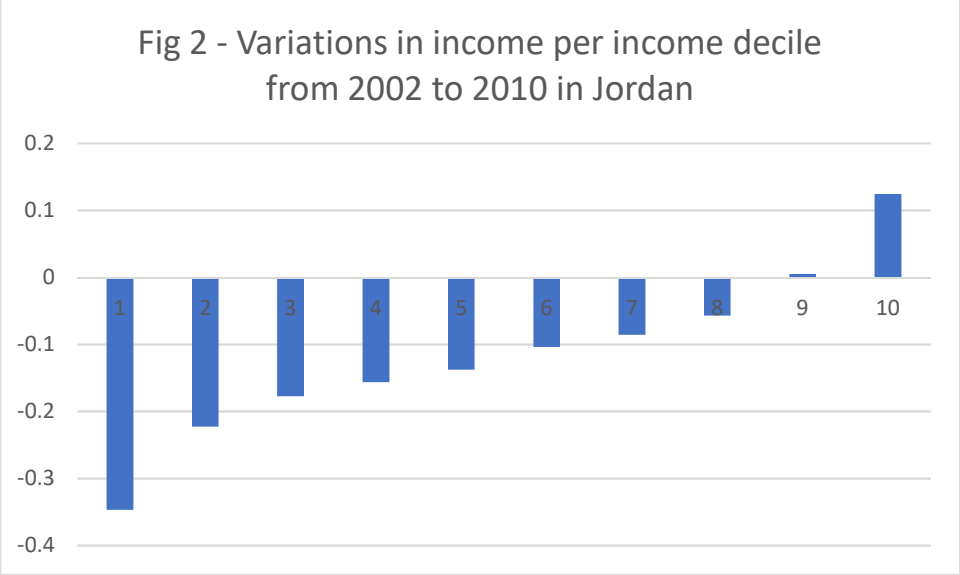
From 2000 to 2010 the Gini index diminished constantly in Egypt, both for income and consumption. The same occurred in Tunisia from 2005 to 2010. A calculation carried out by the World Bank for Tunisia based on a multiple indicator cluster survey collocated the country's Gini

index in 2000 at 40.8. Calculations based on subsequent waves of the same survey in 2005 and 2010 collocate the Tunisian Gini index in those years respectively at 37.3 and 35.8, slightly lower than this paper's calculation based on the HIECS survey. Thus, the World Bank calculation shows an even greater decrease in inequality. In this paper, I chose to utilize the HIECS survey because it allows me to disaggregate and analyze the different components of consumption. That said, this second source also confirms the trend of inequality decrease along the entire decade.

The trend in Jordan goes in quite the opposite direction, starting from relatively low levels of inequality in 2002, peaking in the middle of the decade in 2006, and diminishing slightly in 2010 – but still at a significantly higher level than at the beginning of the decade. As often happens, movements in income inequality tend to be wider than those in consumption inequality, due to the tendency of consumers to smooth their consumption habits along with income changes. In some cases, especially in high-income countries with sophisticated financial sectors that allow for easy access to credit for consumers, income and consumption inequality trends can even move in opposite directions usually with income inequality widening and consumption inequality shrinking (Krueger and Perri 2006). However, this is not usually the case for medium and low-income countries with scarcely developed financial sectors, as in most Arab countries. This seems to be the case also for Jordan and Egypt, where trends in consumption inequality seem to mirror those in income inequality.



Notes: X axis: income-distribution deciles. Y axis: shift in income for each decile normalized between 0 and 1 (0 = no change; 1 = 100% change)



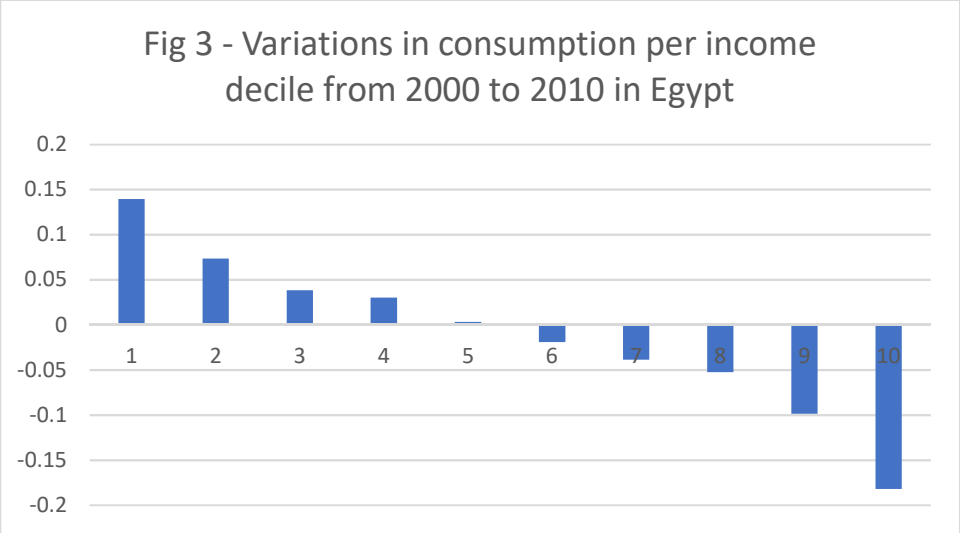
Notes: X axis: income-distribution deciles. Y axis: shift in income for each decile normalized between 0 and 1 (0 = no change; 1 = 100% change)

Fig 1 and Fig 2 show the variations in income occurred for each decile of the income distribution between the beginning and the end of the decade in Egypt and Jordan, respectively. Each bar shows the percentage variation that occurred between the mean incomes of the same deciles of the two distributions. The figures for the first observation are adjusted according to the official inflation rate in order to be fully comparable with the figures for the second observation.

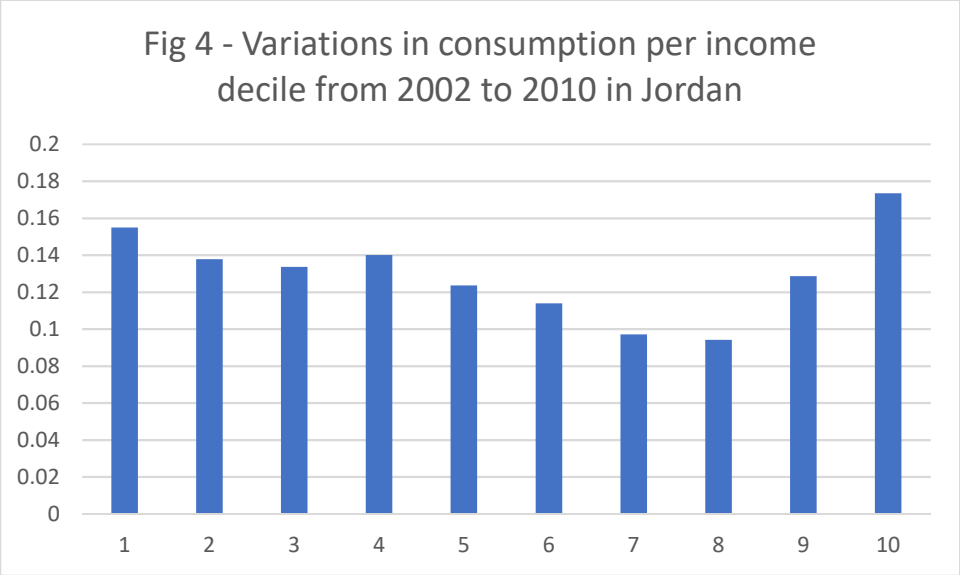
Comparing the two graphs we can observe opposite movements occurring in the income distributions of the two countries. In Egypt, we see a general loss of real income along the entire distribution and particularly concentrated in the upper half. This led to a significant decrease in the level of inequality accompanied by a general loss in real income. In Jordan we observe the opposite movement. Losses are concentrated in the lower half of the distribution while they are limited in the upper part. The top two deciles see even a slight increase in real income.

The decile that experienced the strongest loss in Egypt is the top decile (approximately –25%), a finding that may seem counter-intuitive given the development of crony capitalism observed in the same period. I will return to this issue in the conclusion of this section of the paper. In contrast, in Jordan the heaviest loss (more than –30%) was experienced by the lowest decile.

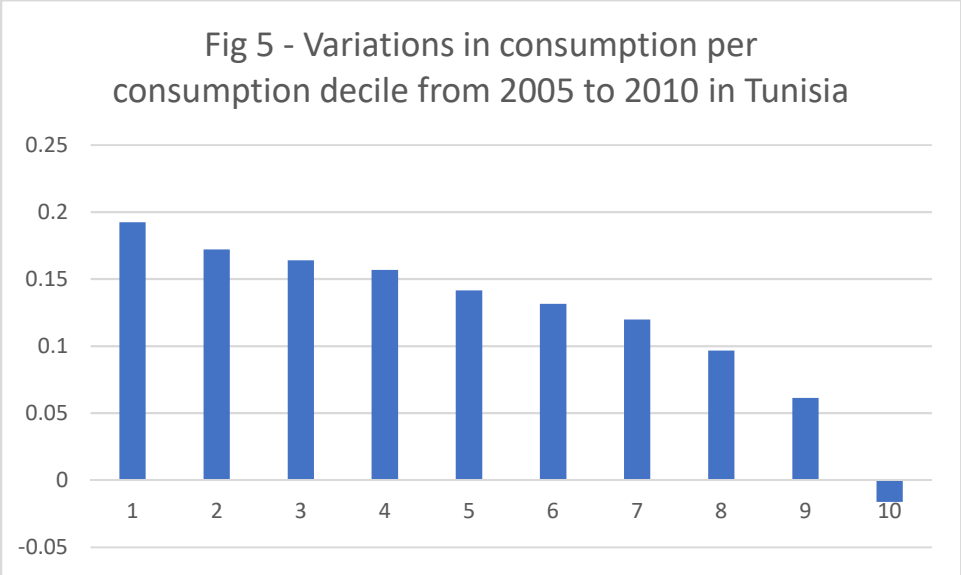
Figs 3, 4, and 5 show variations in the distribution of consumption, this time including Tunisia. For Egypt and Jordan, the deciles on which the variations are calculated are those of the income distributions utilized in the previous graphs. Instead, for Tunisia the deciles are those of the consumption distribution.



Notes: X axis: income-distribution deciles. Y axis: shift in consumption for each decile normalized between 0 and 1 (0 = no change; 1 = 100% change)



Notes: X axis: income-distribution deciles. Y axis: shift in consumption for each decile normalized between 0 and 1 (0 = no change; 1 = 100% change)



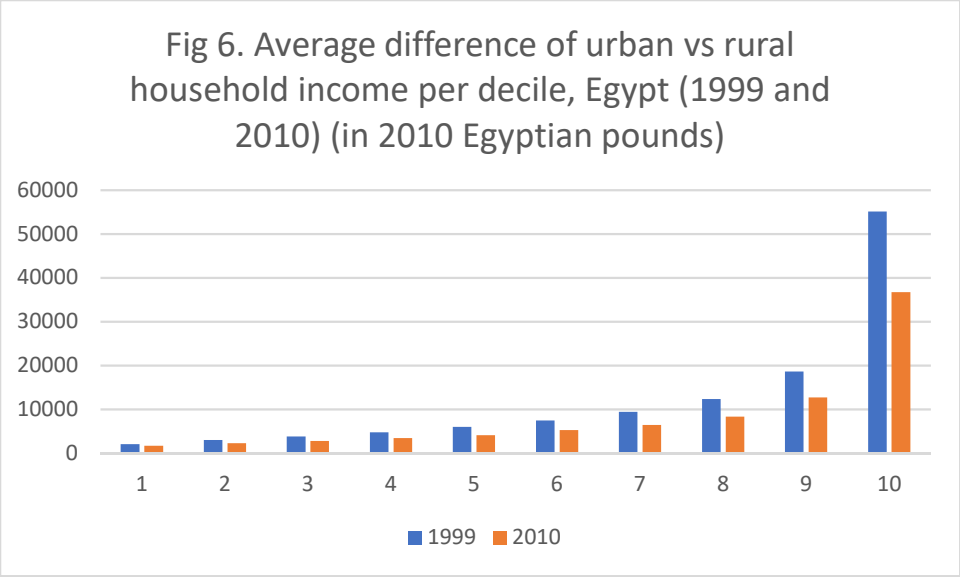
Notes: X axis: consumption-distribution deciles. Y axis: shift in consumption for each decile normalized between 0 and 1 (0 = no change; 1 = 100% change)

We can see that in Egypt that variations in income are mirrored, albeit imperfectly, by variations in consumption for each income decile. The lower part sees a slight increase in consumption, while the upper part a slight decrease, both concentrated in the tails, which contributes in the decrease of the measure of consumption inequality.

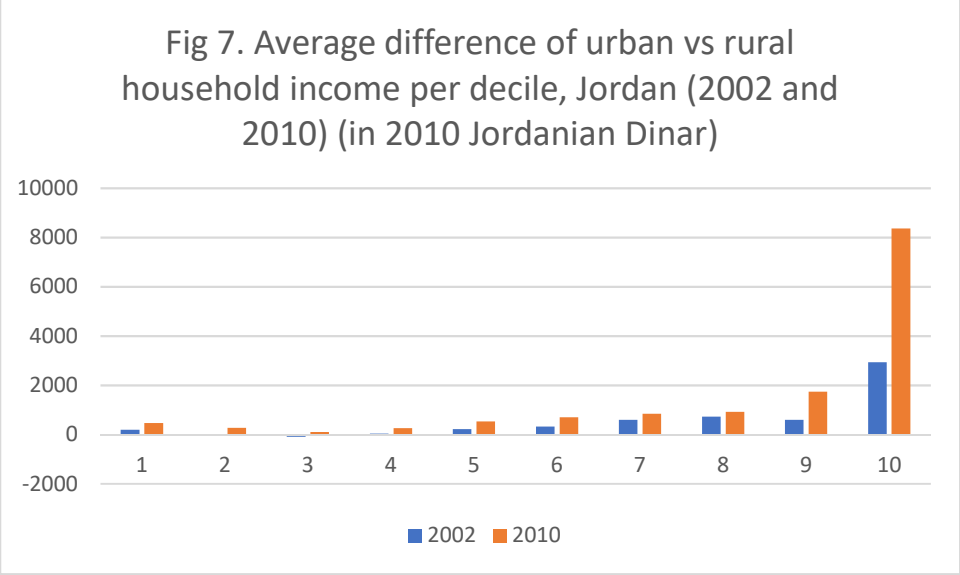
In Jordan we see a generally homogeneous increase in consumption expenditures along the entire distribution, with a peak in the top decile. Since the country saw a contraction of real income along almost the entire distribution during the same period, the almost equally stiff increase in consumption means a significant increase of the share of income devoted to consumption.

Finally, for Tunisia we see a trend resembling that of Egypt, although in this case the increase in consumption is not limited to the lower half of the distribution, but spreads, although at a steadily decreasing rate, also to the upper half. Only the last decile sees a very slight contraction. The analogy with Egypt lies in the fact that increases in consumption are concentrated in the lower half of the distribution and are progressively less pronounced moving toward the upper part. Interestingly, in Tunisia during a five-year period we observe variations in consumption higher than those seen in Egypt and Jordan during an eleven-year and an eight-year period, respectively. This is indicative of faster changes occurring in the income and consumption habits of the population, which is something that we analyze in more detail in the next section.

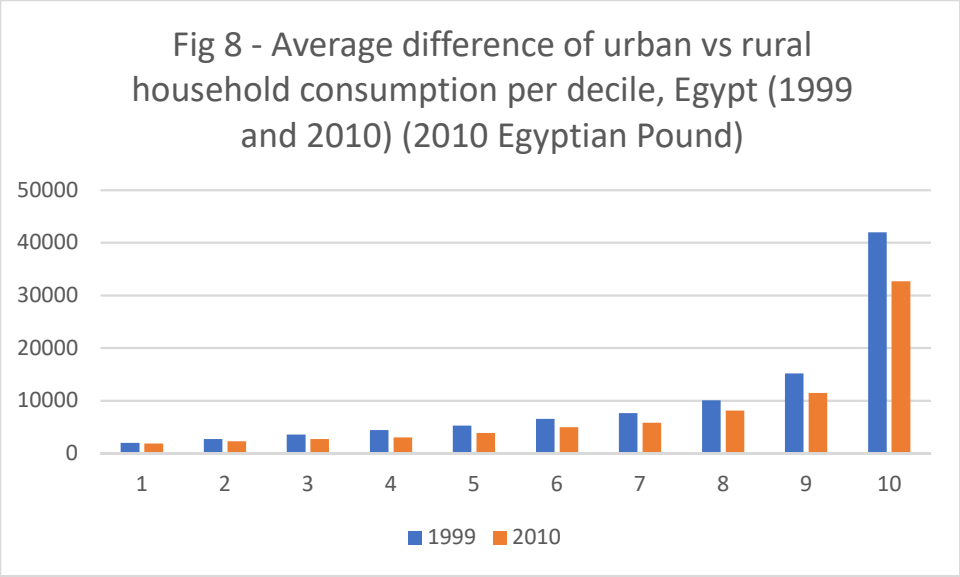
This section now turns to analyzing the variations that occurred in income and consumption distributions in each country, disaggregating them for urban and rural areas. This distinction is of interest since protests in these three countries were characterized by different urban-rural dynamics: they started in rural areas and towns in Tunisia, reaching the bigger cities only in a second phase, while they were mainly concentrated in the main urban centers in Egypt and Jordan. Figs 6 and 7 compare the variations between urban and rural distribution of income per decile at the beginning and at the end of the 2000s for Egypt and Jordan. Figs 8, 9, and 10 compare the same variations between urban and rural areas in the distribution of consumption for Egypt, Jordan, and Tunisia.



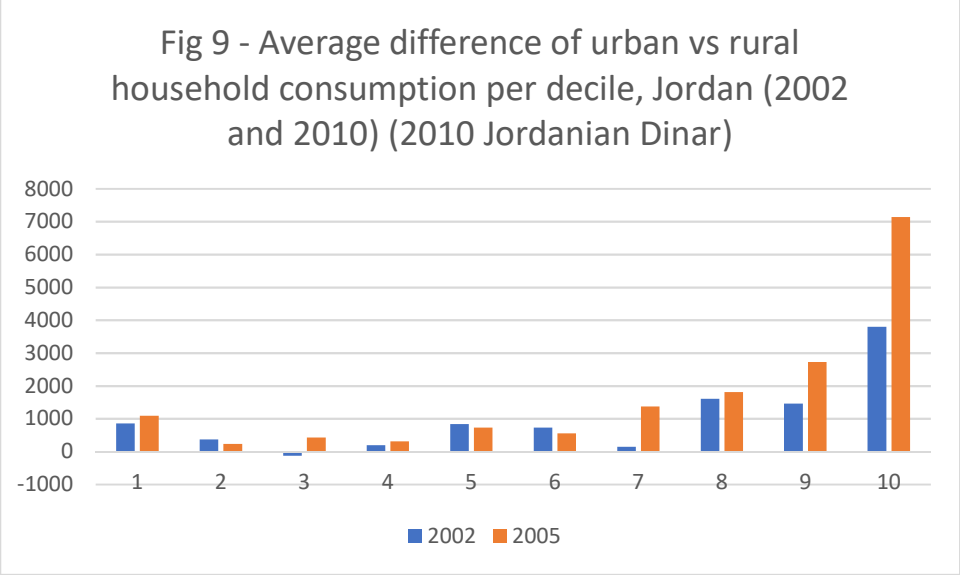
Notes: X axis: income-distribution deciles. Y axis: differences between urban and rural average income in 1999 and 2010



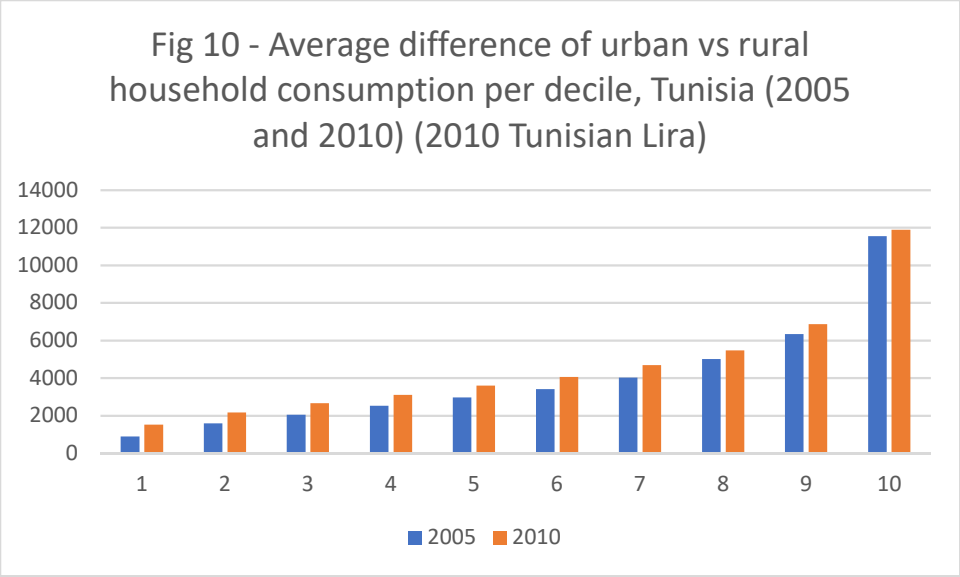
Notes: X axis: income-distribution deciles. Y axis: differences between urban and rural average income in 1999 and 2010



Notes: X axis: income-distribution deciles. Y axis: differences between urban and rural average consumption in 1999 and 2010



Notes: X axis: income-distribution deciles. Y axis: differences between urban and rural average consumption in 1999 and 2010



Notes: X axis: consumption-distribution deciles. Y axis: differences between urban and rural average consumption in 1999 and 2010

Income differences between urban and rural areas in Egypt decreased significantly during the 2000s along the entire distribution, supporting the hypothesis that most of the income loss occurred in urban areas. The opposite occurred in Jordan, where differences in income between urban and rural areas increased, especially in the upper part of the distribution. This means that the increase in income observed in the last two deciles was mainly concentrated in an emerging, wealthier, urban elite class.

Trends in consumption for both Egypt and Jordan follow those for income. In Tunisia we observe an increase of the difference between urban and rural areas along the entire distribution in favor of the former. Although slight, this increase is significant, since it formed in only five years. This means that the increase in consumption shown in Fig 5 occurred mainly in urban areas.

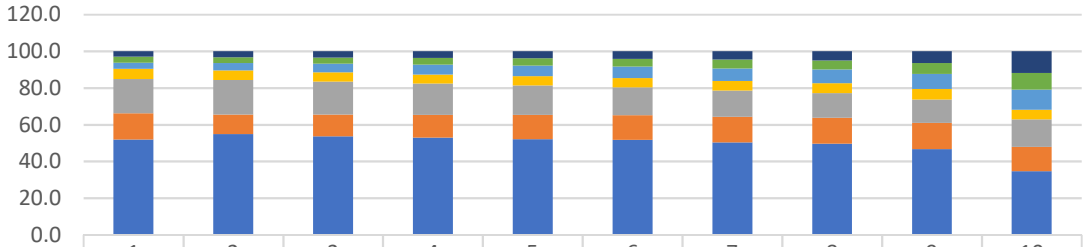
1.4.2. Consumption composition

Observed in isolation, variations in levels of consumption do not say much about the well-being of consumers. In periods of robust economic development, increased consumption may be the effect of increased disposable income and/or easier access to credit. Furthermore, it can be the

effect of an increased disposition to consume caused by changing social habits, increased variety of the offer, more access to media marketing, and so on.

However, in times of economic hardship increased consumption can mean also more money spent on basic goods, such as food, housing, education and healthcare. This is why it is useful to disaggregate total consumption figures at the beginning and the end of the period under investigation and analyze the changes in their components. Figs 11, 12, 13, 14, 15, and 16 show the components of the consumption for each decile of the income distribution (consumption distribution for Tunisia) in Egypt, Jordan, and Tunisia at the beginning and at the end of the considered period.

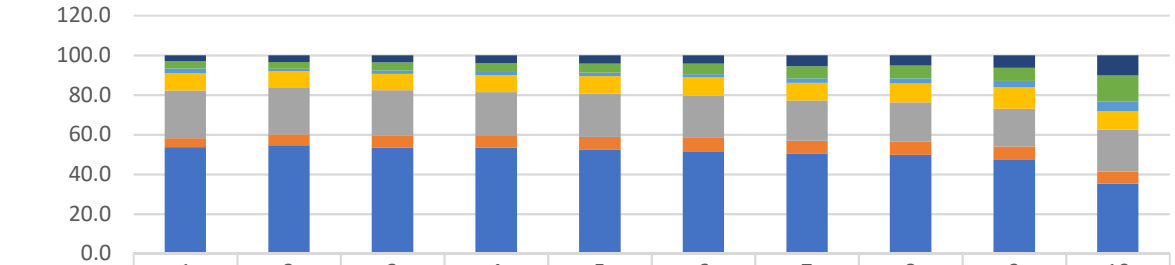
Fig 11. Disaggregation of expenditure per income distribution decile, Egypt (1999)



	1	2	3	4	5	6	7	8	9	10
TRANEXP	2.9	3.3	3.4	3.6	3.8	4.1	4.5	5.0	6.5	11.8
EDUCEXP	3.4	3.1	3.4	3.7	3.9	4.2	4.9	5.0	5.8	9.1
CULTEXP	3.3	4.1	4.7	5.3	5.8	6.2	7.0	7.4	8.3	11.0
MEDEXP	5.5	5.2	5.0	4.9	5.1	5.2	5.2	5.4	5.7	5.2
HOUSEXP	18.8	18.8	18.0	17.1	16.1	15.2	14.2	13.5	12.6	15.0
APPEXP	14.3	10.7	11.8	12.4	13.3	13.5	14.0	14.1	14.3	13.3
TOTFOOD	51.9	54.8	53.7	52.9	52.0	51.7	50.3	49.6	46.7	34.7

Notes: X axis: income-distribution deciles. Y axis: disaggregation in components of consumption for each decile normalized to 100

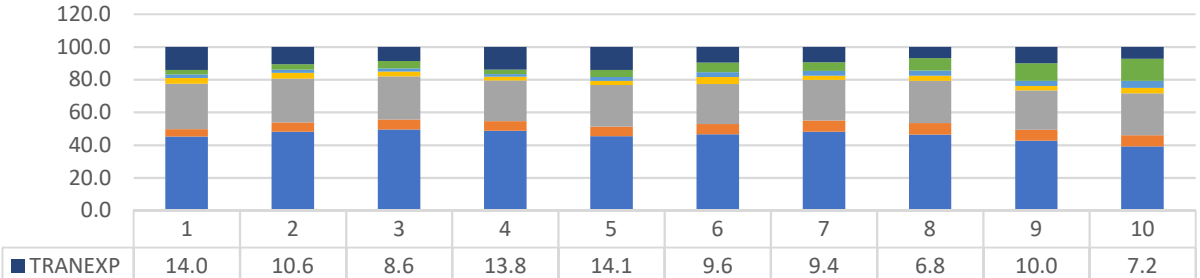
Fig 12 - Disaggregation of expenditure per income distribution decile, Egypt (2010)



	1	2	3	4	5	6	7	8	9	10
TRANEXP	3.0	3.4	3.7	4.1	4.3	4.2	5.5	5.2	6.3	10.3
EDUCEXP	3.8	3.4	4.0	4.4	4.5	5.3	6.2	6.5	6.6	12.9
CULTEXP	2.3	1.3	1.7	1.7	1.8	1.8	2.3	2.6	3.2	4.9
MEDEXP	8.8	8.2	8.2	8.4	8.7	9.2	8.9	9.4	10.9	9.3
HOUSEXP	24.0	23.6	22.9	22.2	21.9	21.3	20.2	19.7	19.0	21.2
APPEXP	4.4	5.5	5.9	5.9	6.3	6.7	6.7	6.9	6.9	6.0
TOTFOOD	53.7	54.6	53.5	53.4	52.5	51.6	50.3	49.8	47.2	35.3

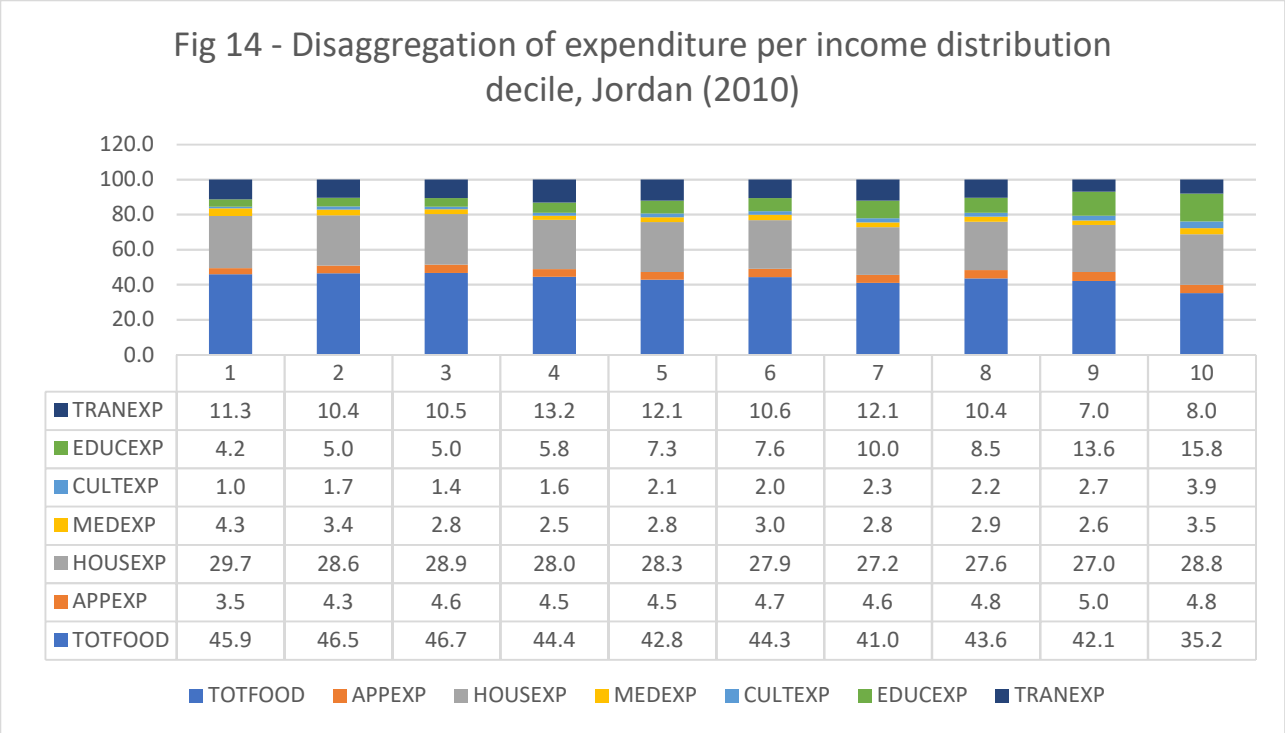
Notes: X axis: income-distribution deciles. Y axis: disaggregation in components of consumption for each decile normalized to 100

Fig 13 - Disaggregation of expenditure per income distribution decile, Jordan (2002)



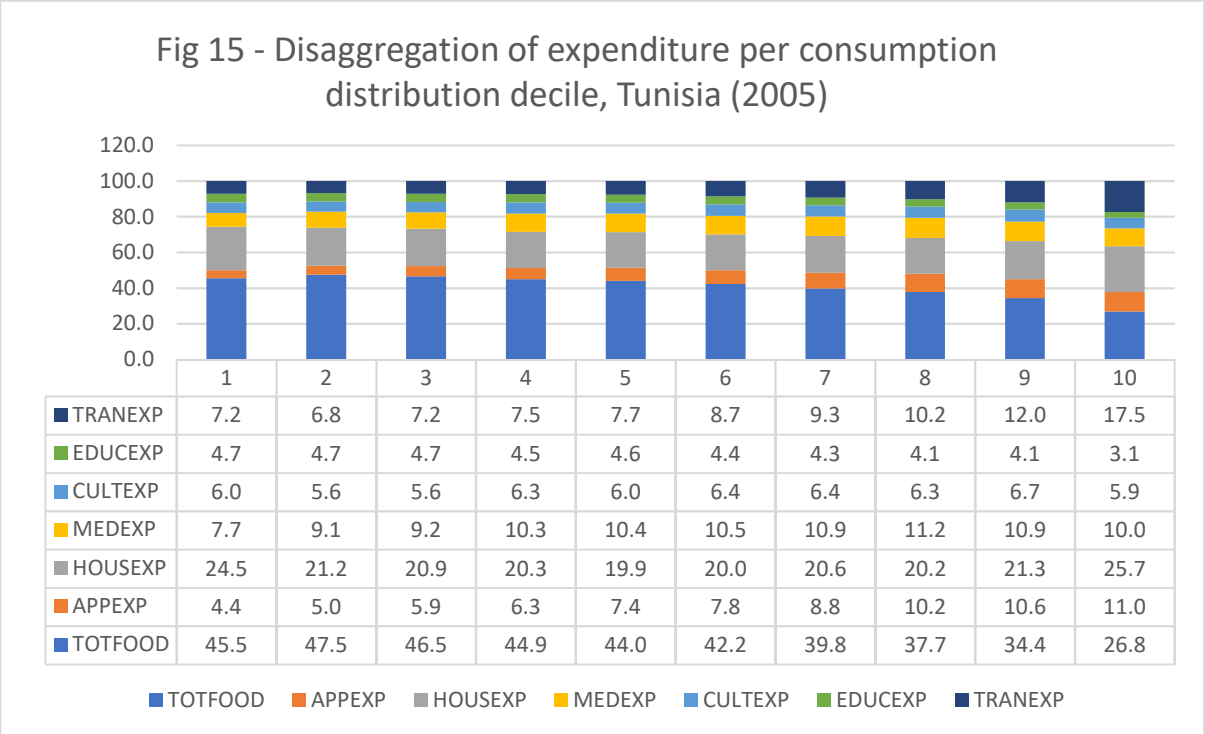
	1	2	3	4	5	6	7	8	9	10
TRANEXP	14.0	10.6	8.6	13.8	14.1	9.6	9.4	6.8	10.0	7.2
EDUCEXP	2.9	3.3	4.5	2.8	4.3	5.8	5.3	7.8	10.8	13.5
CULTEXP	2.1	1.9	2.0	1.6	2.2	2.9	2.9	3.1	3.0	4.4
MEDEXP	3.5	3.5	2.9	2.3	2.7	4.3	2.5	3.1	2.7	3.2
HOUSEXP	27.8	26.8	26.5	24.9	25.4	24.5	25.0	25.9	24.2	25.8
APPEXP	4.4	5.6	6.0	6.0	6.0	6.3	6.7	6.9	6.5	6.8
TOTFOOD	45.2	48.1	49.6	48.7	45.3	46.6	48.2	46.4	42.8	39.1

Notes: X axis: income-distribution deciles. Y axis: disaggregation in components of consumption for each decile normalized to 100



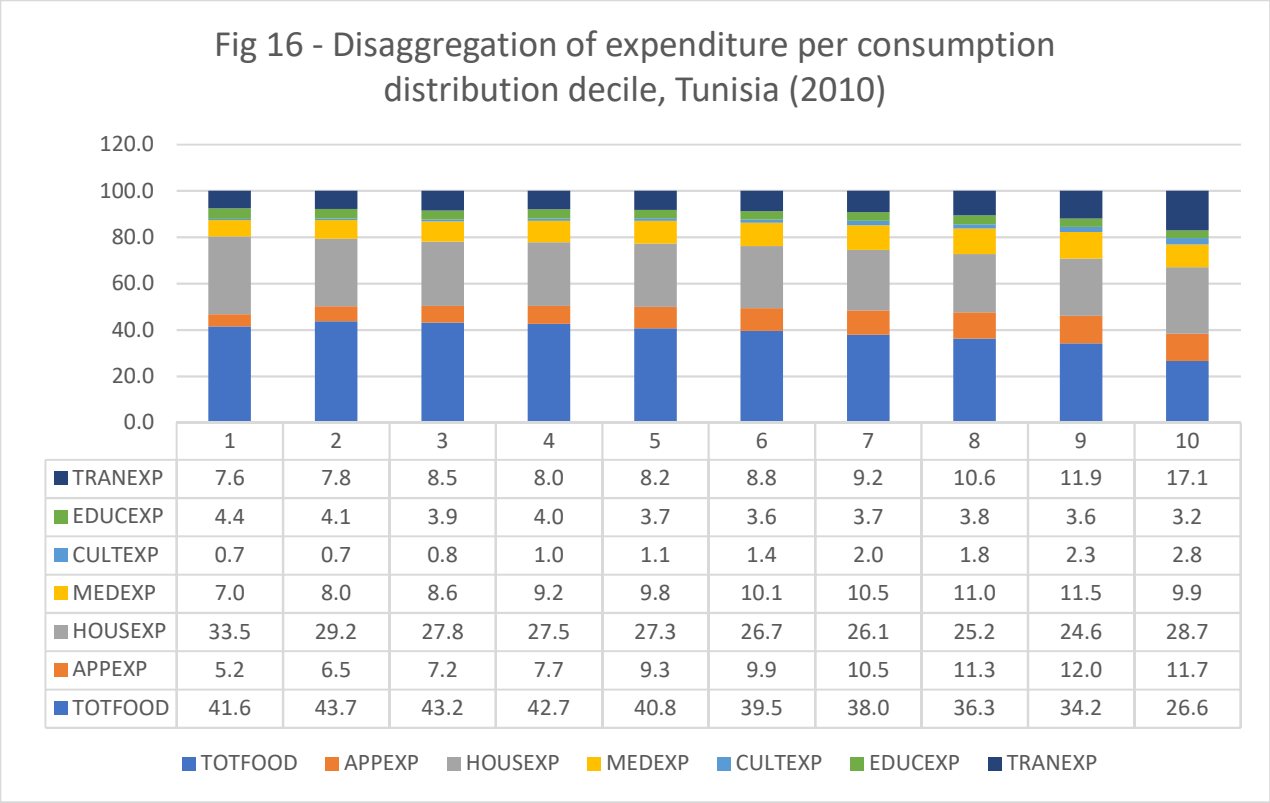
	1	2	3	4	5	6	7	8	9	10
TRANEXP	11.3	10.4	10.5	13.2	12.1	10.6	12.1	10.4	7.0	8.0
EDUCEXP	4.2	5.0	5.0	5.8	7.3	7.6	10.0	8.5	13.6	15.8
CULTEXP	1.0	1.7	1.4	1.6	2.1	2.0	2.3	2.2	2.7	3.9
MEDEXP	4.3	3.4	2.8	2.5	2.8	3.0	2.8	2.9	2.6	3.5
HOUSEXP	29.7	28.6	28.9	28.0	28.3	27.9	27.2	27.6	27.0	28.8
APPEXP	3.5	4.3	4.6	4.5	4.5	4.7	4.6	4.8	5.0	4.8
TOTFOOD	45.9	46.5	46.7	44.4	42.8	44.3	41.0	43.6	42.1	35.2

Notes: X axis: income-distribution deciles. Y axis: disaggregation in components of consumption for each decile normalized to 100



	1	2	3	4	5	6	7	8	9	10
TRANEXP	7.2	6.8	7.2	7.5	7.7	8.7	9.3	10.2	12.0	17.5
EDUCEXP	4.7	4.7	4.7	4.5	4.6	4.4	4.3	4.1	4.1	3.1
CULTEXP	6.0	5.6	5.6	6.3	6.0	6.4	6.4	6.3	6.7	5.9
MEDEXP	7.7	9.1	9.2	10.3	10.4	10.5	10.9	11.2	10.9	10.0
HOUSEXP	24.5	21.2	20.9	20.3	19.9	20.0	20.6	20.2	21.3	25.7
APPEXP	4.4	5.0	5.9	6.3	7.4	7.8	8.8	10.2	10.6	11.0
TOTFOOD	45.5	47.5	46.5	44.9	44.0	42.2	39.8	37.7	34.4	26.8

Notes: X axis: consumption-distribution deciles. Y axis: disaggregation in components of consumption for each decile normalized to 100



	1	2	3	4	5	6	7	8	9	10
TRANEXP	7.6	7.8	8.5	8.0	8.2	8.8	9.2	10.6	11.9	17.1
EDUCEXP	4.4	4.1	3.9	4.0	3.7	3.6	3.7	3.8	3.6	3.2
CULTEXP	0.7	0.7	0.8	1.0	1.1	1.4	2.0	1.8	2.3	2.8
MEDEXP	7.0	8.0	8.6	9.2	9.8	10.1	10.5	11.0	11.5	9.9
HOUSEXP	33.5	29.2	27.8	27.5	27.3	26.7	26.1	25.2	24.6	28.7
APPEXP	5.2	6.5	7.2	7.7	9.3	9.9	10.5	11.3	12.0	11.7
TOTFOOD	41.6	43.7	43.2	42.7	40.8	39.5	38.0	36.3	34.2	26.6

Notes: X axis: consumption-distribution deciles. Y axis: disaggregation in components of consumption for each decile normalized to 100

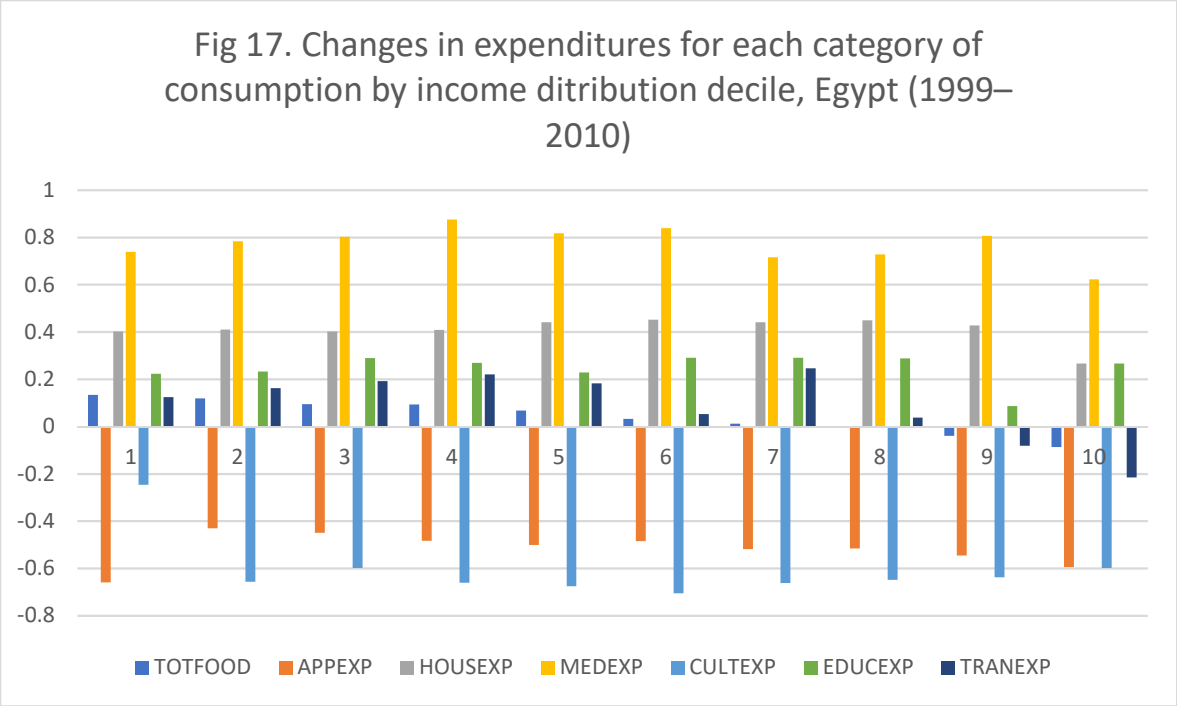
The disaggregation allows us to analyze any changes and significant shifts in consumption habits that occurred within the population of the three countries under study during the 2000s. In the six graphs, consumption is disaggregated by categories of goods. While none of these categories contains goods that could be deemed either exclusively basic or exclusively positional/ "non-essential", a rough division of the categories is possible. Thus, the categories food expenses (FOODEXP) medical expenses (MEDEXP), education expenses (EDUCEXP), and housing expenses (HOUSEXP) can be classed as basic. In contrast, the category for culture and leisure expenses (CULTEXP) could be deemed positional. Clothing and footwear expenses (APPEXP) and transportation expenses (TRANEXP) are mixed, since they contain goods that are basic or positional in almost equal shares. Through this classification we can figure out how an increase (or decrease) of expenditures for each decile was distributed. If increased spending was mostly

directed toward non-essential goods, this would indicate an increase in well-being. Were it for basic goods, this would suggest declining well-being since it would mean prices for basic goods had risen or disposable income available to consume non-essential goods had fallen (or both).

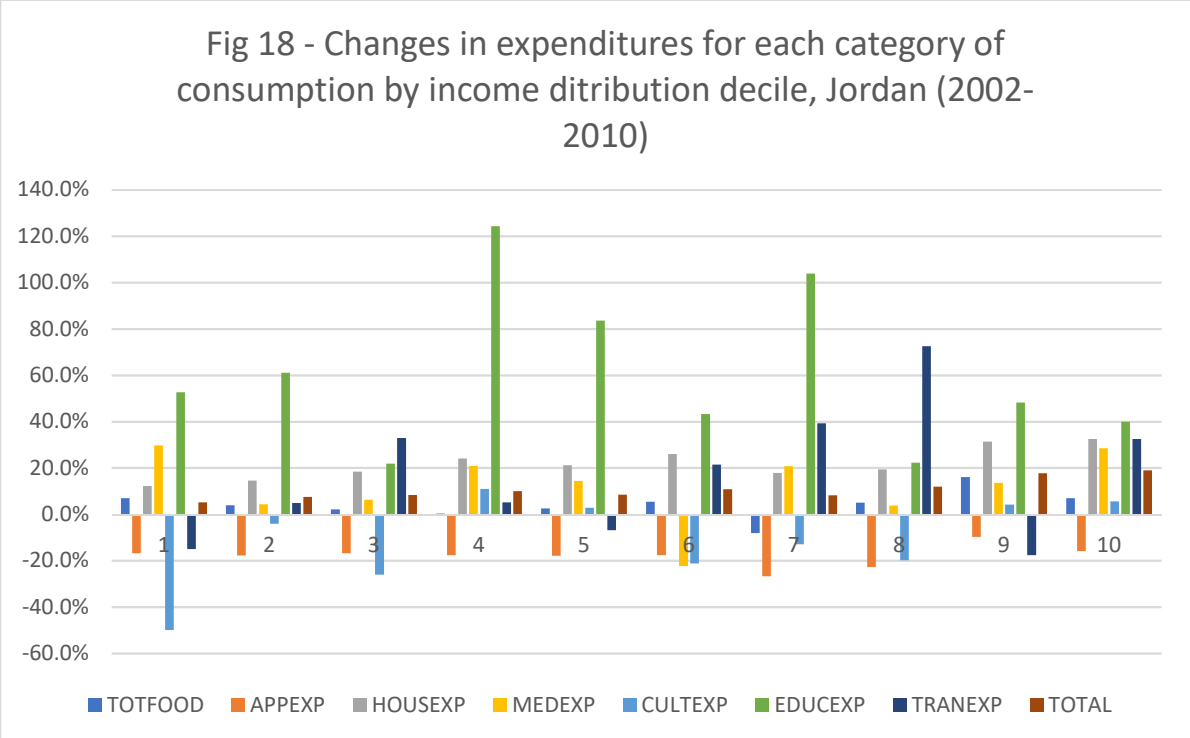
Comparing the data from the two waves of surveys considered for each country what emerges are significant increases in expenditures mainly in categories of basic goods. In particular, housing emerges as a dramatically growing expense for all deciles in Tunisia and Egypt (and more moderately in Jordan). Medical expenses also grow significantly, especially in Egypt. Finally, education expenses emerge as the main source of expenditure increases in Jordan for the entire distribution, especially for the middle-income groups.

On the other hand, cultural and leisure expenses decrease in all three countries, particularly in Tunisia and Egypt. Especially in Egypt and Jordan, expenditures for clothing and footwear decrease alongside expenses for culture and leisure. Although this may, in part, be a result of the increase in imports of cheap clothing from Asia during the period under consideration, these data may also be the effect of cuts in expenses for more non-essential, better-quality kinds of clothing.

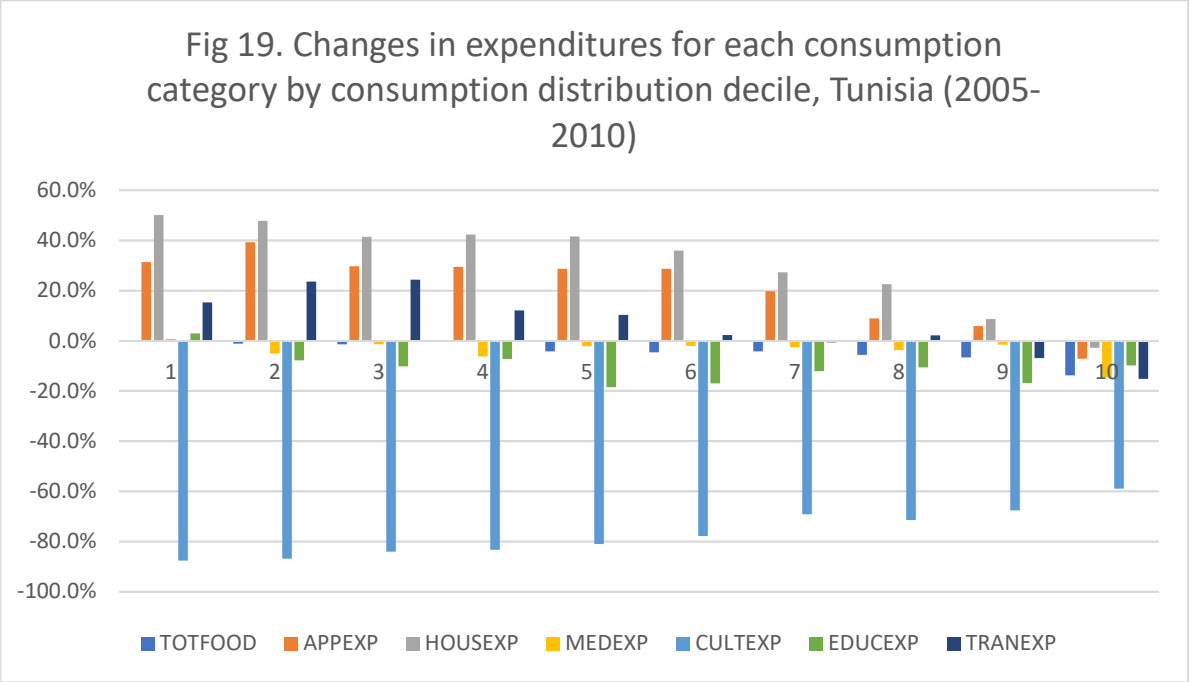
Fig 17, 18 and 19 sum up these findings by showing the shifts between the expenditures of the first wave and those of the second wave (adjusted for inflation) for each consumption category.



Notes: X axis: income-distribution deciles. The bars within each decile represent each consumption component. Y axis: values of the shifts normalized between 0 and 1



Notes: X axis: income-distribution deciles. The bars within each decile represent each consumption component. Y axis: values of the shifts normalized to between 0 and 100



Notes: X axis: income-distribution deciles. The bars within each decile represent each consumption component. Y axis: values of the shifts normalized between 0 and 100

1.4.3. Analysis of the data

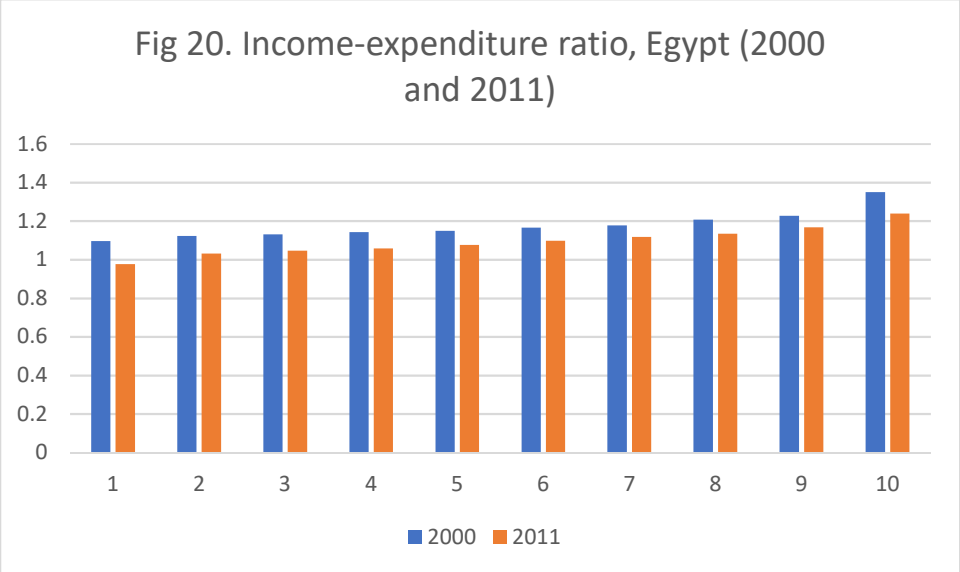
The data analyzed in the previous section point to three key trends that are highly salient for this paper.

First, in all three countries under investigation here, the 2000s saw a deterioration of living conditions, although to different extents. The deterioration was quite similar in Tunisia and Egypt, where it appears to have been distributed along the entire population and particularly pronounced in the upper half. In contrast, in Jordan losses were concentrated in the lower half, and there was even an increase in real income for the most well-off urban households (i.e. the top 10%). Furthermore, in Egypt losses in real income were mirrored in stiff changes in consumption habits – with a dramatic reduction in non-essential consumption and an equally dramatic increase in expenditures for basic goods such as housing and medical care. In contrast, in Jordan changes in

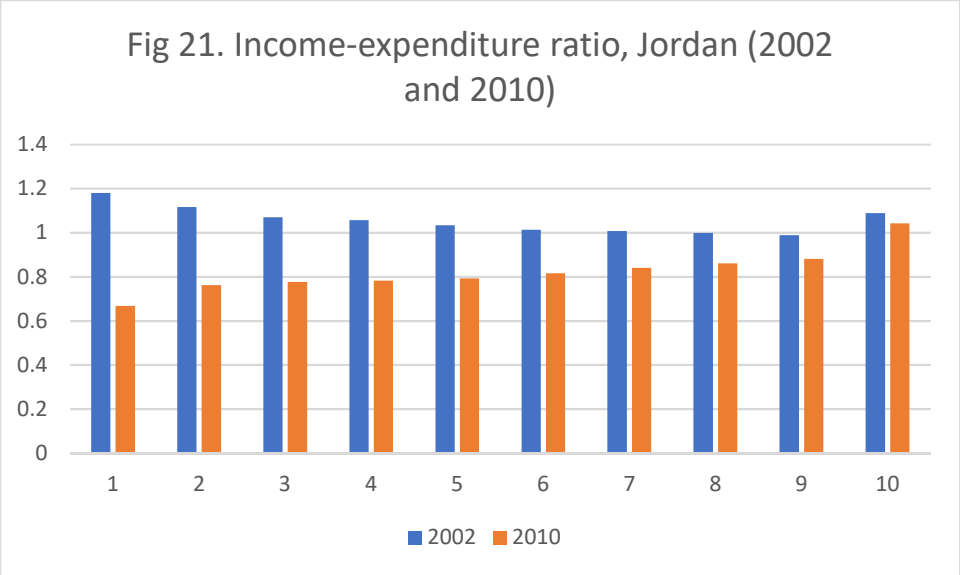
consumption habits appear to be more limited, especially for the medium-upper part of the distribution with some deciles even increasing their leisure expenditures.

Expenditure changes were particularly dramatic in Tunisia, with increases in expenditures levels for basic goods, especially for housing, even higher than in Egypt and Jordan despite the observations for Tunisia covering a significantly shorter period. In Tunisia and Egypt, the middle–upper income groups appear to be particularly hit although the two countries differ in the urban–rural dimension of the losses, with Tunisia witnessing worsening conditions especially in rural areas while Egypt especially in urban areas.

It is possible to capture some of the most important and salient aspects of the shifts in household living conditions by showing the differences in real household income in the first part of the decade versus 2010. Figs 20 (for Egypt) and 21 (for Jordan) show the difference in the ratio of household income to household expenditure in 2000 and in 2010 for each income distribution decile. The differences in the distribution of the losses in real income and purchase power are evident.



Notes: X axis: income-distribution deciles. Y axis: income-consumption ratios. When bigger than 1, average income is higher than average consumption; when smaller than 1, average income is lower than average consumption



Notes: X axis: income-distribution deciles. Y axis: income-consumption ratios. When bigger than 1, average income is higher than average consumption; when smaller than 1, average income is lower than average consumption

Each bar in the graphs represents the ratio of income to expenditure for each decile. If the ratio is greater or equal to 1 this means that an average households income matched or exceeded its expenditure in that decile for that year. If the bar is equal or higher than 1 averagely households' incomes covered, or more than covered, expenditures during that year. In contrast, if the bar is lower than 1 the average incomes of that year could not cover average expenditures. In Egypt, the proportion between incomes and expenditures decreased equally across the entire distribution. In contrast, In Jordan, the decrease was particularly stiff in the lower half and more limited in the upper half. Furthermore, in Jordan's first observation, the lower part of the distribution showed an income/expenditure proportion even higher than the upper part. In the second observation, however, this trend is reversed, with the upper part showing generally higher figures.

Curiously, for the year 2010 the ratio of household income to expenditure was below 1 for every single income level, bar the top income decile. This apparent paradox is explained in part by shifts in in the housing situation in the country over the period and partly by a set of inferences about household planning. First, in Jordan—as in Egypt and Tunisia—in 2010 there had been a

significant increase in spending on basic goods without an attendant rise in household incomes compared to 2002. This meant that for almost all income groups the ratio in 2010 had fallen to below 1. Second, Jordan's financial system is more sophisticated than Egypt and Tunisia's, with easier access to credit for private consumption. This may have allowed Jordanian consumers to smooth changes in their consumption habits despite widespread losses in real income. Third, the highest increase in household expenditures recorded in Jordan was for education. On the one hand, this means a reduction in the welfare system's capacity to guarantee free or cheap education to the general population. On the other, however, it also means that during this period Jordanians – especially those in middle income groups (where the biggest increases are concentrated) – may have decided to significantly increase their investment in education, which demonstrates a certain expectation that the future might see improvements in living standards.

The second key element emerging from the observation of the data relates to the trends of inequality. Due to the distribution of the losses particularly concentrated in the middle–upper part of the distribution, Tunisia and Egypt witnessed a reduction in inequality. Jordan, on the other hand, recorded widening inequality levels due to the concentration of losses in the lower half of the distribution; the most advantaged groups witnessed improvements in income and expenditures. In general, the two countries where living conditions worsened the most registered decreasing levels of inequality, while the country where losses were more limited saw an increase. This was mainly because in Egypt and Tunisia losses were particularly pronounced for the middle- and upper-income groups, while in Jordan losses were particularly heavy for the most disadvantaged households.

Such results may seem counter-intuitive if compared to the well-documented emergence of crony capitalism that characterized most Arab countries in this period, including those considered in this paper. In the past, as discussed in the paragraph on methodology, some observers expressed doubts about the capability of statistical surveys to effectively capture the increasing wealth of the regimes' cronies, hence impairing their ability to correctly estimate social inequality. However, especially in the case of Egypt, this argument has been largely explored and disproved, as described earlier in this paper.

Indeed, if analyzed more closely, the phenomenon of crony capitalism does not necessarily conflict with decreasing inequality for three reasons. First, most of the literature describes crony capitalism as a phenomenon concerning a very limited number of people (Hinnebusch 2006). In fact, although obviously no official figures exist, the literature asserts that the numbers of cronies that progressively surrounded the regimes during the last decades comprised no more than a few tens of individuals. Even considering the number of proxies directly benefiting from each of these individuals, the number remains still limited to a few hundred. Such numbers are not sufficient to significantly influence measures of inequality. If the rest of Egypt's population of 90 million or Tunisia's 11 million, see its income and expenditures decreasing, the increasing wealth of a few hundred wealthy families, although significant, will be insufficient to offset the measure.

Second, one of the characteristics of this kind of economic regime is the incapability to expand the social groups benefiting from the prevailing economic order beyond a restricted circle of cronies. In the past, Middle Eastern regimes were able to replace or create new upper–middle- and upper-income groups who could indirectly benefit from proximity to the ruling elite mostly through creating new high-ranking (and relatively well-paid) posts in the state apparatus or in state-owned companies. However, modern Middle Eastern cronyism has been unable to repeat this outcome,

mainly due to the strict rules imposed by international markets that place severe limits on recurrent public expenditures. Third, the enrichment of these new actors occurred often at the expenses of traditional economic elites that had benefited greatly from public-sector expansion and trade protectionism in the previous decades. Such traditional elites were often hurt by austerity measures and competition from imported products in both relative and absolute terms. In fact, traditional productions exposed to international competition and limited availability of credit lines often could not find neither capital to expand and modernize sufficiently to retain their domestic-market shares, nor to approach foreign markets abroad. Thus, also a significant part of subjects previously belonging to the economic elite saw their relative position worsen, influencing national inequality measures. This created a dynamic of "turnover at the top" which produced significant elite transformation without significantly shifting the overall concentration of wealth within the richest deciles of the distribution.

Finally, the third element emerging from the analysis of the data are the differences and analogies in the changes in consumption composition for each country. In fact, in Egypt expenditure increases were recorded especially for housing and medical care, in Tunisia for housing, and in Jordan for education, followed by housing. Therefore, despite other differences, increases in housing expenses were featured in all three under investigation here countries. Such increases were particularly dramatic in Tunisia, where they reached 50% during a period of five years, and more limited in Jordan, where an increase of around 20% in 8 years was seen.

1.5. Conclusion

The first part of this paper has reviewed the literature on the effects of inequality on political behavior and the literature on perceptions of inequality. The paper then analyzed trends in income

and expenditure inequality in the three case studies: Egypt, Jordan, and Tunisia. Three main trends emerge. First, there was a general deterioration in living conditions in all three cases. Second, despite this secular decline in living standards, inequality fell in Egypt and Tunisia, although it widened in Jordan. The decreases in inequality in Egypt and Tunisia were mainly caused by distributional effects – falling incomes and consumption were concentrated in the upper–middle income groups the most, and poorer groups relatively less. Third, significant changes were seen in the various components of household expenditure across the three country cases over the period under study. That said, all three shared one feature in common: a dramatic increase in housing expenditures along the entire income distribution.

Such results would lead to remarkably different conclusions depending on whether they are seen through the lens of grievances theory, resource theory, or relative power theory. According to the grievances theory, Jordan should have found itself most affected by protests and, potentially, revolts. In Jordan, there was a strong contraction of income (nearly –60% in real terms) in the lower part of the distribution; wealthy urban groups, in contrast, saw a significant improvement in their incomes. The result was a sharp widening in inequality (8 points difference in the Gini index in only 8 years) in Jordan, which the theory tells us should have spurred widespread popular disenchantment. Thus, when the wave of protests erupted in Tunisia, creating a momentum that crossed the entire Arab world, Jordan should have witnessed major social protests. Similarly, in Egypt and Tunisia the narrative of grievances theory also fits poorly. While both countries certainly witnessed general declines in well-being during the 2000s, these falls were concentrated in the medium–upper half of the distribution, leading to a significant reduction in levels of inequality. Thus, while all groups felt the pinch, it was clear that the impact was felt most among

wealthier groups, who dramatically curtailed spending on luxury items, therefore reducing the potential for mass grievances.

According to RT, in Egypt and Tunisia the potential for protests should have declined even more steeply during the period under study. In fact, the widespread contraction witnessed along the entire income distribution of these countries should have shrunk the capability of those people needed to ignite and participate in mobilization and social protests. This would have been true to some extent for lower and medium income groups in Jordan, which witnessed a contraction in their well-being. However, Jordan's most advantaged groups saw increases in available resources, opening more space for them to plan and mobilize for protests against a ruling regime with which they had fundamental disagreements.

Turning to RPT now, we see a fundamentally different account. On the one hand, in Tunisia and Egypt, the reduction of inequality would have made it more difficult for the most advantaged groups to control the political discourse and avoid the emergence of opposition and protests. On the other, the fact that especially middle- and upper-income groups were hit by the economic losses made it particularly hard for the regime to avoid the emergence of protests ignited by these social classes. In fact, although hit by economic downturn, the individuals belonging to these classes have higher relative power in comparison, for example, to those located in the lower half of the distribution. This means that their relative costs for igniting and participating in protests would be relative less where they to feel inclined to undertake such mobilization. Indeed, the heavy economic losses felt in this period may have provided such a reason. Thus, according to RPT, Tunisia and Egypt should have been the countries witnessing the biggest waves of protests. In

contrast, the same social classes in Jordan saw only limited losses if not real gains in income and well-being while the social groups that witnessed the biggest losses were those for which the costs for social protests are relatively higher. Furthermore, the increase in inequality would have translated into a stronger capability of the ruling regime to control public discourse and avoid the emergence of opposition. Therefore, in 2011 Jordan should not have been a country witnessing major protests.

Post-factum analysis seems to confirm the scenario outlined by RPT. In fact, Tunisia *was* the country witnessing the first massive wave of protests, followed by Egypt, and indeed Jordan *did* see only minor demonstrations. However, the findings laid out in this part of the paper—while strongly indicative—are not conclusive concerning the dynamics at play during the 2011 uprisings. The second part of this paper therefore tests grievances theory, RT, and RPT further using the available demographic data on the individuals that joined the 2011 protests.

2. Part II – Participation in the 2010-2011 protests: The role of household income and other determinants

2.1. Introduction

The previous part of the paper analyzed trends of income and consumption inequality in three Arab countries – Egypt, Jordan, and Tunisia – during the decade preceding the 2011 upheavals in the region. It looked at the data through the lens of different threads of literature on the effects of economic inequality on political behavior and on the determinants of the perceptions of inequality and unfairness within the population.

Three different approaches to the relationship between economic inequality and political behavior were discussed and applied to the data – namely, grievances theory, RT, and RPT. To review, grievances theory postulates that growing inequalities lead to political activism especially among the most deprived sectors of the society. RT postulates that political activism is a costly endeavor for individuals and, therefore, is affected by the availability of resources of various kinds, especially time and money. This means that the richer a person is, the easier it is for her to join various sorts of protests. The third thread of literature, RPT, holds that the relative costs of political activism vary depending on the position of each individual within the distribution. In the presence of high levels of inequality, the elite is endowed with more relative power and is more able to control the political discourse while, in the presence of lower levels of inequality, the costs for those located in the lower parts of the distribution to undertake political activism are lower. This means that, on one hand, lower levels of inequality potentially translate into higher levels of political activism and, on the other, that it is always relatively less costly, and therefore easier, for people located in the upper part of the distribution to join opposition movements than for those situated in the lower part.

The analysis of the data in the previous part seems to confirm the predictions of RPT over the other two: the countries that witnessed falls in inequality – Tunisia and Egypt – also witnessed more widespread and impactful protests than Jordan, where inequality increased significantly during the 2000s. Furthermore, Tunisia and Egypt also witnessed significant deterioration in living standards across the entire distribution of income. However, the deterioration was felt most among medium and upper income groups. This means that the social groups for whom, according to the theory, it would have been less costly to join protests were likely to have developed strong grievances.

To verify whether the outcomes of the previous part find confirmation in the available data on the individuals that joined the protests, the second part of this paper analyzes the results of the second wave of the Arab Barometer surveys carried out at the end of 2011. In the surveys, interviewees were asked directly whether they had joined any protests during the previous year. The objective of this investigation is to isolate the demographic profile of protest participants and, in particular, to verify in which social classes and in what part of the income distribution these individuals were located.

This part of the paper aims to test once again the different predictions of the three strands of the literature introduced in the previous part. If the predictions of grievance theory are correct, the data should show an overrepresentation of the most deprived social groups among the protesters. The way this prediction translates in the data can be two-fold, depending on whether we consider absolute deprivation or relative deprivation. For the former, we should expect to find the bulk of the protesters hailing from the lower part of the income distribution. In the second case, we should expect to find that protesters were mostly from those social groups that witnessed the strongest

deterioration in life conditions during the previous decade – medium and upper income groups in Egypt and Tunisia and the poorest strata in Jordan.

If, in contrast, RT is correct, we should expect to find that richer people were the most likely to join the protests in all the countries under investigation here. Furthermore, protest participations should be determinate purely by income levels and not by the level of inequality. Therefore, we should observe a similar positive correlation between income and participation regardless of the level and the trends of inequality of each country. Finally, as for RT, RPT predicts that we would find the bulk of protesters to be better off. However, RPT conditions its predictions on the relationship between income and participation depending on whether inequality is high and increasing or low and decreasing.

This section of the paper proceeds as follows. The first subsection reviews the literature that has investigated participation in the 2011 protests and the protesters' demographic characteristics. The academic research on this is quite limited. It is therefore necessary to supplement what studies we do have with contemporary accounts of the characteristics of the protests – those of journalists, analysts and various other observers who chronicled the events of the Arab Spring as they unfolded. The second section describes the methodology and the data sources utilized. The third section presents the analysis of the data drawn from the Arab Barometer surveys. This analysis is framed by the literature on inequality and political behavior. The final section provides some concluding remarks.

2.2. What kind of people took to the streets during the Arab Awakenings? A literature review

As mentioned, academic research on the demographic characteristics of the participants in the 2011 upheavals is quite slim. In fact, it is limited to one study—that by Beissinger, Jamal and Mazur (2012) titled "Who participated in the Arab Spring? A Comparison of Egyptian and Tunisian Revolutions". This paper utilizes the same data source as the present work: the second wave of the Arab Barometer surveys. Two countries only – Tunisia and Egypt – are investigated, those where the biggest and most effective protests took place. The objective of the paper is to analyze the data through the lens of four different strands of the literature on democratization and revolutions: the *modernization approach,* the *civil society approach,* the *class approach,* and the *collective action approach.*

The *modernization approach* interprets protests and popular upheavals leading to transitions to democratic regimes as the effect of a shift in values within the population and, in particular, among its younger cohorts (Almond and Verba 1963; L. Diamond, Linz, and Lipset 1989; Huntington 1991; Dahl 1971; Lipset 1959; R. Inglehart 1990). Following this approach, these studies propose three related hypotheses based on theoretical assumptions of the social groups in which modern (read: liberal and democratic) values are more likely to coalesce. These are that the protesters should be disproportionately drawn from: 1) the most highly educated citizens; 2) the youth, and; 3) less-religious people.

The *civil society approach*, instead, prioritizes the role of civil society groups and movements in diffusing liberal values within non-democratic societies and in providing the coordination and the collective action capabilities to organize various kinds of large-scale protests (L. J. Diamond and Plattner 1989; R.D. Putnam 1993; McCarthy and Zald 1977; Olson 1971). Previous literature on the Arab Spring also emphasized the role of organizations such as religious groups built around

local mosques or labor unions in mobilizing large numbers of people in several countries (Beinin 2011). From this approach, the authors develop one hypothesis – namely, that the 2011 protesters should have come disproportionally from civil society groups.

The *class approach* highlights the importance of role played by certain social classes in determining the likelihood of each individual to join the protests. Some authors assign more importance to the role of those citizens belonging to the most deprived social classes, who, they argue, should participate disproportionally more than richer citizens (Bermeo 1997; Collier and Mahoney 1997; Rueschemeyer, Stephens, and Stephens 1992; Acemoglu and Robinson 2005; Boix 2003). Other authors emphasize the importance of the middle class in spurring opposition movements (Moore 1966; Huntington 1991). Finally, some authors point at the importance of cross-class alliances to boost the chances of successful upheaval (Dix 1984; Goodwin 2001; Thompson 2003). In particular, Goldstone (2011) emphasizes the importance of cross-class alliances in spurring the 2011 Arab revolts. By applying this approach, the authors elicit four hypotheses. Two aim to test whether the 2011 protesters came predominantly from the middle class or from the working class. A third tests whether the protesters were members of a cross-coalition, while a fourth tests whether they were mostly from the disadvantaged social groups prioritizing economic redistribution instead of social and political freedoms.

Finally, the *collective action approach* stresses the importance of risk calculations in determining participation in protests. According to this approach, people who derive their income from state institutions in various forms are less likely to take the streets and participate in protests that may potentially overthrow the ruling regime and the state institutions linked to it (Hardin 1997; Olson 1971; Tullock 1971). Thus, the hypothesis that authors elicit from this approach is that employees in the public sector should have participated proportionally less in the protests.

The sketch emerging from the authors' analysis of the data contradicts most of the hypotheses formulated and confirms a few of them. The first element that emerges is a significant difference between the social composition of the protests in Egypt and Tunisia. In fact, while Tunisian protesters were overwhelmingly from the younger age cohorts, in Egypt the greatest share of protesters was middle-aged. In Egypt, belonging to a civil society organization seems to have played a significantly more important role than in Tunisia. Finally, while in Egypt a great majority of protesters came from the middle class, in Tunisia participants appear to have come from a wider range of social groups. In general, however, the poorest social classes seem to have been the least likely to join the protests, while members of the middle class were represented disproportionally in both countries.

Interesting for the work of this paper, the definition of "middle class" utilized by Beissinger, Jamal and Mazur has less to do with income considerations and more with an individual's profession. They isolate the members of the middle class according to their stated professions, such as government employees, private-sector employees, or highly qualified professionals. This approach also leads them to conclude that in Egypt the vast majority of the protesters were middle class, whereas in in Tunisia an alliance between different social classes took place.

However, this kind of approach based on profession and not on income risks ignoring important considerations regarding, for example, the broader characteristics of the surveyed individuals' households. The authors find that Tunisia was "more diverse in terms of participant class backgrounds, with workers constituting 17 percent of participants, students – 19 percent, and the unemployed – 21 percent". However, there is the risk in stating these demographic measures they have ignored important characteristics of these individuals' households and, ultimately, of their class. This is especially true with student and unemployed protesters, who may well have belonged

to more privileged households despite their current work status. In fact, the analysis based purely on household income carried out in the next sections of this paper partially flattens the differences found by Beissinger, Jamal and Mazur.

Beside this single work focused directly on the question of demographics and protest, other academic works have touched the same topic tangentially while focusing on other aspects. Many of them do so relying on the most diffused narratives on the protests. For example, some stress the role of the youth and their grievances (see, e.g., Achcar 2013) although such considerations have been partially debunked by Beissinger, Jamal and Mazur, especially in the case of Egypt. Others insist on the role of the most deprived social groups (see, e.g., Achcar 2013; Bogaert 2013; Joya et al. 2011) and or of specific kinds of civil society organizations such as labor unions (see, e.g., Beinin 2011). Furthermore, Diwan (2013) has treated extensively the key role of the middle-income groups in the upheavals, with results confirmed by the analysis of the data carried out by Beissinger, Jamal and Mazur.

Finally, along with these academic works, a vast number of other journalistic sources have presented contemporaneous narratives that, depending on each article, emphasize different aspects of the protests observed anecdotally, such as the role of social media, the role of the young cohorts, or that of different religious groups and parties (see, e.g., Gerges 2011; Mothana 2011; Beaumont 2011).

In sum, sources of different kinds have tackled various aspects of the social composition of the 2011 protests. Their narratives converged on some common points, such as the role of the youth and of poor and/or middle-income groups – as well as of innovative technologies such as

smartphones and social media. However, only one academic work has tackled the topic directly, analyzing the most reliable data source available on the 2011 protesters. This single work has the merit of having debunked several elements of the more anecdotally driven narratives developed in the aftermath of the 2011 upheavals and of having confirmed a few of them through solid data analysis. However, the analysis carried out by Beissinger, Jamal and Mazur on the class composition of protests is of little use for this paper, which tackles the issue from a household income-based angle. In fact, while a classification of social classes based on profession is highly salient given their particular research objectives, it risks neglecting some characteristics of the surveyed individuals relevant for the theories on the effects of inequality on political behavior applied in this paper.

2.3. Methodology

The source of the data utilized in this part is the second wave of the Arab Barometer surveys, carried out in 2011. The Arab Barometer is a project founded in 2005 by a group of scholars specialized in the Arab world from the University of Michigan and Princeton University. The project was soon joined by numerous other universities and research centers from several Arab countries such as Jordan, Palestine, Morocco, Algeria and Kuwait. In 2010 a partnership was formed with the Arab Reform Initiative (ARI) in order to expand the project's scope.

The second wave of the Arab Barometer covered 11 Arab countries. Most of the surveys were collected at the beginning or during the second half of 2011. The three country case studies under consideration were included and their specific surveys were conducted in June in Egypt and Jordan and in October in Tunisia. In Egypt the sample included 1,220 people, in Tunisia 1,196 and 1,145 in Jordan. Within these samples, 98 respondents reported having participated in the protests in Egypt, 192 in Tunisia, and 83 in Jordan. The time period in which this wave's surveys were

collected was a unique opportunity to gather information about the participants in the 2011 upheavals. For this reason, two special sections were attached to the surveys of Tunisia and Egypt containing specific questions on the protests that had occurred at the beginning of that year. These special sections asked questions regarding the interviewees' participation in the protests, their reason for participating and their expectations regarding the transitional phases their countries were undergoing. Therefore, for Egypt and Tunisia it is possible to isolate within the sample those who participated specifically in the Arab Spring protests. The question on participation for these two country is binary, presenting the respondents with only a Yes-No answer which, if used as dependent variable, allows only for logit regressions.

However, not all social conditions were the same during the surveys. Respondents from Tunisia and Egypt found themselves in a much freer atmosphere in ongoing democratic transitions, which allowed survey collectors to ask these specific questions in other countries, such as Jordan, this was not possible. The surveys collected in the other countries thus contain more indirect questions about participation in various kinds of protests during the previous three years, therefore covering a longer period than just the months immediately following the Arab Spring. Nonetheless, these questions can be used as proxies for participation in the 2011 protests if treated with adequate caution. In particular, the standard version of the surveys asks respondents about two different kinds of protest activities separately – namely "meeting to learn about a subject or sign a petition" and participation in "protest, march, or sit-in". For each of these activities, respondents could choose among five different answers: "once", "more than once", "I have never participated, "I don't know", or "Declined to answer". In order to run a logit regression comparable to those I run for Tunisia and Egypt (there the question on protest participation has only two possible answers: "Yes" and "No") I created a new factorial variable 0-1, where "1" labels all those respondents that

declared they have joined a protest at least once and "0" those who declared they did never join a protest over the previous three years. To do so I considered only those who reported having participated in protests, marches, or sit-ins. I then merged those reporting having participated once and those reporting having participated more than once into one group and those who marked any of the other three available answers into another.

This procedure has one major shortcoming: by asking whether the respondents participated in one or more protests during the past three years it risks mixing together participants in the Arab Spring demonstrations and participants in several other protests. However, the outcome can still be considered a valid proxy for participation in the Arab Spring demonstrations for two reasons. First, although the previous three years witnessed a few local protests, none compared in length and dimension to those at the beginning of 2011. It is therefore safe to assume that most of the respondents that reported having participated in at least one protest meant those that occurred in 2011. Second, the slogans of earlier protests, just like those of 2011, were characterized mainly around economic issues: increasing prices for primary commodities and a lack of job opportunities (see, e.g., Mahr 2011). Hence, it is reasonable to assume that a significant share of those who participated in earlier protests also joined the 2011 demonstrations.

The data elicited from the Arab Barometer surveys are analyzed through two main techniques. First, I use exploratory data analysis techniques to analyze the social class provenience of those who participated in the protests. Due to the significantly smaller size of the sample (98 people who reported having participated in Egypt, 111 in Tunisia, and 83 in Jordan) compared to that of the HIECS surveys, participants are divided not by deciles of income but by quintiles. In particular, I use the data on monthly and yearly household income in US dollars.

Second, I perform multivariate logit regressions for each country using participation in the protests as the dependent variable and the main demographic characteristics of the respondents present in the survey as independent variables. In particular, the list of independent variables is the same used previously by Beissinger et al. and includes whether respondents come from rural or urban areas, their gender, age, level of education, employment status, and their income. I aim to verify whether income, once controlled for other individual characteristics, help explaining protest participation and whether it is positively or negatively correlated. Once filtered for missing data for running the regressions, Egypt's sample was reduced to 727 observations, Jordan's sample to 827, and Tunisia's to 613.

2.4. Analysis of the data

This section explores the data provided by the Arab Barometer on the individuals that participated in the 2011 protests in the three countries under investigation here in this paper. In particular, this section analyzes the role of the individuals' position in the income distribution in determining the likelihood of protest participation.

A first subsection applies simple techniques of visual exploratory analysis to analyze the income distribution of the share of the population joining the protests, while a second part applies econometric techniques to pinpoint the demographic determinants of participation.

Before proceeding to analyze the income distribution, this section provides some general information on the share of each county's population that joined the 2011 protests. First, the share of respondents that reported having participated in the demonstrations varies significantly for each country: 16% for Tunisia, 8.7% for Egypt, and 8.8% for Jordan. This percentages must be read with the geographic and demographic size of each country in mind, as well as the extent of their geographic dispersion. In fact, although Egypt and Jordan show similar percentages, once

translated into absolute figures the differences in the size of the mobilization are thrown into sharp relief. In 2011 Egypt had a population of almost 86 million people. That means that the 2011 upheaval saw the mobilization of almost 7.5 million people – concentrated in the main urban centers such as Cairo and Alexandria. The majority of Egypt's population, dispersed among the huge rural areas of the country, could hardly join the main demonstrations in the northern urban centers.

In contrast, Jordan had a population of almost 7.5 million people in 2011 (the same number that joined the protests in Egypt), which means that approximately 600,000 people mobilized across the country. Although the Jordanian protests were significant, they did not have the same massive impact as those in Egypt, for three main reasons. First, the absolute number of more than half a million, although impressive, does not carry the same danger for a repression apparatus as 7.5 million people do. Protests were easier to handle for the police and the security forces. A consequence of this was that protesters were never able to establish a stable geographic and symbolic focal point for their gatherings such as Tahrir Square in Cairo, which meant that every demonstration and every sit-in had to be organized and conducted from scratch. Second, protests were sparse across at least six different cities within a relatively small country, leading to a significant dispersion of the protests despite a relatively small territory. Finally, protests in Jordan lasted significantly longer than in Egypt or Tunisia. The first demonstration occurred on 14 January, eleven days before the first in Egypt (25 January) and protests continued throughout the country until mid-April. Therefore, although by Spring the share of the population that had participated was significant and even slightly bigger than in Egypt, geographical and temporal dispersion contributed in moderating the political impact of the Jordanian protests. In fact, the biggest demonstrations took place in the capital Amman and never saw the participation of more

than a few thousand people (even less according to the authorities) and never lasted more than one day (Tobin 2012).

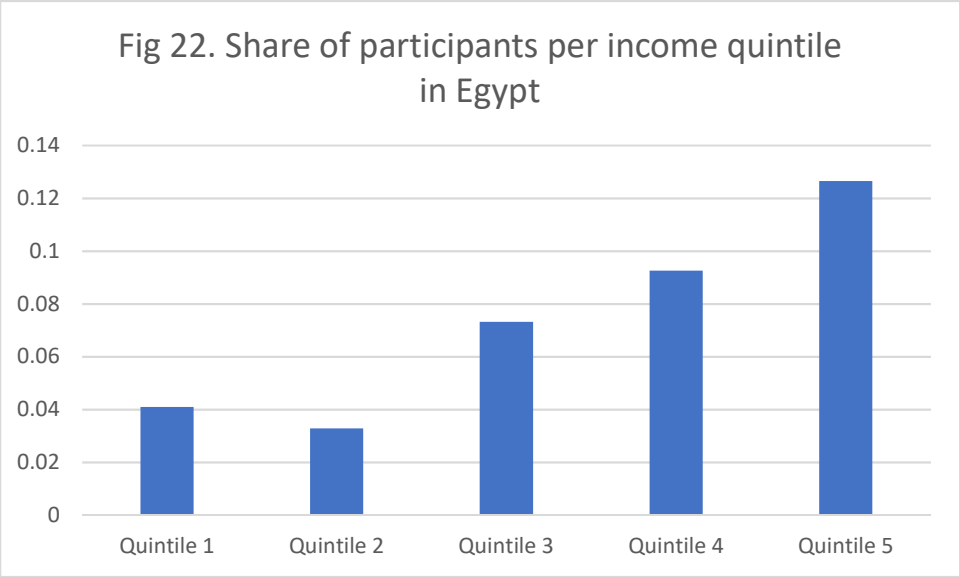
Finally, the share of protesters in the total population was significantly larger, almost double, in Tunisia: 16%, which amounted to 1.7 million people in a population of 10.7 million people. Although the absolute numbers cannot compete with those of Egypt, the share of the population involved is impressive and it is the main element that led Beissinger, Jamal and Mazur to affirm that Tunisia was the only country in which the protest movement saw the alliance between different social classes and significant participation from inhabitants of the countryside.

In fact, several accounts describe Tunisian protests as sparked and concentrated mostly in the rural areas in contrast to those in Egypt that started and developed within the main urban centers (Achcar 2013). However, the analysis of the data shows a predominance of urban s in all three country cases: 66% of the total in Egypt, 75% in Tunisia, and 83% in Jordan.

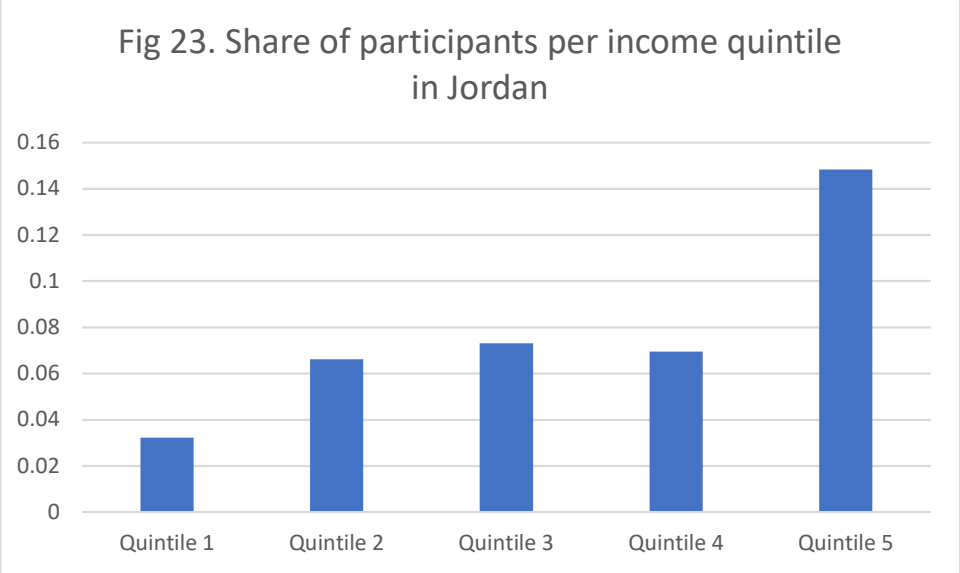
2.4.1. Income distribution of the protesters

This section now turns to analysis of the income distribution of the participants. Due to the small sample at our disposal, the distribution is divided into quintiles (and not deciles as in the previous part). To offer a fuller picture of the distribution, this section provides two different series of graphs. The first series shows the percentage of the population of each income quintile that joined the protests. The second series shows the percentage of protesters that belonged to each income quintile. Since each quintile represents 20% of the total population, if the percentage of one quintile is bigger than 20% it means that that the population belonging to that quintile was overrepresented. In contrast, when the percentage is smaller than 20% the population belonging to that quintile was underrepresented.

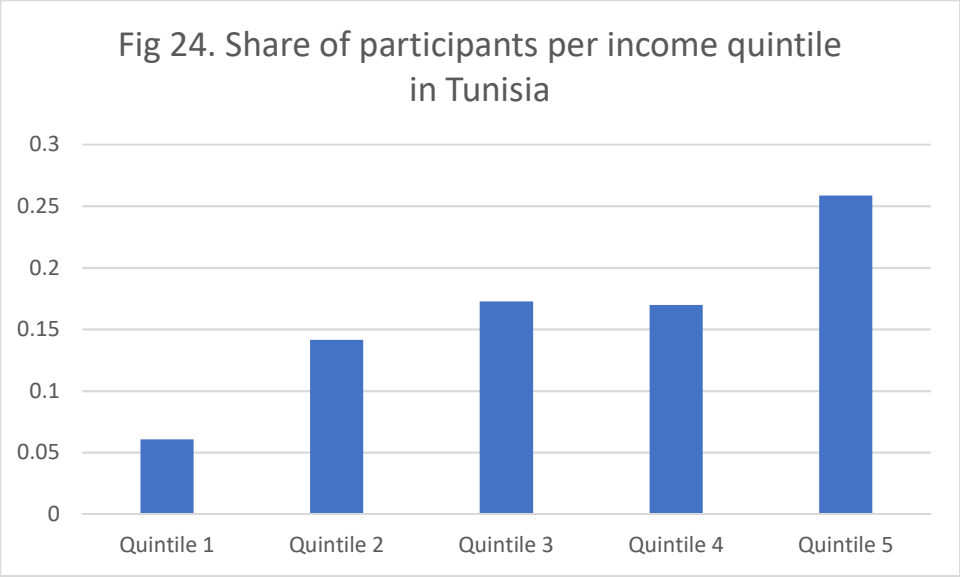
Fig 22, 23, and 24 show the shares of participants of each quintile's total population in Egypt, Jordan, and Tunisia.



Notes: X axis: income-distribution quintiles. Y axis: share of each quintile's population that participated in the protests normalized between 0 (no participation) to 1 (100% of the quintile's population participated)

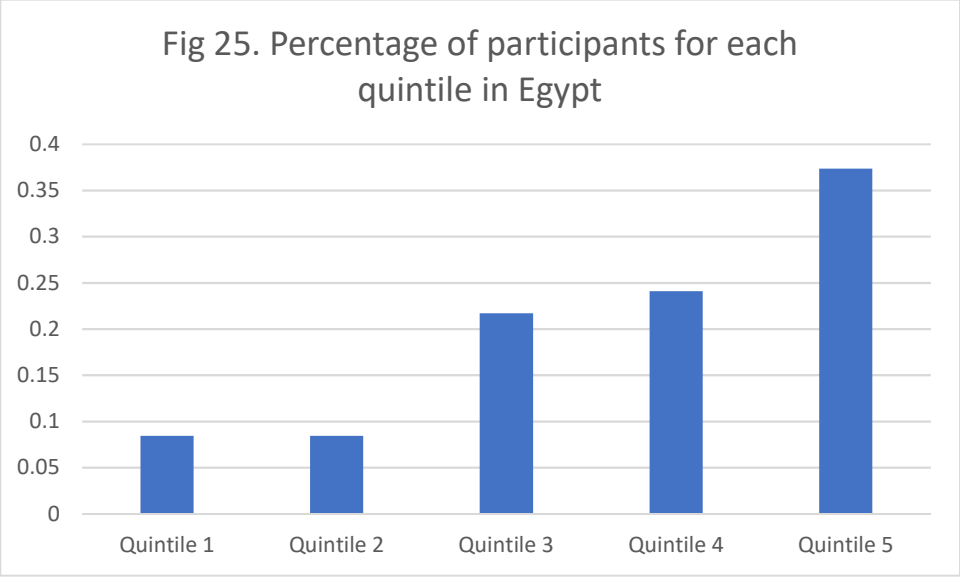


Notes: X axis: income-distribution quintiles. Y axis: share of each quintile's population that participated in the protests normalized between 0 (no participation) to 1 (100% of the quintile's population participated)

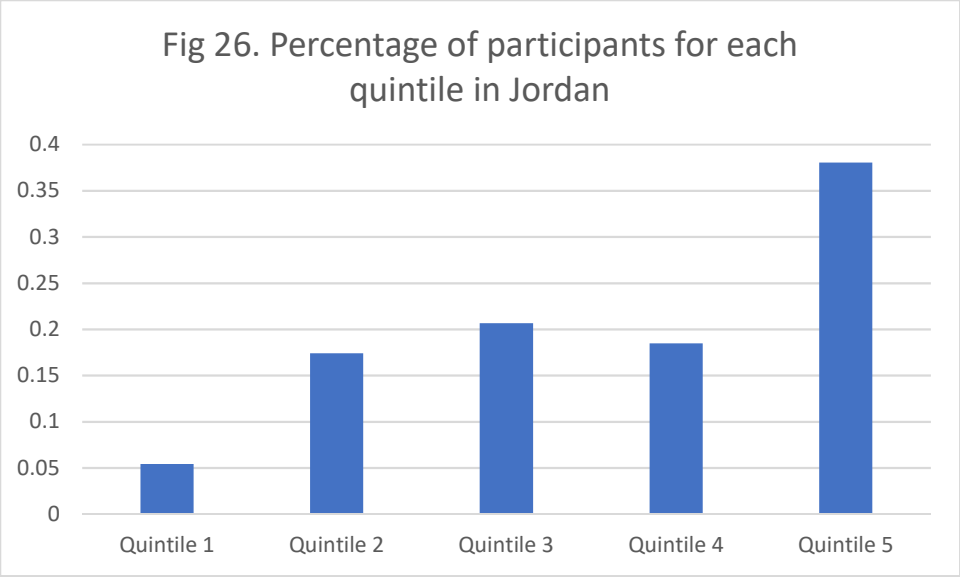


Notes: X axis: income-distribution quintiles. Y axis: share of each quintile's population that participated in the protests normalized between 0 (no participation) to 1 (100% of the quintile's population participated)

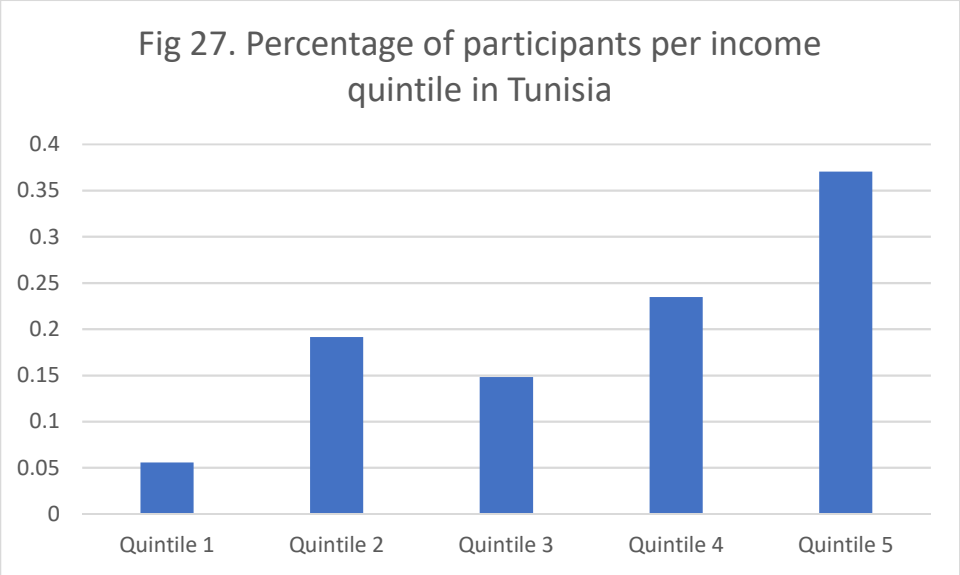
Fig 25, 26, and 27 show the percentage of protesters belonging to each quintile in the total number of protesters.



Notes: X axis: income-distribution quintiles. Y axis: share of protesters belonging to each income-distribution quintile normalized between 0 (no protesters among the quintile's population) to 1 (all protesters belong to the quintile's population)



Notes: X axis: income-distribution quintiles. Y axis: share of protesters belonging to each income-distribution quintile normalized between 0 (no protesters among the quintile's population) to 1 (all protesters belong to the quintile's population)



Notes: X axis: income-distribution quintiles. Y axis: share of protesters belonging to each income-distribution quintile normalized between 0 (no protesters among the quintile's population) to 1 (all protesters belong to the quintile's population)

Two main elements emerge from the analysis of the graphs. First, the richest quintile is constantly overrepresented within the protesters and the share of the population belonging to it joining the protests is the biggest in all three countries. Second, it is possible to observe a quiet strong linearity in the relationship between income and participation: the share of participants increases constantly

with income. This relationship appears particularly strong in Jordan, where the population belonging to the richest quintile participated at a rate more than double than the second most participating quintile, and where the people belonging to the richest quintile represented almost 40% of the total participants. Similar percentages for the highest quintile are present also for Tunisia and Egypt (37% in both), making the richest 20% of the population by far the main segment of the population participating in the 2011 protests in all three country cases.

This finding contradicts in part Beissinger, Jamal and Mazur's conclusion according to which the "middle class" represented the core share of the participants in Egypt but less in Tunisia, where significant shares of workers, students, and unemployed people joined. The analysis of the participants' household income shows that a significant share of these subjects classified as different from the "middle class" – especially students and unemployed individuals – belonged to households from much richer segments of the distribution. Furthermore, this finding cast some doubts also on the definition of "middle class" used in Beissinger, Jamal and Mazur's paper. In fact, defining the "middle class" simply according to the individuals' professional background can be misleading for at least two reasons. First, a classification based uniquely on profession risks neglecting important elements of the individual's household background that bear on her resources and capabilities. Although unemployed or a student, a person may nevertheless belong to a relatively rich family, allowing her to enjoy the privileges deriving from her family's income and to carry the expectations associated with privileged social status. Second, defining these individuals as "middle class" may be misleading also because it may make them appear as belonging to the middle-income segment of the population. In contrast, as the data show, the most of them belong to the upper part of the income distribution.

2.4.2. Other determinants of participation

This section now turns to further test the relationship between income and participation using econometric techniques. First, it tests the relationship using a simple logit regression that has participation as binary dependent variable and income as single independent variable. Second, it adds as independent variables other main demographic characteristics included in the surveys to control whether the relationship between income and participation remains strong or loses significance.

Table 4 shows the results of the logit regression having only income as independent variable.

Table 4	Coefficient	Z value	
Egypt	0.0002751	0.0101	*
Tunisia	0.0005438	0.0323	*
Jordan	0.00075	0.0074	**

Income emerges as positive and significantly correlated to participation in all three countries under study: the higher the income, the higher the probability that a person joined the protests. The relationship is particularly significant in Jordan, above the 99% degree of significance. In Egypt, it is just below the 99% threshold and in Tunisia comfortably above the 95% threshold.

Tables 5, 6 and 7 show the results of the regressions after adding the following five demographic features as control variables: age, gender, urban/rural provenience, education level, and work status (employed/unemployed).

Table 5–Egypt	Coefficient	Z value	
Age	-1,36E+01	0.197822	
Gender	-9,28E+02	0.014304	*
Urban/Rural provenience	-6,87E+02	0.011270	*
Education level	2,72E+02	0.000943	**
Work status	-5,24E+02	0.169327	
Income	1,10E-02	0.931601	

Table 6–Tunisia	Coefficient	z value	
Age	-0.0306029	0.00101	**
Gender	-15.206.483	3.37e-07	**
Urban/Rural provenience	-0.2470316	0.34302	
Education level	0.2409797	0.00700	**
Work status	0.0587281	0.84006	
Income	0.0001414	0.64223	

Table 7–Jordan	Coefficient	z value	
Age	0.0004090	0.71172	
Gender	-0.6581883	0.01933	*
Urban/Rural provenience	0.1467607	0.64077	
Education level	0.1625763	0.07760	
Work status	0.0784853	0.58049	
Income	0.0006247	0.02033	*

Two * indicate Z values above the 99% threshold and one * indicates Z values above the 95% threshold. In Egypt and Tunisia income loses significance in favor of other individual features such as gender and education. Men and more highly educated individuals proved more likely to join the protests in comparison to women and less educated people. In Egypt the urban provenience emerges as significant in explaining participation, while in Tunisia age emerges as negatively and significantly correlated. This somehow confirms the prevalently urban character of the Egyptian uprising and indicates Tunisia as the only case among those under investigation here in which young people were more likely to participate in the protests. In contrast, Jordan emerges as a case apart. In fact, only gender, along with income, is significant in explaining participation.

These findings are in line with the insights of RPT and only partially with those of RT. In fact, income emerges as more determinant in explaining participation in protests in Jordan, where inequality was higher and increasing. In contrast, in Tunisia and Egypt, where inequality was lower and decreasing, income appears less crucial and other individual characteristics emerge as significant in explaining participation. According to RT, such a distinction should not be present.

People should participate merely depending on their resource endowment and independently from inequality levels.

However, it should be noted that the two independent variables resulting strongly correlated with participation in both Egypt and Tunisia – gender and education level – are directly linked to income. In Arab societies, men are usually the main breadwinner in the family, which makes them the subjects most likely to have full control of household wealth. Secondly, as showed in table 8, in both countries education levels are strongly and positively correlated to income – which signals that access to higher education is strongly dependent on the family's wealth – although Egypt's coefficient is quite lower than Tunisia's. This means that in Tunisia higher education is significantly greater for individuals from rich households than in Egypt.

Table 8	Coefficient	Z value	
Egypt	7,38E-01	<2e-16	**
Tunisia	0.0017960	<2e-16	**

In fact, when subtracting the education level from the control variables of the previous regression, income becomes significant below the 95% threshold for Tunisia but not for Egypt.

2.5. Conclusion

This part of the paper has tested the insights of the three strands of literature on the effects of inequality on political behavior introduced in the first part of this paper – grievances theory, relative power theory and resource theory – and applied them to the data provided by the second wave of the Arab Barometer surveys on the protesters that took part in the 2011 upheavals in Egypt, Tunisia, and Jordan.

According to grievances theory, we should have expected to find that most of the participants in the protests were from the poorest income groups, especially in countries where inequality

increased causing resentment among the lower strata. Alternatively, we should have expected that protesters were from the most relatively deprived groups i.e., those groups that witnessed the worst deterioration of living standards during the previous decade. As we have seen in the first part, in Egypt and Tunisia medium and upper income groups witnessed the worst deterioration in economic conditions during the decade preceding the uprisings, while in Jordan the biggest losses occurred among the social groups located in the lower part of the income distribution.

Conversely, according to RPT, income inequality influences the calculations of those located in different parts of the income distribution in different ways. When inequality is high, those located in the lower part will be more reluctant to petition for better conditions and redistribution. In fact, due to the concentration of resources in their hands, the higher income groups would be able to condition the public discourse toward their interests and their needs. In contrast, when inequality is low, poorer people to find it easier to mobilize politically and express their grievances. On the other hand, richer people will always find it relatively easier to attend protests and demonstrations than those who are poor. When inequality is high, almost only richer people will find it convenient to participate in protest action. However, when inequality is low, they will still constitute the bulk of the protesters but will be more readily joined by poorer individuals.

Finally, according to RT, we should have seen richer people making up the vast bulk of protesters and income being the main determinant for participation irrespective of the level of inequality. This is because RT assumes that protest mobilization and political participation more generally is always primarily determined by each individual's resource endowment. The richer someone is in absolute terms, the easier it is for her to engage politically and attend protests and demonstrations.

The findings stated here definitely disprove the expectations of grievances theory. In all three countries under study the upper quintile of the income distribution is the one contributing the most to the number of protesters in both absolute and relative terms. Furthermore, from the results of the exploratory data analysis it is possible to observe a certain degree of linearity in the positive relationship between income and participation: the more we move the observation to the lower part of the distribution, the less people are likely to have joined the protests. The linearity is partially confirmed by the results of the regressions run using participation as independent variable and income as single independent variable. For all three countries income emerges positively and significantly correlated to participation. However, the relationship loses significance for Egypt and Tunisia, but not for Jordan, once control variables are introduced.

On the other side, these results seem to confirm the insights of both RT and RPT, which both state that the richer and individual the more likely it is that she finds convenient to participate in protests. However, the final outcomes of the econometric analysis seem to go in the direction of RPT, and seem to partially disprove the predictions of RT. In fact, while the significance of the effects of income on participation remains strong for Jordan, the country that in the previous decade recorded a significant increase in its inequality rate, the same significance disappears when controlled for other demographic features for Egypt and Tunisia, the two countries characterized by a significantly lower level of inequality and where inequality had been decreasing during the previous decade. However, the analysis of only three cases can hardly be considered conclusive in this regard.

In sum, two main results emerge from the analysis carried out in this part of the paper. First, richer people constituted the bulk of the protesters in the Arab Spring in all three countries under study

while poorer social classes participated the least. Second, income was more strongly correlated to participation where inequality was high and increasing than where it was lower and decreasing.

3. Conclusion: A (partially) alternative narrative of the 2011 protests

This concluding part draws together the findings presented in the previous sections of the paper and positions them within a homogeneous narrative on the factors that led to the 2011 wave of protests. It is structured as follows. Drawing the various strands of analysis in the paper together, the first section offers some remarks on the role that inequality and income played in protest participation. The second part details an alternative narrative of the factors that led to the 2011 protests, taking into account the existing literature on the topic and the findings of this paper.

3.1. Bringing all it home: the role of inequality and income in the 2011 protests

This paper seeks to test one of the most diffused assumptions about the 2011 Arab uprisings – namely, that the protests were primarily joined by the most deprived social groups in response to increasing economic inequalities. It has tested this assumption through the lens of the existing literature on the effects of inequality on political behavior, which falls into three main strands: grievances theory, resource theory, and relative power theory. The three theories were applied to three country cases: Egypt, Tunisia, and Jordan. These three cases were selected for theoretical and practical reasons. The theoretical reasons have to do with their comparability – namely, the socioeconomic features they share, such as income levels and scarcity of natural resources. Moreover, they all witnessed significant protests in 2011. The practical reasons have to do with the availability of data: these are the only three countries with the aforementioned characteristics whose standardized HIECS surveys are available and are included in the 2011 wave of the Arab Barometer.

In the first part of this paper, the core hypotheses of each of the three strands of the literature were tested using microeconomic data provided by the HIECS surveys. For all three countries analyzed, the analysis of the data shows that the decade that preceded the Arab Spring was characterized by

a general deterioration of income levels and living conditions. Income contracted while consumption grew – contributing to the positive story of increasing economic growth. However, this paper showed how consumption growth in this period was spurred by dramatic increases in expenditures for basic services such as housing, healthcare, and education. This is likely a result of the significant cuts in the public provision of these kinds of goods over the period. In contrast, expenses for leisure and positional goods fell sharply. The data also show that in this period income and consumption inequalities decreased in Egypt and Tunisia and increased significantly in Jordan. Such diverging trends reflect the fact that hardship affected social classes in each country in distinct ways. In Egypt and Tunisia, the middle- and upper-income groups were relatively most affected, which led to a decrease in inequality. In Jordan, in contrast, inequality grew. Those at the bottom and in the middle were hit the hardest, while the wealthier urban groups actually saw income and living standards grow.

The three theories all predict different outcomes from this set of common underlying facts. According to grievances theory, deterioration in the living conditions concentrated at the bottom and increasing inequality should have made Jordan the country witnessing the strongest protests. In contrast, decreasing inequality in Egypt and Tunisia should have seen protests in those two countries smaller or non-existent.

RT and RPT make very different predictions. According to the former, the economic losses witnessed by the most advantaged groups in Egypt and Tunisia should have spurred discontent among them and led to significant mobilization due to the superior resource endowment of these income groups. RPT would predict similar outcomes for Egypt and Tunisia, with decreasing inequality and economic deterioration concentrated in the middle–top part of the income

distribution. For Jordan it would make a contrasting prediction, with the relative gains enjoyed by the upper income groups and increasing inequality there producing little or no protest.

The events of the 2011 uprisings seem to confirm the predictions of both RT and RPT. Both Tunisia and Egypt witnessed major popular protests that toppled the long-standing rulers in each – Zine el-Abidine Ben Ali in Tunisia and Hosni Mubarak in Egypt. In contrast, in Jordan, protests were less effective and only a minor share of the protests explicitly called for the end of the Hashemite dynasty.

However, it is not possible to distinguish whether the most important factors at play were those emphasized by RT or those of RPT. Moreover, the simple analysis of microdata on income and consumption is not sufficient to conclude that deprived social groups were not those most involved in the protests in Tunisia and Egypt, as grievances theory would imply. In fact, in this regard, it is possible also to apply a wider concept of deprived social groups including the most "relatively deprived" groups that in these two countries had suffered the biggest economic losses in relative terms during the previous decade i.e., the upper and medium–upper groups. Such a different understanding of deprivation would lead grievances theory to predict significant protests in Egypt and Tunisia and not in Jordan. However, for this prediction to be valid, we should find that relatively richer citizens were those who participated in the Tunisian and Egyptian protests, while poorer citizens were those who participated in the Jordanian ones.

To settle these questions, the second part of this paper tested the same theoretical lenses on inequality and political behavior with the data on the participants in the protests provided by the 2011 wave of the Arab Barometer surveys. This wave of the Arab Barometer is of particular

interest since it was collected during the second half of 2011 and provides a unique set of data on the demographic characteristics of the individuals who had just participated in the Arab Spring.

First, exploratory analysis techniques were applied to analyze the income distribution of the participants in the three countries. Although absolute numbers of participants vis-à-vis the total population vary significantly, in all three countries under study individuals belonging to the upper quintile of the income distribution constituted the bulk of the 2011 protesters (between 37% and 40%). Furthermore, a certain linearity is recognizable across the entire distribution: the lower the income the lower the likelihood that an individual joined the protests.

Such linearity is partially confirmed by the econometric analysis of the data. Logit regressions on participation with the only independent variable being income show a positive and significant relationship between participation and income in all three countries. However, once other demographic characteristics such as education level, gender, age, and employment status, are controlled for, income ceases to be significant for Egypt and Tunisia, while it remains significant for Jordan.

Such findings once again disprove the predictions of grievances theory. People belonging to the lower income groups were the least likely to join the protests while the most advantaged groups provided most of the participants in all three countries under investigation. Furthermore, even where most advantaged groups had not been the hardest hit by the economic deterioration of the previous decade, such as in Jordan, their percentage among the protesters was not smaller than in Egypt and Tunisia. In contrast, it was even higher.

Once again, the results seem to confirm the predictions of RT and RPT. In all three countries, those located in the upper part of the income distribution constituted the bulk of protest participants, even where these social groups had seen a relative improvement in their economic conditions

during the previous decade, as in Jordan. However, the fact that income emerged as a significant predictor of participation only in Jordan – while losing significance once other demographic characteristics were controlled in Egypt and Tunisia – lend more support to the predictions of RPT and partially undermine those of RT. In fact, according to the former, income becomes less important in determining participation in protests when inequality is low and decreasing, while it is a strong predictor of participation when inequality is high and increasing.

In conclusion, the findings of this paper disprove with certainty the predictions of grievances theory, which provides the theoretical background to the most diffused narratives on the Arab Spring. In fact, contrary to mainstream accounts, the great majority of those joining the protests in all three countries in 2011 were relatively well off, while those at the bottom tended to stay away. Moreover, in this paper the theorized predictions of RPT have proven a slightly better fit for capturing the dynamics at play than those of RT. With a sample of just three countries, however, these results cannot be considered conclusive.

To be clear, the findings do not mean that poverty and deprivation were not important in sparking the uprisings. As the paper has explained, the decade preceding the revolts were years of significant economic deterioration across all three cases, with different social groups affected differently from one to another. This deterioration may have become the source of discontent along the entire income distribution of the analyzed populations, and especially among those social groups hit the hardest. In particular, the lack of employment opportunities and, in general, of social mobility appear to have played a determinant role in boosting feelings of unfairness and negative attitudes toward economic inequality, as the first part of the paper showed.

The following are a few considerations on the dynamics of the 2011 protests that can be surmised from this paper's findings.

1- *Protest slogans vs election outcomes*: Clearly, the demographic composition of the protests was quite different from that of the general population. Most of those mobilizing in protest came from advantaged groups who brought slogans and messages related to their worldviews and interests into the streets. Democracy, social justice, secularism, women rights, and other liberal values emerged often (although not always) – alongside those concerning socioeconomic issues – at the core of the slogans of the 2011 demonstrations. In contrast, the democratic elections that followed the topple of the autocrats in Tunisia and Egypt shocked many external observers and even many participants in the uprisings. In fact, in both countries religious parties won a majority of the votes, while in most cases those political formations that seemed to embody the values of the uprisings performed relatively poorly in the elections. Several powerful explanations for these developments have been provided by the previous literature, such as the lack of organizational structures that characterized the new parties in comparison to the vast organizational experience and solidity that religious parties had achieved in the previous decades (Bradley 2012). However, further explanation for this mismatch emerges from the results of this paper. More concretely, the difference in interests and perceptions between the majority of the participants in the uprisings and those of the rest of the population is thrown into sharp relief. While the worldviews and values that emerged during the demonstrations reflected those of the most well-off groups, the results of the subsequent elections mirrored the worldviews and values of the entire electorate. Thus, a much broader share of the

population – much of which is more preoccupied with cultural and religious issues than the typical protester – was "active" in the politics of the political transition.

2- *Reforms vs revolution*. Important differences emerged also among the protest movements that developed in each country. While, for example, in Tunisia and Egypt protesters started calling for the downfall of the regime quite early, in other countries such as Jordan (or Morocco), calls for regime change were rarer and mostly marginalized by the protesters. For sure, several factors in each country affected the protesters' attitudes toward the ruling regime. For example, previous literature has pointed to the specific features of Arab monarchies – such as Jordan or Morocco – in shielding the kings from popular discontent, usually redirected toward the executive branches (Ottaway and Muasher 2011). However, an additional explanation can also be found in the specific socioeconomic composition of the protesters and in their interests. While most advantaged groups in Tunisia and Egypt carried the heaviest burden of the previous decade's economic deterioration, in Jordan most advantaged groups, especially those located in urban areas, had enjoyed a significant improvement in living standards. Thus, in Egypt and Tunisia these income groups had more existential grievances toward their regimes than in Jordan where, although demands for better life conditions were also strong, they were more moderate and accompanied by demands for social and political reforms within the existing system. Here, the bulk of protesters belonged to social classes that, for the most part, had become better off in the previous decade. They wanted and expected more but were probably not ready to go so far as to jeopardize their accumulated advantages by demanding the downfall of the regime.

3- *Protests shaped by the elite*. The first two considerations lead to a third one that has to do in general with the shape and the direction that protests take according to the different interests that they embody. In fact, if slogans, messages, and, ultimately, the possible final outcomes (such as ousting the ruling autocrat) are determined by the worldviews and the interests of the majority of the protesters, this has significant repercussions for the analysis of the origins and of the outcomes of uprisings, such as those seen during the Arab Spring. As we have seen in this paper, more than one third of the protesters in all three case studies came from the most advantaged groups. Moreover, due to their enhanced access to education and the latest communication technologies, it is possible to assume that their power to shape and messages of the protests extended even beyond their numerical majority among the participants. This has at least three important implications, on the origin, on the shape, and on the outcomes of these protest movements:

- First, the fact that economic deterioration was relatively harsher on most advantaged groups meant more radical and numerous protests in Tunisia and Egypt but fewer in Jordan. In fact, more people that could afford to organize and join protests had more grievances in the former two countries. Bigger numbers in the streets at the beginning of the protests may have also constituted more effective focal points for people belonging to poorer social classes who joined following a simple rational calculation: the more people join a protest, the more likely it can succeed, the less potentially costly it is. Therefore, more people of the most advantaged groups in the streets meant relatively decreased costs to join also for poorer individuals.

- Second, as we have seen, the interests and perceptions of the most advantaged groups shaped also the slogans, the messages, and the values emerging from the demonstration during their occurrence. In particular, liberal democracy seemed to emerge as the form of government demanded by the streets in substitution to the regimes that protesters aimed at toppling.
- Third, all this had a powerful influence on the final outcomes of these movements, especially in Egypt and Tunisia. After the end of the rule of Ben Ali and Mubarak, the transitional periods moved in the direction to form liberal democracies in the two countries. However, the results of the first elections shocked most of the participants in the protests, which saw their expectations for full-fledged liberal and secular democracies disappointed. In the following period, many of them joined protests against the new governments dominated by the Islamist parties that had won the elections. In Egypt, many secularists supported the authoritarian coup d'état carried out by the Egyptian military two years after the 2011 protests. A subject for future research could be, for example, the composition of the protests that happened in June 2013 at that led to the coup.

3.2. The long road to the Arab Spring: An alternative narrative

This final section reviews and analyzes in detail the findings presented from the previous literature and reframes them in light of the findings of this paper. In so doing, it presents an alternative narrative of the historical, ideological, and socioeconomic developments that led to the 2011 protests. This narrative takes a long-term view of the political economy of the political regimes in Arab states, with a particular focus on the underlying structure of the social contract between authoritarian regimes and their people.

3.2.1. The old and the new social contract

The economic reforms introduced by Arab governments during the two decades preceding the Arab Spring have often been described as a change in the economic paradigm applied by those regimes. For several decades, the economies in these countries were state-dominated. Import-substitution policies and a vast public apparatus and state-owned corporate sector employing much of the working population were the norm. However, by the beginning of the 1980s, these same countries were compelled to change their economic paradigm, mainly in response to the pressures exerted by external forces such as Western countries and Western-dominated international organizations such as the IMF and the World Bank.

The role of the US after the Cold War is particularly salient. Buoyed by its victory over the Soviet Union and its status as the global hegemon, the United States was keen to promote its liberal recipe for economic and political development to the rest of the world. Indeed, Western countries, international economic organizations, and their prevalent economic models did play an important role in influencing economic change in the Arab world during this period. However, it would be too simplistic and ultimately misleading to dismiss these changes as forced deviations toward a liberal, or neoliberal, economic model caused by overwhelming external pressure.

A more complete and comprehensive explanation of the socioeconomic reshaping that occurred during the 1990s and 2000s requires that these developments be understood in context. Thus, they are better understood as a series of attempts by several Arab regimes to significantly alter the existing social contract within their respective societies using the support and the means at their disposal within the contemporary international order. Such changes were motivated by external as well as domestic factors and were not simply a product of imposition by international forces. In particular, a new socioeconomic contract was rendered necessary due to the dramatic international,

regional and domestic transformations that had been occurring since the 1980s, which ultimately made the old social contracts of these countries unsustainable.

From independence, and despite the significant ideological and institutional differences across them (ranging from absolute and constitutional monarchies to socialist and revolutionary republics) all the Arab states had laid down social contracts with the following features in common:

- A rentier or semi-rentier and low-productive economy
- Neo-patrimonial power structures supervising the distribution of rents (for a review see Bank and Richter 2010).
- Mostly one-way and top-down communication channels from the leaderships to the rest of society and, therefore, a lack of bottom-up systems of communication and channeling of demands, especially in the form of independent civil society organizations

To different extents in each case, this kind of social contract remained relatively stable until the end of the 1970s. However, at the beginning of the 1980s, almost all Arab countries entered a structural crisis that was exacerbated and accelerated a decade later by the end of the Cold War and the bipolar international order.

This structural crisis was caused by international, regional, and domestic factors. At the international level, the end of the Cold War had also ended the support of the two major superpowers for their local allies in various parts of the world, including the Middle East. Countries that had been close to – and to a certain extent dependent on – the Soviet Union lost their main ally and source of military and financial aid. At the same time, the regional allies of the West saw a decrease in financial support.

A second international factor was oil prices, and their two-fold effects on the economies of resource-poor Arab countries. At the beginning of the 1980s oil prices plummeted after a decade

of price spikes that had brought big quantities of petrodollars into the financial markets to be used for cheap credit around the world, and especially for developing countries. Moreover, the booming economies of oil-rich states had attracted significant numbers of immigrants from resource-poor Arab countries, whose remittances had become important financial resources, in many cases overshadowing the remittances from nationals who had emigrated to European countries.

Finally, at the beginning of the 1970s the leftist, anti-colonial ideologies that had dominated the political and social discourse of the Arab world since independence entered into an irreversible decline. Throughout the following decades, Marxism, Pan-Arabism, Nasserism and Baathism were all progressively confronted and superseded by various strands of Islamist thinking in both intellectual and popular circles. This ideological shift fed into economic management, with the old state-led developmental model progressively undermined. Thus, both ideological and political economy frameworks were steadily superseded by the dominant, Western liberal model, which, to some extent, came to be adopted and supported also by the mainstream Islamist discourse.

At the domestic level, different specific factors affecting the sustainability of the old social contract can be outlined for each country. However, one fundamental factor was common to all Arab countries: rapid population growth after 1950. Egypt passed from 23 million inhabitants in 1960 to 86 million in 2011; Tunisia from 4 million to 10.7 million; Jordan from less than 1 million to 7.5 million; Morocco from 12.3 million to 33 million; Syria from 4.5 million to 20.8 million. Such dramatic increases had a deep impact on the ability of the current economic paradigm to sustain the social and economic achievements of the previous decades. In particular, public sectors became increasingly unable to absorb new entrants into the labor market and to guarantee the stability of the achieved per-capita income levels.

Thus, what followed throughout the 1990s and 2000s were a series of attempts to profoundly modify the social contract that had ultimately determined the stability of these regimes and kept them in power for decades. One mistake of the mainstream narrative, however, has been to describe such changes as planned, organized, and mostly ideologically (in a neoliberal sense) motivated. The lack of planning and organized ideological approach becomes clearer when the main characteristics of the reform attempts carried out by Arab regimes in this period are unpacked. These had three main characteristics:

1- They were neither planned nor desired by the local regimes through some ideological realization. And while they were "forced upon" these regimes, this was not by some specific international actor or organization, but by fast changing external and domestic circumstances (Dacrema 2015). The special circumstances that in the previous decades had allowed these countries to build-up a rentier or quasi-rentier model of social contract ceased to exist, rendering these countries' socioeconomic infrastructure unsustainable and forcing these regimes to find an alternative while struggling to remain in power.

2- The changes introduced were mostly uncoordinated due to the lack of adequate planning and, mainly, due to the lack of institutional efficacy and efficiency. The rentier or quasi-rentier and neo-patrimonial structures did not support adequate planning and balanced mechanisms that would reinforce these kinds of radical reforms. This produced three main effects:

    - First, reforms could not be agreed upon and applied in coordination with the countries' different social segments. This was mainly caused by lack of independent civil society organizations and by limited availability of communication channels between regimes and citizenry.

- This led to the second effect: the incapacity to sufficiently forecast, detect, communicate, and, when necessary, balance the effects of the reforms introduced. Subsequent measures introduced during this period had often uncoordinated or even opposite effects. For example, while, on the one hand, vast shares of the public sector were privatized, public jobs reduced, and employment in the private sector encouraged, on the other, the regimes continued to use the public sectors as main consensus-levers, using wage increases as main means to curb discontent. Such measures diminished the relative attraction of the private sector vis-à-vis the public sector for new entrants in the labor market while also increasing the capacity of households to support longer periods of unemployment while waiting for a public job.
- Reform plans and their implementation were subject to conflicting incentives also from the point of view of the regimes. On the one hand, those in power needed to maintain their channels of communication and support with their main constituencies to exert control and maintain stability. On the other, the implementation of the new, more sustainable social contract implied structural changes in the nature and in the dynamics of the power structures. Due to the limited resources at their disposal, regimes needed to drop the traditional special relations they entertained with specific social groups – and the economic obligations that such relations entailed – while trying to expand their social bases on different premises other than the old patronage dynamics. No regime was able to successfully manage such a transition, mainly due to their total refusal to introduce political

reforms that would enhance the democratic channels of participation of the citizenry: the only "cheap" way to enhance the regimes' perceived legitimacy.

3.2.2. A hybrid economic model

The lack of experience and vision regarding economic reforms and the climate of "emergency" in which reform programs were often launched led most Arab regimes to demand intervention from international organizations and assistance from external actors. However, in most cases the receipts suggested were disregarded or only partially applied due to the conflicting agendas held by local regimes on the one hand, and international organizations on the other. The hybrid process of the neoliberal reforms pushed by international organizations with the aforementioned characteristics of the Arab regimes perpetuated along the years progressively crystallized into a specific development model showing common features in most Arab countries. This is a model with three main features that Dacrema (2015) has described as follows:

1- **Measures of trade openness having conflicting aims**. On the one hand, the regimes aimed to boost export-led economic growth as suggested by the Washington Consensus recipe. On the other, trade openness allowed for cheap imports that softened the harsh effects of economic changes and downturns on the population. In fact, while cheap imports helped sustaining the populations' consumption, they constituted formidable competitors for local productions, harming local businesses, exports, and employment.

   Moreover, historical and political issues – such as the absence of strong regional organizations and mutual historical tensions – impaired expansion of trade within the region via the relaxation of tariffs and border restrictions between Arab countries. The Arab world remained among the least interconnected regions in the world, while trade expanded

greatly with other areas, especially Europe, North America, and Asia. This implied that to establish the rules for market access each Arab country had to deal singularly with significantly bigger countries, such as the US or China, or organizations, such as the European Union, from a weak position. This led Arab countries to accept rules and restrictions often unfavorable to their products and domestic developmental aims.

2- **Privatization of state-owned companies but lack of reform of state bureaucracies**. In order to improve the sustainability of their budgets, Arab regimes proceeded to privatize most of the state-owned companies, which had constituted the bulk of state employment during the previous decades. However, in most cases privatizations where not conducted according to market rules. These companies were handed to businessmen close to the regime (if not actual members of the dictators' families). This allowed the regimes to retain some leverage over these businesses, which in numerous cases were providers of important services such as telecommunications, education and healthcare. However, this created room for ineffective accountability in their management. The closeness of their private owners to the governments often allowed them to be shielded from competition and market forces. They obtained de-facto monopoly positions at the disadvantage of the local consumers, a dynamic that in some cases had harsh effects on the living standards of the populations. Furthermore, the new business owners and their crony circles came to constitute new elites, often in competition with, and at the detriment of, the traditional business communities that saw their position, and sometimes even their living standards, worsen.

At the same time, the regimes chose to not carry out any major reform of their administrative sectors, which remained the last main source of patrimonial rent distribution fully in the regimes' hands. This led to the perpetuation of the traditional inefficiencies of the public administrations, at the detriment of new private-sector activities and investment attraction.

3- **Foreign investment attraction compensating for lack of domestic investment**. The lack of will to reform the main structures of rentier or semi-rentier distribution systems, constituted mainly by subsidy packages and an over-employment in the public sector, did not allow Arab regimes to liberate enough resources within the state budget to enact vast state-led investment programs. Thus, they turned to foreign capital, attracted by special tax treatments for foreign investors. The uncertainty regarding private investment flows and limited room to condition their nature and objectives often led to uneven distribution among economic sectors and territories, to the repatriation of most profits, and to limited efficacy in stimulating local activities and employment. At the same time, the (often partial) liberalization of the financial sector did not led to a significant increase of the financial support for small and medium businesses, which in most countries constitute the backbone of private-sector employment and household incomes. These businesses remained characterized by scarce bankability, mainly due to the incapability and unwillingness of the national fiscal systems to catalog and tax them. As a result, most of them were left in a status of complete or partial informality. This led financial institutions – even when privatized – to use their resources mostly to finance the state debt or to support a small

number of big enterprises (with limited employment-creation capacity) linked to regime circles.

Such features led to one outcome fundamental to understand the growing fragility of the Arab regimes: it eroded their consensus bases without properly creating an alternative. On the one hand, regimes tried to maintain their connections with and the privileges of their traditional bases. In periods of crisis they increased (or reintroduced) subsidies and public-sector salaries. However, as showed in this paper, the urban and rural bourgeois that had largely benefited from the expansion of the public sectors in the past witnessed a gradual deterioration of its living standards only temporarily slowed down in periods of crisis. Similarly, the traditional, small private sector – composed mainly of artisan, family enterprises – continued to enjoy a de-facto informal exemption from taxation as in the past. However, this kept small enterprises in substantial informality, impairing their bankability and access to credit. Therefore, when domestic markets were rapidly opened, they could hardly find capital to expand and improve their activities in order to cope with foreign competition. Even less were they able to compete in international markets by exporting abroad.

Thus, although to different extents, despite disordered attempts to keep their traditional consensus bases, even social groups that had supported and benefited significantly from the old social contract developed economic grievances, and the small minority of cronies and new entrepreneurs that managed to benefit from the recent economic transformations in both relative and absolute terms was hardly comparable in terms of numbers and influence within the society.

3.2.3. The life-course effects: Disruption of settled expectations

To this point, this discussion has attempted to detail the dynamics and the institutional environments underlying the reform programs carried out in the Arab world in the years preceding the 2011 upheavals. The regimes' structures of power, decision-making, and rent distribution was covered. However, it remains to lay out the broader effects that such structures caused within Arab societies. In particular, it is crucial to detail the kind of social dynamics spurred by rentier or semi-rentier social contracts and by their subsequent progressive substitution with the neoliberal economic model.

In an interesting study on the aspirations and frustrations of the Arab youth, Dhillon and Yousef (2011) applied the life-course theory to explain high frustration levels among young Arabs. Throughout the decades that followed Arab independence from European colonialism, formal and informal institutions were created and developed around the life models outlined by the rentier social contract. Since various kinds of public-sector employment were the at the core of such life models, formal institutions such as education and healthcare systems developed around the concept of public employment as the benchmark activity for the national working force. Schools and universities developed programs mainly aimed at preparing students to enter the public sector, while in several countries public employment became the key to access comprehensive healthcare coverage.

Moreover, public-sector jobs emerged as a central vehicle for the young to transition to full, independent adulthood. In the years after independence, elements of the traditional cultures, such as marriage traditions and social rules to access adulthood, progressively entered in and adapted to the new social contract proposed by post-independence regimes. Marriage contracts adapted to the new economic model, and public-sector jobs became the minimum requirement for the future groom to demonstrate his financial stability to the bride's family. Therefore, public-sector jobs

became the prerequisites for marriage and for accessing the credit necessary to purchase an autonomous house for the new family: traditionally, the two main prerequisites for adulthood access. This adaptation was easily accepted and encouraged mainly because the new social contract ensured a significant improvement of life conditions. Measures aimed at guaranteeing automatic hiring for high school and university graduates also encouraged young people of modest origins to pursue higher education, quickly transforming and reshaping traditional rural societies in which, before independence, almost 85% of the Middle East's inhabitants lived (Dhillon and Yousef 2011).

However, improvements in income and life conditions were rarely coupled with matching improvements in productivity. Most the public-sector expansion was financed through various types of rents, easy credit (especially during the oil boom of the 1970s), and foreign support. Increasing public-sector wages boosted salaries also in the smaller private sectors, which had remained mostly protected by foreign competition by import-substitution policies.

In many respects, the mismatch between income and productivity that developed during these decades is a key factor that explains the increasing levels of discontent and instability witnessed in most Arab countries in recent years. Life-course theory is particularly suited to capture the main elements of these social–psychological dynamics. In fact, the full complexity of the mismatch began to emerge once the post-independence economic model attenuated beyond a certain point, revealing its underlying unsustainability. While regimes enacted disordered attempts to reform their economies and introduce more sustainable social contracts, it was not possible for either formal or informal institutions to adapt effectively to the new dispensation. Expectations derived from the experience of post-independence generations were thus virtually destined to be

disappointed. With the new private-sector labor market neither as stable nor as remunerative as the traditional public-sector one had been, the structural components of traditional social institutions, such as the patriarchal family model characterized by one breadwinner, became increasingly unsustainable for most young families.

At the same time, deeply rooted social norms and lack of adequate infrastructure, such as easily accessible childcare institutions, did not allow for a significant expansion of female employment. This led most young entrants in the labor market to eschew private-sector jobs, or to consider them only as temporary solutions, while postponing the achievement of key stages of the life courses – namely marriage – until the chance for a public-sector job would present. Moreover, lack of or limited education reforms significantly contributed to the productivity–expectations mismatch. For the most part, educative institutions remained attached to the old paradigm based on educative programs aimed at forming labor force for the public sector. Scarce or no innovations were introduced to make education (university education especially) more palatable for the private sector and foreign investors. Thus, the cohorts of new university graduates were the most impacted by an expectations mismatch, most often forced into precarious jobs in the private sector for which they were significantly overqualified and that at the same time paid too little to repay the sums invested in acquiring advanced education in the first place.

But the disordered reform attempts undertaken by Arab regimes not only disrupted the life-course experiences of young generations. In fact, at the same time, state budget cuts hit public services such as healthcare, education, public housing, and consumption support (usually in the form of food or fuel subsidies). Households that had become accustomed to free, or almost free, access to these services saw their day-to-day expenses constantly increase, hurting especially those upper–middle income groups that in the previous decades had been the main recipients of public support

and benefits. Furthermore, the new degree of financial and entrepreneurial liberalization allowed for increased real-estate speculation, especially in the major urban centers. This was coupled with accelerated rates of urbanization due to the underinvestment and limited job opportunities in the rural areas, leading to rapidly increasing – in some cases, even skyrocketing – real-estate prices.

As this paper has showed, in several countries such as Egypt and Tunisia, these economic transformations hit particularly those social classes that had benefited the most from the previous social contract, such as high-ranking public-sector workers, but also professionals such as architects and engineers whose activities had traditionally been closely linked to a bloated public sector and state-owned corporate sector. Especially these groups of relatively well-off and highly educated professionals and entrepreneurs saw their lifestyle under increasing threat from the dramatic shrinking of government support, the arrival of cheap imports due to trade-liberalization and the increasing costs of basic goods.

Moreover, younger generations – especially those belonging to these social classes – profited to a certain extent from the liberalization policies of their governments. Exchange with and traveling to the rest of world increased quite a lot. New varieties of products, new technologies, and new ideas became available, contributing to increased aspirations and expectations, especially among the young. Even where upper income groups did not witness significant deterioration in their lifestyles compared to the past, increased exposure to new products and new ideas – and to the way of life in other countries – increased their expectations about the future and their assessment of what was being offered under the prevailing system at home.

These people – members of the upper and middle-upper income groups – were the same people that had become used to close connections and some degree of influence over those in charge.

They still do, to some extent, despite the recent transformations occurred within the regimes' inner circles. This made them feel relatively freer than other social groups to express their discontent through associative activities, new media instruments, and to join full-fledged protests when the chance arose. On the one hand, they had money and resources to access communication instruments, and, on the other, they had money and connections to enjoy relatively higher degrees of impunity compared to members of poorer social groups. These factors led them to become the numerical and ideological bulk of the protests that exploded in 2011. As this paper attempted to show, the prevailing presence of their grievances and their demands during the protests conditioned in different ways and to different extents of confrontational posture the movements that developed in each country.

A Game-Theory Approach to Radicalization:

Understanding Rapoport's waves of terrorism through the dynamics of correlated equilibria

Abstract

This paper provides an overview of the relatively limited literature that applies the principles of game theory to the study of political or religious radicalization. After describing its main findings, it suggests how Rapoport's seminal work on the historical "waves of terrorism" can be treated dynamically through some fundamental game-theoretic principles such as coordination problems, Thomas Shelling's focal points and in the solutions proposed by the literature on correlated equilibria. In its final part, this paper analyzes how these principles can be used to tackle the common dynamics characterizing Islamist radicalization in contexts that are ostensibly very different such as Tunisia and the United States. By considering such diverse countries, this paper aims to debunk the notion, common in the public debate, that Western and Middle East countries are characterized by completely different and incomparable dynamics and to demonstrate the existence of common universal elements underlying the phenomenon of radicalization.

Introduction

Game theory has been seldom applied to the study of terrorism and radicalization. This stems primarily from specific features of this literature. For instance, the undertaking of terrorism acts and, more in general, the process of radicalization, have been framed for a long time as the products of unhealthy states of mind, such as mental instability and antisocial tendencies. In this context, a rational approach such as game theory is simply inapplicable: If terrorists are "crazy people", they will not act rationally. However, more recent strands in the literature have analyzed terrorism and radicalization with a deeper, more sophisticated approach. Modern scholarship does not consider terrorists as crazy, irrational actors; rather, several studies demonstrated the rationality underlying

their strategies (see, e.g., Landes 1978; Sandler and Enders 2004). In this modern framework, radicalized people are mentally healthy individuals who have gone through a phase of deep psychological strain causing what Kruglanski and Orehek (2011) define "cognitive openings" which, in some cases, may lead them to embrace radical worldviews. Thanks to this fundamental transformation in the study of radicalism, an opportunity was created for the application of game theory.

At first, scholars began applying the games previously used to frame the negotiations between states or business entities to those occurring between governments and terrorist organizations (Sandler, Tschirhart, and Cauley 1983; Lapan and Sandler 1993). Moreover, similar tools have been applied to explore the competitive relationship between different terrorist groups (Chlebik 2010). However, works focusing solely on the process of radicalization have been scarce. Only one scholar, Jacob Olidort, has attempted to apply game theory concepts to explain the factors leading single individuals or groups to adopt or reject terrorist tactics.

This paper aims to contribute to this rather slender literature by revisiting one the most important works ever published in the field of radicalization studies through the lens of game theory: David C. Rapoport's "Four Waves of Modern Terrorism" (2013). In this seminal work, Rapoport analyzed the diverse ideologies – anarchism, anti-colonialism, leftism and Islamism – that throughout the last century have been the pole of attraction for most coexisting radical organizations. According to Rapoport, people radicalize in such different ways depending on the "*zeitgeist* of their epoch" i.e., the ideology internationally predominant during their life-time, which provides the main cultural references to the individuals living in that time-period. According to Rapoport, the process of globalization, which has been progressing over the last century, has allowed these ideologies to

become transnational and influence radical groups in different countries. This paper re-elaborates Rapoport's theory, building on and expanding Olidort's work, which applied Tom Schelling's focal points to the dynamics of radicalization. This paper portrays the process of radicalization as a coordination problem that individuals need to solve in order to act in concert according to a common ideology. To solve it, they converge toward that ideology that is the most resonant with their cultural references and what they think are the currently predominant cultural references of other people. In sum, people adopt a certain radical ideology, instead of others, in order to *coordinate* i.e., to embrace an ideological framework that, they assume, is the one joined by most people who wish to subvert the current socio-political system. They solve the coordination problem through what Robert Aumann (1987) defined as "correlated equilibria" i.e., those common ideas and behaviors people elaborate by drawing from the same poll of knowledge.

This approach has the merit of pinpointing some of the most important universal dynamics underlying the process of radicalization, filtering them from those elements that are specific to the various forms that radicalism can take (Islamism, anarchism, etc.) or to the social contexts in which radicalization occurs. In order to highlight such universal dynamics, in the last part of this paper two rather different case studies are considered: Tunisia and the United States. The patterns of Islamist radicalization in these two contexts are analyzed in order to highlight their common dynamics and systematize them within the game theory framework introduced in the previous sections.

This paper proceeds as follows. The first part provides a review of the existing literature applying game theory to the study of terrorism and radicalization. The second part introduces the game-theoretic notions of coordination problem and correlated equilibria and applies them to Rapoport's

concept of terrorism waves. The third part analyzes the phenomenon of jihadi radicalization in the United States and Tunisia, in order to highlight the dynamics described in the previous part within these two rather different scenarios. Finally, the fourth part provides some concluding remarks, drawing the findings together and presenting some avenues for future research.

1. Game theory and the study of terrorism and radicalization: A literature review

Economic tools and theories such as economic data analysis and rational choice theory have provided useful insights in the study of terrorism and extremist behavior (for a review see Sandler and Enders 2004) The main underlying common feature of this set of economic analytical tools is the characterization of the subjects involved in the interactions (such as governments, terrorist groups, and extremist individuals) as rational actors aiming to maximize their profits and minimizing their losses, while being subject to particular constraints.

The first to introduce this approach to the study of terrorism was William Landes'(1978), who described terrorists as rational actors, an interpretation that contrasted some of the prevalent theories at the time, which saw terrorism as the result of deviant minds and irrational decision-making. Utilizing data from terrorist hijacking incidents before and after the introduction of metal detectors in US airports in 1973, he demonstrated the rationality-inducted effects of increased punishment (longer sentences) and higher probability of being caught (through higher surveillance and metal detectors) on the decision to carry out a terrorist attack.

Enders and Sandler (Enders and Sandler 1993;2004) further expanded on Landes' theory portraying terrorists as rational actors, demonstrating the applicability of other economic theories in the study of terrorism. For example, they illustrated how the concept of *substitution* – which postulates the act of substituting a good or a technique with another cheaper and having a similar

effect/use – is useful to explain changes in terrorist tactics following the introduction of measures that rendered previous tactics more dangerous and/or expansive. Using a vector autoregression analysis, the authors demonstrated that, on the one hand, the introduction of metal detectors decreased the number of skyjackings while, on the other hand, it resulted in an increase of other terrorist incidents that metal detectors would not be able help prevent. Analogously, the authors demonstrated how the concept of *complementarity* can also provide insights for terrorism researchers. Namely, how attacks cannot usually obtain the desired effects if they were not complemented by additional actions such as threats or propaganda campaigns.

The economic approach to terrorism, utilizing tools such as game theory, presents two main advantages: First, it helps defy once again the interpretation of terrorism and radicalization as the results of irrational and pathological states of mind. Second, it helps isolate the factors determining the outcomes of the strategic interactions between governments and terrorists, and helps explain their implications in the long run, including their unintended effects in changing the tactics employed by terrorist organizations. Furthermore, it is useful to better understand the individual dynamics leading a person to adopt a radical worldview and to commit terrorist acts.

Most of the literature applying game theory to the study of terrorism has departed from the models used to analyze the behavioral aspects of negotiations and transactions. Different versions of such models have focused on the specific interactions occurring between governments (or security agencies) and terrorist organizations. Thus, the literature has mainly focused on collective actors (governments, agencies, terrorist organizations and cells), mostly neglecting the individual level and the process of radicalization (Sandler, Tschirhart, and Cauley 1983; Sandler and Lapan 1988; Siqueira and Sandler 2006; Lee 1988; Lee and Sandler 1989; Daniel, Arce, and Sandler 2003; Arce

M. and Sandler 2005; Lapan and Sandler 1993; Chlebik, 2010). Only recently has the literature tackled these topics, aiming to expand our understanding of the radicalization phenomenon through the lens of game theory-specific tools (Olidort 2015; 2016).

In this section, the paper will explore some of the studies applying game theory to terrorism studies. In particular, it will focus on studies whose contents are relevant to our understanding of the dynamics of contemporary terrorism and the inherent policy dilemmas. The first part will outline the relatively vast literature regarding the strategic interactions between collective actors, while the second will introduce more recent literature on game theory applied to the individual and collective radicalization processes.

1.1. Governments vs. Terrorist organizations

Following the wave of left-wing terrorism prominent in several Western and non-Western countries during the 1970s and 1980s, scholars began applying the dynamics of game theory to the interactions between governments and local terrorist organizations, including situations particularly focused on the terrorist techniques utilized at the time, such as hostage release negotiations.

Sandler et al. (1983) devised a model to predict the outcome of the negotiation process between the government and a terrorist group when hostages are taken and/or properties are seized. Applying game theory-specific tools, they highlighted the importance of past interactions – i.e., the probability distribution of the results of past governmental concessions – to predict the outcome of the current interaction.

Lapan and Sandler (1988) departed from hostage-crisis situations and instead built an extensive game where the government makes the first move by choosing the level of deterrence: the

concessions the government is willing to resolve the crisis. They focused particularly on situations where governments declared in advance their unwillingness to pay ransom for kidnapped nationals or officers. Through the use of case studies, they demonstrated that in the presence of the right set of incentives such preemptive measures can become counterproductive, leading governments to capitulate if the expected losses surpass the potential losses of giving in to the terrorists' demands (including harm to their reputation). They analyzed the set of incentives determining terrorists' decisions to carry out a kidnapping despite the credible belief that the government will not negotiate. They highlighted how such incentives may often lead the group to carry out an attack, especially when they think that they can obtain a sufficiently high payoff even if they fail (i.e., without obtaining the satisfaction of their requests).

Their conclusions are currently relevant as well, since certain countries, such as the US, have a no-ransom payment policy. A significant number of US citizen kidnappings have been carried out during the last decades despite the policy of non-negotiation consistently applied by the US government due to the reputational and symbolic payoffs obtained by terrorist groups for seizing American citizens.

A recent, high profile case was that of journalist James "Jim" Foley, who was abducted by Islamic State (IS) militants while working in Syria in 2012. IS kidnapped Foley though the US government was relentless in their refusal to negotiate with his kidnappers. Eventually, Foley was executed in 2014 and the video of his death was used by the group as propaganda material. In an email to Foley's family, the group stated that the US government's refusal to negotiate and pay ransom proved that they had no motivation to deal with Muslims except through force (*NBC News* 2014).

Sandler and Lapan (1988) and Sandler and Siqueira (2006) use game-theoretic analysis to tackle

a different kind of issue: namely, the factors determining terrorists' target choice. They build a three-player game, two states and one terrorist organization who must choose which of the two countries to attack. The two countries move first, deciding the level of deterrence, which in this case is the level of resources each country devotes to the prevention of terrorist attacks. At glance, this may look as a simple arms-race dynamic, in which the two countries incur into a continuous escalation of their deterrence levels to avoid an attack against their territory and direct it against the other one. However, the authors also included in their calculation a "globalization factor," i.e., the fact that in a globalized world an attack against one state may have negative repercussions in other states, like for example when citizens of various countries who might be living in the country attacked, are injured or killed. Thus, their calculations included not only the direct damages caused by the attack carried out in their national territory, but also the harm incurred to their broader national interests because of an attack carried out against another country.

Their model leads to three interesting outcomes. First, they show how the building of deterrence levels in an international environment is primarily a strategic interaction: when a nation chooses its level of deterrence, such a choice will influence the calculations of the other nation regarding its own deterrence. Second, depending on the value of two contrasting costs determined by the presence of the "globalization factor" (the cost of an attack carried out against one country compared to the cost for the same country of an attack carried out against the other one) the authors find that the Nash equilibrium[6] of their model may result either in too much or too little deterrence

[6] A Nash Equilibrium in the outcome of a game involving the interaction of several participants in which no participant can benefit from a unilateral change of strategy if the other players' strategies remain unchanged. A Nash equilibrium represents a stability in the game, without it necessarily being the "social optimum" i.e., the outcome in which the sum of all players' benefits is the highest possible. One famous example of this situation is the game known as "Prisoner's Dilemma". Although in order to obtain the "social optimum" the two players should both choose not to confess, the Nash equilibrium for both the players is represented by the "confess" option, which makes the game end with the collective worst possible outcome. "Nash equilibrium" is named after mathematician John Forbes Nash Jr. who first proposed the concept in 1950. See Nash JF. Equilibrium Points in N-Person Games. Proceedings of the National Academy of Sciences of the United States of America. 1950;36(1):48-49.

in comparison with the social optimum.

Finally, they highlighted the limit of intelligence sharing among potential target nations. In fact, according to their model, in case intelligence sharing occurs without any further coordination in deterrence-building, the information shared may be used by one country to increase the likelihood that the threat is transferred toward the other[7].

Lee (1988) and Lee and Sandler (1989) tackled the same problem but from a different perspective. They analyze a case where country "A" decides to reach an agreement with a terrorist organization, essentially making their territory a safe haven for the organization in exchange for the reassurance that the country will not be attacked. This scenario is an extension of the arms-race scenario analyzed in the previous example. In this case, in addition to the possibility of increasing its own deterrence measures, the government can also choose to negotiate with the terrorist organization to redirect any potential attacks toward country "B" and ensure its territory remains unharmed. The authors demonstrated that lacking sufficient incentives for cooperation, this is the dominant option in the prisoner-dilemma model they employed. It is also useful in explaining the outcomes of several real-life cases in which countries chose to appease international terrorist organizations instead of collaborating with other potential targets to eliminate the threat. This is, for example, what happened in 1985 when the Italian government, faced with incidents of domestic far-left extremism, chose to protect several Palestinian terrorists in exchange for exemption from terrorist attacks. A decision that strained the relationship between the Italian government and allies who sought jurisdiction to go after suspected terrorists on Italian territory[8].

[7] A similar arms-race dynamic that explains states' choices in deterrence is employed by Sandler and Enders (2004) who call such a dynamic "transference race".

[8] In 1985, the American air force intercepted an Egyptian civilian aircraft directed from Cairo to Tunis and forced it to land in the NATO military airport of Sigonella, Sicily, where US troops were stationed. The airplane was

Using an analogous model, Sandler and Arce (2003, 2005) analyzed the decision-making process of two countries, in choosing between reactive and proactive policies to minimize a terrorist threat. The authors defined "reactive policy" as the kind of deterrence measures aimed at protecting the country's citizens, territory, and infrastructure. On the contrary, a "proactive policy" is a set of measures aimed at tracking and eliminating the terrorist organization at home and beyond the country's borders. The main difference between the two policies is that while reactive policies are cheaper and only benefit the country employing them, proactive policies are more expansive and may benefit both countries even when they are only implemented by one.

In their model, the authors show that in a static-form game the free-riding option is dominant. One country will have the best incentive to implement a reactive policy to free-ride on the other country's decision to implement a proactive policy. If both countries perceive the threat level the same way, they will end up choosing a reactive policy and neither will employ proactive measures. However, when the terrorist threat is bigger for one country than the other, it is possible that the former's dominant strategy will be to implement a proactive policy regardless of the other's choice not to. According to the authors, this is exactly what happened between the US and the EU following the 9/11 attacks in 2001. While in the pre-9/11 era proactive policies were rarely employed by either actor, following the attacks, US perception regarding the benefits of implementing a proactive policy changed.

As a result of the attacks, the Bush administration believed that the benefits of a proactive policy

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transporting four Palestinian members, including the leader Abu Abbas, of the commando that few weeks before had hijacked the cruise ship "Achille Lauro", killing a paraplegic American citizen of Jewish origin Leon Klinghoffer. The Americans had planned to board the aircraft once it landed at the NATO airport and arrest the four terrorists. However, the Italian government officially claimed that the airplane was under Italian jurisdiction and forbade the American troops from carrying out the arrest. The Italian Prime Minister Bettino Craxi ordered Italian special forces to surround the airplane and the ensuing stand-off with US forces continued for hours before President Ronald Regan ordered the American troops to stand down.

were higher despite the high costs. At the same time, the EU's calculations did not change significantly, and free-riding on the US's actions remained the dominant option. Furthermore, the authors highlighted that by employing a dynamic model in which incentives might potentially change in the long run, the positive incentives for adopting only reactive policies (or even of not adopting either reactive nor proactive policies) may change, pushing the other country to participate in proactive policies by joining the other country in the effort to eliminate the international terrorist organization outside their borders.

A different game-theoretical concept, "signaling games"[9], was also employed by Lapan and Sandler (1993) to model the interaction between a terrorist organization and a government that is unaware of the real strength of the menace. Attacks serve as signals that the government utilizes to adjust its information regarding terrorists' capabilities and to calculate its incentives to offer concessions, or repress them fully. In this strategic interaction, terrorists have a vested interest in offering confounding signals regarding their strength which can lead to the government overestimating their power and, thus, offering concessions. Therefore, terrorists might choose to utilize most of their resources in the first few attacks despite the fact that this might severely deplete their ability to carry out further actions. However, through backward induction[10], a rational government can anticipate this way of thinking. The authors concluded that the government will make concessions only if the level of the attacks exceeds a certain threshold, while also considering

[9] A "signaling game" describes the situation in which at least one of the actors has imperfect information about what the other actor is doing and the latter can provide true or false signals about his strategy. For example, in a 2-strategy, 2-player game, player 1 moves first and chooses between two strategies. Player 2 cannot see what player 1 chose and player 1 can now "signal" his choice to player 2. Player 1 may signal his true move or let player 2 believe that he chose the other option. Player 2 knows that player 1 may lie. Hence, player 2's strategy choice will depend on player 1's signal and the calculated probability that the signal is false.

[10] "Backward induction" is the process of inferring other players' best strategies by simulating what is the most likely best end-scenario for each of them and then reconstructing backward all the possible decisions they may take at the various points of the game in order to achieve it.

the interest of the terrorist organization to overspend its resources in the first attacks.

In 2010, Chlebik (2010) changed this perspective significantly. He analyzed a decision game where governments, as passive actors, are subjected to the moves of two different terrorist groups (specifically, terrorist cells) competing against one another. The two groups are contending with each other in two contrasting fields: on one side, each group tries to attract more attention and cultivate a better reputation through its actions in order to obtain more resources from potential state (and non-state) sponsors at the detriment of the other group. On the other hand, more attention and better reputation also attract the attention and subsequently, repressive measures nations opposing their activities.

In this case, each group is interested in redirecting the repressive actions against the other one. Both cells have limited resources that can be depleted by carrying out terrorist attacks or by repressive measures enacted against them, and which can be increased with the support of sponsoring countries.

In the static model, the decision of each group on whether to carry out an attack or not, depends on the dynamics of these two variables. After a few attacks, one group might obtain more support than the other, but may also discover that the enhanced repression measures it has to endure are too high compared to the additional resources it was able to accumulate. This scenario may favor the emergence of the other group which may now enjoy less support but is also subject to less repressive actions.

The author then proceeds by adding a further dynamic element to his model. After a long period of continuous threat coming from each of the two terrorist groups, the repressive capabilities of the opposed countries may increase, augmenting the disincentives to carry out attacks for both

groups. In the long run, if not coupled with augmented resources provided by sponsoring countries, the general incentives to carry out attacks will thus diminish.

This kind of model is currently particularly relevant to the study of the dynamics occurring between IS and Al-Qaeda. The two organizations became competitors after a dispute in 2013 led to their separation. In the following years, IS was able to attract enormous attention, conquering major portions of the Anbar and Nineveh provinces in Iraq and most of Eastern Syria, and declaring the beginning of a new Caliphate in June 2014. IS's bold military actions and effective propaganda strategy certainly led many international jihadis to redirect their support from Al-Qaeda to the Islamic State.

However, its initial successes also attracted the attention of several regional and international nations and non-state actors. In less than two years, IS became the primary target of most of the nations and organizations fighting against the global jihadist movement and the volume of military repression which it was subjected to resulted in the sharp decrease of its territory and its operational capabilities in the Middle East.

Al-Qaeda is now in the best position to profit from this situation, exactly just as the model predicts. Furthermore, the new level of threat that IS represented led to a heightened level of international response and coordination. Other countries, not the US alone, are today engaged in preemptive anti-terrorism operations outside their territories, a development that may result in an environment that terrorist organizations will find harder to operate in.

1.2. Game theory, radicalization, and psychological processes

As showed in the previous section, in past decades, a consistent number of articles have utilized game-theoretic tools to tackle the "downstream" side of terrorism studies, i.e., the study of the decision-making processes of existing terrorist groups. However, few articles have tackled the

"upstream" side of terrorism, namely radicalization. For the purposes of this paper, radicalization is defined as the process through which an individual or group come to embrace an extreme ideology which opposes the current status quo and might even go as far as justifying and encouraging the use of violence to achieve its objectives. Radicalization can occur at the individual level – and lead a single individual to adopt a radical viewpoint and potentially commit ideologically-motivated illegal acts, both violent and non-violent, or at the organizational level, leading an entire organized group to mobilize to violence to fulfill its ideological goals.

Jacob Olidort (2015, 2016) has analyzed both individual and collective radicalization through a game-theoretic lens. At the collective level, Olidort (2016) focused on the theoretical complications that traditional classifications of Salafi groups encountered after the outbreak of the Arab Awakenings in 2011.

In the countries were the uprisings were followed by a significant liberalization of the political environment – notably Tunisia and Egypt – and by the organization of free and fair elections open to almost all political parties, including Islamist ones (previously banned from openly participating in politics in most Arab countries), several Salafi groups decided to form political parties and participate in the new political course. Before the uprisings, most of these Salafi organizations had explicitly professed their abstention from political participation, justifying their decision on sophisticated theological bases that led such groups to be referred to as "quietists". Organizations such as the Egyptian Salafi Dawaa, which had previously demonized political participation – in particular, defining political parties as sinful instruments of "Fitna" (division) of the Islamic community – formed political parties that participated in the elections, often obtaining noteworthy results and becoming protagonists of the national political scene.

In his analysis of the behavior of Salafi movements, Olidort warns against treating Islamist

organizations as ideologically and politically static. In fact, in presence of a "fluid political environment" it is risky to rely too much on classifications such as that of Wictorovicz[11] and, in general, on fixed categories.

To explain the changes in behavior of Salafi groups, Olidort recurred to the insights provided by literature applying game theoretic principles to institutions. According to this approach, an institution is seen as "a system of human-made, nonphysical elements – norms, beliefs, organizations, and rules – exogeneous to each individual whose behavior it influences that generates behavioral regularities"(Greif and Laitin 2004). Therefore, in the case of Salafi organizations, the object of examination would be the "Salafi ideological principles of political engagement." Olidort sought to discover why and when Salafists violate their ideological principles by dealing with political institutions and becoming involved in the political process. Furthermore, he tried to clarify at what point such self-contradictory behavior transforms from an opportunistic exception to an established behavioral rule followed by the group.

According to the classic game-theoretic approach, changes in institutions occur solely in presence of exogeneous shocks, i.e. significant changes in the surrounding environment that deeply modify the calculations of an organization leading it to move from its current behavior (institution) toward a new one that has become more convenient. In the classic game-theoretic approach, an institution is thus to be considered an "equilibrium" i.e., the most convenient response to the surrounding environment and, more specifically, to the expected moves of the other actors operating in the same environment. For example, if an organization expects that any attempts to participate in

[11] Quintan Wictorowics (2006) provided a classification of Islamist group that has become mainstream among commentators and academics. He divides them between "purists" (who focus on preaching the correct Islamic-Salafi practices and consider impure any involvement in partisan politics or violent activities), the politicos (who justify peaceful involvement in politics to protect the true faith from foreign influence and corrupt elites), and the jihadis (who justify the use of violence in order to protect and expand the true faith with the final aim of establishing an Islamic State).

politics will be repressed, it will seek to develop institutions that preclude political participation. Analogously, in the moment in which the political environment starts allowing for an open participation and the prospects for gaining significant political power are concrete the same organization will start embracing new institutions and justifying participation.

However, such changes, although reasonable, are rarely automatic. In fact, an organization may attempt to employ a new institution – participation in politics – for a short time and then go back to its old institutions – such as the use of political violence or Salafi quietism. The new external changes that spark such retreats are not necessarily motivated by purely exogeneous factors. To explain how they can be generated, Olidort employed two interconnected concepts first developed by Grief and Laitin (2004): *quasi-parameters* and *institutional self-reinforcement*.

If we consider exogeneous conditions influencing an organization's decision-making as parameters, and its possible behaviors (institutions) as variables, the concept of quasi-parameters can be summarized as: those changes in the external environment – and therefore parametric since they occur outside the organization – that are caused by the institution (behavior) adopted by the organization. Thus, they are exogeneous in nature but endogenously generated. Because of that, they can lead to a reinforcement of the institution – generating changes in the exogenous parameters favorable to the survival of the institution – or to the progressive demise of the institution – generating changes in the exogeneous parameters that progressively render the institution no longer the best strategy. For example, following a significant modification in the surrounding political environment, a Salafi organization may decide to abandon its quietist approach for active participation in politics through the formation of a political party, because it calculates that the chances it will gather significant political power are favorable. However, the new institution – participation in politics – may cause the external support from sponsor countries,

that do not see Islamist involvement in politics positively, like for example Saudi Arabia, to cease. The end of external support may curb the development of an effective electoral machine and diminish the prospects of acquiring political power. Hence, the changes sparked by the new institution may lead to the recalculation of the parameters that led to its own introduction and result in its demise. In other cases, participation in politics may lead supporters of Islamist electoral participation that previously ignored the organization due to its quietism to join it. In this case, the quasi-parameters entailed by the new institution lead to its self-reinforcement.

Another example where this game-theory approach to institution can be applied is that of the Palestinian Hamas and its participation in electoral politics. In 2006, after years of widespread use of terrorist means, Hamas opted for the peaceful participation in the Palestinian Authority's elections when significant changes in the surrounding political environment allowed for it. The leadership justified their involvement through a religious argument, as they had done previously for their use of political violence. They explained their move by utilizing the Islamic concept of "Hudna" ("armistice", or "long-term truce")(Tuastad 2010). However, they were not able to carry out other fundamental changes required to fully join the political process, such as recognizing the state of Israel. When their victory at the elections was basically nullified by their intransigent opposition of Israel and other important international powers, they quickly reversed their new less extreme rhetoric, embracing once again political violence as their main means of confrontation (Dunning 2016). In this case, the new institution of peaceful political participation was not self-reinforcing.

In a different paper published in 2015, Olidort (2015) focused on the topic of individual radicalization. He criticized the still widespread approach employed by several anti-extremism

research programs focusing primarily on mental health and economic factors. In contrast, he utilized the game-theoretic concept of "focal points" introduced by Thomas Schelling in his book "*The Strategy of Conflict*"(1980). Focal points, in Schelling's theory, represent the endpoint of the rational process leading individuals or nations to reach agreements based on "anticipating what the other person or country might do". In the case of radicalization, Olidort points to the "*psychic moments*" – as defined by Schelling – leading a group of likeminded individuals to find in a terrorist organization such as IS and its ideology the rational best common option of engagement among many, including non-violent moderate ones. The same option is favored by several individuals due to their common "explicit and internally consistent value system" (Schelling 1980).

According to Olidort, for Salafists embracing violent jihad, that value system is Salafism. However, IS's propaganda strategy is not devised only to appeal to Salafists but also to attract people with varying kinds of values systems. He points to interviews of former IS foreign fighters conducted by the New York Times journalists Chams Eddine Zaougui and Pieter Van Oastaeyen (2014), which explored these recruits' motivations, namely, the reckless violence against civilians employed by the Assad regime. The journalists noted that "most started as idealists". Thus, different kinds of people came to see in IS the option of engagement most resonant with their values, and the one offering the best response to perceived injustices: IS became what Olidort defines as a "Schelling point of radicalization." What makes IS particularly effective in attracting recruits is its "ability to sell and validate its worldview" in front of potential recruits. It finds this ability in what Michael Bacharach calls a "frame" i.e., "the set of concepts or predicates an agent uses in thinking about the world"(Bacharach 2006, p. 10). The Islamic State sells a narrative portraying the Sunni world under siege and threaten by Shiite forces secretly supported by Western

powers. A narrative fed by the reckless repression against mainly Sunni protesters enacted by the Alawi Assad regime and its Shiite allies, and further validated by the West's failure to intervene despite the regime violating the 'red line' on the use of chemical weapons designated by then US President Barack Obama himself.

In Europe, this narrative finds confirmation in the status of marginalization witnessed by many communities of Muslim origins. In contrast, IS "offers the promise of a tranquil and authentic Islamic state, full of opportunity for those who accept it" through which a person can find spiritual and physical fulfillment. Paramount to the promotion of this narrative is to constantly demonstrate that, through the employment of tactics including violence and terrorism, IS can effectively provide these items. This is something that the Islamic State has managed to do for a considerable amount of time, through the dissemination of videos and testimonies showing the possibility of obtaining glory, wealth, and power, by joining its ranks, and following their version of a proper Islamic-Salafi lifestyle.

Through its propaganda machine, IS has always tried to portray itself as the winning side, even when militarily it started to decline. In sum, in the eyes of its recruits, IS managed to emerge as the most effective and credible option for fighting for a common cause. In other words, it became a Schelling point of radicalization, becoming more popular as more people gravitated towards it. As Schelling himself explains, "terrorism is contagiously suggestive and furthermore looks easier the more there is of it".

In the next part, I depart from Olidort's work to further develop the concept of focal points as it relates to individual radicalization. In particular, I analyze the dynamics that lead people to radicalize in a certain "direction" – right-wing extremism, left-wing extremism, jihadism etc. –

depending on their social environment and/or the historical period they live in.

Furthermore, I will seek to develop the concept of radicalization as a "game-theoretic coordination game".

2. Radicalization as a Coordination Effort

During the last decade, theories of radicalization have moved beyond the approach that sees terrorism as the result of altered mental statuses and irrational behaviors. New multidisciplinary approaches have framed violent radicalization within ordinary psychological dynamics such as the need for identity construction, identity confirmation, as well as the need for social acceptance and self-significance (Arena and Arrigo 2006; Kruglanski et al. 2009)

Literature from the fields of psychology and sociology points to the importance of reference groups in an individual's construction of self, behavioral schemes, and self-esteem. Social Identity Theory (SIT) (Hogg, Terry, and White 1995; Al Raffie 2013) and Quest for Significance Theory (QST) (Kruglanski et al. 2014; 2009) have highlighted the mechanisms leading individuals to seek confirmation of their role in society from their surrounding social environment. Failure to obtain these confirmations results in so-called "cognitive openings," which make individuals open to and seek out alternative worldviews and social support systems that would provide individuals with the desired sense of belonging. While most of the times this exploration is resolved within the ordinary boundaries of society, in some cases it can lead individuals to adopt worldviews and join new social environments promoting values counter to the status quo, which encourage and justify the use of political violence to achieve their goals.

Various dynamics have been identified as major factors pushing an individual toward such a scenario. Among them, three are particularly important: First, physical or virtual proximity to new

potential reference groups possessing an extreme ideology. Radicalization usually occurs in the presence of networks of previously radicalized individuals looking for new recruits; networks characterized by physical proximity have so far emerged as more effective than virtual ones. Second, the ability to understand the elements composing the extreme ideology and the cultural resonance of such elements with the pre-existing beliefs of the individual. Third, the chance, within this alternative social environment, to obtain enhanced self-esteem and significance coupled with a sufficient number of other individuals keen to confirm the new and improved role through interaction.

Although the presence of these factors is not in itself sufficient *per se* to guarantee that the individual will radicalize (or that ideological radicalization will lead to mobilization), their presence augments significantly the chances for it to occur. Other factors, however, can intervene in the process and thwart it, such as the persisting role of other reference groups of great importance to the individual (such as her family) which may impair her total acceptance of the new extreme ideology. Especially, if it entails participation in terrorist activities, or the high potential costs of the punishments imposed by society on the people engaging in political violence (or, in some country, for merely joining radical movements). These considerations are necessary to introduce the theoretical insights presented in this paper.

According to these approaches, radicalization constitutes one potential answer to the need for a socially recognized role in the society, therefore satisfying one's expectations. In a game-theoretic framework such a need may constitute the basic element of the utility function[12] characterizing the individual looking for alternative ideological frameworks and social interactions. This paper aims

[12] In economics, a utility function is a parametric function measuring the observable preferences of consumers in order to study and predict their choices. Economists include in the utility function all the factors that may influence such preferences, based on the observation of the consumers' behavior. Factors are usually preceded by parameters representing the weight of each factor in determining the consumers' preferences.

to provide insights to understand the dynamics of this utility function and present an explanation on why radicalization takes a path toward a certain ideology instead of another.

2.1. The "wave" concept

Historically, terrorism has taken different symbolic and ideological forms. The phenomenon of radicalization to violence has been a constant characteristic of human societies for centuries, although to different extents. Over different eras, it took the form of protests, revolutions, radical movements, and anti-systemic parties, and all these various forms have been shaped by different messages, slogans, and ideological backgrounds. In sixteenth-century Europe it materialized in peasant revolts across Germany based on the new religious precepts of Protestantism; in medieval northern Italy, the members of the Dolcinian heretical movement massacred civilians of the Sesia valley, an act ordered and religiously legitimated by their leader Fra Dolcino; after the end of the American Civil War (1865) the newly founded Klu Klux Klan spread terror among the black population of the former confederate states through murders, beatings, and organized lynching.

However, according to Rapoport (Rapoport 2001, 2013), author of the Four-Waves theory of terrorism, the first transnational wave of terrorism – the Anarchist wave – goes back to no more than 150 years ago, around the end of the 19° century, which saw, for the first time, the same ideological framework inspiring acts of terrorism in several different nations. Later, in the 20th Century, two more waves – the Anticolonial wave and the New Left wave – followed each other in shaping the strategies and the composition of most terrorist organizations. Rapoport identifies the beginning of the anticolonial wave in the decade that followed the end of the First World War, with the first rebellions against European colonialism in the name of the right to self-determination. The wave continued throughout the two decades following the end of the Second World War; anti-

colonial struggles were mostly successful, ending in the independence of most Asian and African territories previously under European domination. The New-Left wave has its origins in the Cold War and in the conflicts that opposed several governments aligned with the Western block against violent organizations inspired by various kinds of Marxist ideologies. This wave reached its peak at the end of the 1960s and started to decline in the 1970s, abating progressively until the end of the Cold War. Finally, the end of the 20th Century and the beginning of the 21st saw the growing predominance of the current Religious wave.

Rapoport defines a wave as a cycle of activities characterized by phases of expansion and contraction during a given period of time (Rapoport 2013). Activities that "occur in several countries (and) driven by a common predominant energy that shapes the participating groups' characteristics and mutual relationships". Kaplan (2008), introduces the concept of "*Zeitgeist"* to explain the particular features that each wave, and the organizations belonging to it, assume according to the historical period.

Every wave is composed by organizations, which usually arise and disappear within the life span of the same wave and "when a wave's energy cannot inspire new organizations, the wave disappears" (Rapoport 2013, 48). The few organizations surviving the wave in which they were originated usually decline slowly and/or start assuming some of the ideological features of the new wave. The life span of the first three waves lasted approximately one generation, a pattern that "calls one's attention on crucial political themes in the general culture – themes that distinguish the ethos of one generation from another" (Rapoport 2013, 48). During the second half of the 20th Century, leftism (socialist and communist ideologies in the various forms) provided the ideological foundations of several radical movements around the world, including nationalistic insurgency groups, like the IRA or the Basque ETA, as well as full-fledged terrorist organizations, like the

Italian Red Brigades or the German Baader-Meinhof gang. The ideologies exposed by the IRA, ETA, the Turkish PKK, and the Palestinian Black September were a blend of radical leftism and fervent nationalism. On the other hand, in Italy and Germany, the emergence of leftist radicalism was accompanied by the rise of neo-fascist movements. With the end of the Cold War and the fall of the Soviet Union, leftism lost its role as the main ideological reference for radical groups. The 21st century saw religious extremism, particularly Islamist extremism, becoming the main ideological framework cited in terrorist attacks carried out in the West and the Middle East.

In the Middle East and North Africa, the gradual substitution of leftism and nationalism with the radical Islamist ideology as pole of attraction for militant movements has followed the historical path described by Rapoport, although with some regional peculiarities.

Following the Second World War and the Decolonization Era, and since the beginning of the 1950s, the Arab world was ideologically monopolized by Pan-Arabism which spread through military coup d'états in Egypt, Iraq, Syria, Libya, and Yemen, and for two decades dominated the political scene of the entire region. Pan-Arabism in its various forms (such as Nasserism or Baathism) combined many of the New Left's political values with typical anticolonial-nationalist principles. During this period, most of the insurgent and radical groups operating in the Middle East (the Palestinian Fatah, Black September, and ANO, or the nationalist insurgent groups as the Algerian NLF, or the Kurdish PKK) claimed to fight for ideologies based on various degrees of radical leftist values mixed with nationalism.

After the Egyptian defeat in the 1967 Six-Day War against Israel and the death of Gamal Abd el-Nasser – the most important figure of the Pan-Arab movement – in the 1970s the ideology entered an irreversible decline culminating with the fall of the Soviet Union and

the end of the Cold War's bipolar order. Beginning in 1970, Islamism experienced a gradual rise and eventually became the focus for opposition and insurgency movements in the Arab and Muslim world. This new ideological wave, which started in the 1970s, with the resurgence of the Muslim Brotherhood on the Egyptian political scene following a decade of harsh repression, was further spurred by the 1979 Islamic Revolution in Iran. This event showed to the Muslim masses that Islam could become an effective mobilizing ideology.

For decades, to contrast the Iranian influence, Saudi Arabia and the Gulf monarchies invested billions of petrodollars in spreading their own form of Wahhabi Islamism throughout the Muslim world. The first major investment came with the massive support of the mujahidin fighting against the Soviets in Afghanistan (an invasion that, interestingly, also started in 1979). According to Rapoport, these two events – the 1979 Iranian Revolution and the Saudi-sponsored Islamic resistance against the Soviet invasion of Afghanistan – defined the decisive momentum for the formation of the Religious wave. Most of the theoretical framework of this new religious wave had been constructed in the previous decades, especially during the 40s and 50s which coincided with the emergence of the Muslim Brotherhood in several countries, and with the work of Islamist theorists such as Sayyd al-Qutb. Two decades later, new intellectuals, such as Abdallah al-Azzam, further developed the work of al-Qutb, creating the bases for the jihadi ideology as we know it today.

The new radical and insurgent groups that were formed since the 1970s in the region ignored the mostly laical Pan-Arab, socialist, or nationalist ideologies, instead embracing the new Islamist – or even sometimes jihadi – brands. Illustrating the fast move from Nationalism-Panarabism to the new Islamist wave are the personal experiences of some of the oldest Islamist leaders such as Ennahdha's charismatic guide Rachid Ghannouchi, who in his youth

embraced the Pan-Arab ideology before "converting" to Islamism. After the second half of the 1970s, Islamism consolidated its position as new center of attraction of opposition-politics in the region.

2.2. Rapoport's "waves" as a coordination game

So, why is it that, during certain periods of time, radical organizations established in numerous and often remarkably different countries, operate under similar banners and through similar ideological frameworks? And why do these frameworks change over time?

This section will attempt to answer these questions by adopting the perspective of individuals trying to coordinate in collective actions; more specifically, as a coordination problem inscribed in the framework of a game with multiple equilibria. Let us assume that radicalizing individuals want to coordinate their actions with others in order to join a group that is effective in providing them with an identity confirmation and enhanced self-esteem. To do so, such a group would have to be able to provide such individuals with a role that can magnify their self-esteem, and at the same time should be large enough so that the individual can find among the other members confirmation for her new identity-role.

In game theory, a coordination problem is represented by the attempt of two (or more) actors to carry out an action together, for example to meet in a certain place at a certain time without having the possibility to exchange information (for example, by texting each other) before. The most classic coordination game is the so-called "battle of the sexes." A wife and her husband have to choose between spending the evening at the ballet – the choice she prefers – or at the stadium – the choice he prefers. Despite their personal preferences, they both would like to spend the evening together instead of being apart. They do not have a phone or an internet connection so they cannot communicate in advance to decide on a meeting

place; they have a coordination problem with multiple, in this case two, Nash equilibria (the ballet and the stadium). If, for example, the husband knows that his wife will certainly go to the ballet, his "best strategy" will be to join her at the ballet. Analogously, the wife will prefer to join her husband at the stadium if she was certain he would choose to go there. The problem, in their case, is that no one knows exactly what the other is going to do since they are in a situation of imperfect information, and there is a risk they will end up in two different places, which would amount to the worst scenario for both.

But what does this kind of dynamic have to do with the trajectory of the radicalization process? According to Social Identity Theory (SIT) (Arena and Arrigo 2006; Hogg, Terry, and White 1995), individuals build (or re-build) their identity through social interactions, during which, the individual consolidates and obtains confirmation of her identity and status within a group. Therefore, for a new ideological framework to be beneficial to the individual, in terms of enhanced self-esteem, it cannot be adopted in a "social vacuum".

Instead, it needs the presence of numerous people who identify with the group and give each other mutual identity confirmation based on the categories and hierarchies included in the ideological framework. At the same time, these subjects will prefer to pick the framework that seems more effective; that, for example, seems successful in opposing the mainstream system through political action, protests, or maybe even violent attacks. Thus, an attractive group would be one that frightens its enemies and makes its members appear powerful. This dynamic can be explained through the search for self-esteem enhancement: it is easier to feel like a heroic warrior as a member of a successful and victorious armed group than by being part of a weak and outgunned one.

Therefore, the individual is presented with the market of the available ideological

frameworks circulating in her society. Among them, she is particularly exposed to those circulating among her reference groups and are more resonant with her personal background. In a collective-action framework, such different choices within the ideological market can be considered as the different possible equilibria of a game.

Given an individual's point of departure – i.e., the kind of ideals and ideological beliefs she used to embrace – an individual will probably be more inclined to prefer groups having certain values instead of others. If the individual has a religious background, she will probably be more inclined towards groups motivated by religious factors, while if she is used to more political self-categorizations (left-wing or right-wing), he may lean towards groups having a non-religious ideology. The findings of a study conducted by Dina Al Raffie (2013) on the influence of Islamist non-governmental organizations on the communities of second-generation immigrants, support the correlation between values and messages circulating in an individuals' "*social milieu*" (families and surrounding social environment) and the path of their potential future radicalization, namely, if individuals are used to an environment rampant with Islamist references, they are more likely to be attracted to an Islamist ideology. Although this kind of "ideological proximity" is part of the explanation, it does not completely account for the variety of possible ideological leanings. In fact, often people will join a group espousing a radical ideology they are unfamiliar with. For example, in Tunisia, many young people who joined radical groups such as Ansar al-Sharia – and who subsequently left Tunisia to join the Islamic State or Jabhat al-Nusra in Syria and Iraq – had no previous history of Islamist militancy or ideology. On the contrary, before joining violent Islamism, many of them lived liberal lifestyles, which included the use of alcohol and drugs. Furthermore, the explanation of "ideological proximity" does not fully account for the fact

that insurgency groups in various part of the world (and specifically of the MENA region) assume similar ideological stances depending on the historical period in which they operate (or operated) either. They might hold socialist and/or nationalist views during a certain time and Islamist or jihadi in the following years.

We should instead assume that radical ideologies are deeply linked to the mainstream cultural and ideological milieu – or *Zeitgeist* as defined by Kaplan – as much as they are to the social and cultural background of the individual. Finally, recent literature has highlighted the importance of the narrow social environment of the individual in determining her radicalization path (Williams, Horgan, and Evans 2016). If a group of friends, to which a person has strong emotional links, begins radicalizing to a certain ideology or join a radical group, she will probably do the same, irrespective of the specific ideological underpinnings of the new philosophy (Arnaboldi and Vidino 2015).

In order to better clarify these points and better comprehend the dynamics they embody; I will now introduce another game theory-specific concept which can be applied to social behavior: Thomas Schelling's focal points.

The theory of focal points has been utilized by Olidort to explain why people may decide to utilize violence instead of other means. In this paper, the concept is developed further, and focal points are used to explain why in a certain period of time people tend to radicalize toward one ideological framework instead of another.

Focal points were first developed by the American economist Thomas Schelling to solve games of coordination such as the "battle of the sexes" explored earlier. Schelling contributed by introducing the concept of shared culture and environment as possible instruments to solve similar problems. To test his theory, Schelling asked a group of people

to attempt to meet somewhere in New York city without being able to communicate with each other. In this situation, the possible "equilibria" (i.e., the places and the times in which people can meet) are potentially infinite. All 24 hours are available to set the meeting, and New York is a vast city with thousands of potential meeting points. Nevertheless, most participants decided to wait at New York's Central Station at noon. This curious example shows how common environment, history, and culture can influence the coordination between individuals in basic day-to-day situations. These factors can promote the creation of "focal points" (in this case the Central Station at noon) which, despite the presence of countless other possible "equilibria" (in this case, different places and different times to meet), emerge as the prevalent choice among the participants.

In the literature focusing on focal points, their definition and factors determining their formation within a group are left broad and nonexclusive on purpose. According to Myerson, "anything in a game's environment or history that focuses the players' attention on one equilibrium may lead them to expect it, and so rationally to play it" and, in this way, "this focal point effect opens the door for cultural and environmental factors to influence rational behavior" (Myerson 2009, 5).

The concept and the importance of "cultural and environmental factors" should be considered with caution. Exaggerating the influence of culture might lead to bizarre and counter-intuitive conclusions about the deterministic nature of its effects. Culture cannot fundamentally influence the whole of human behaviors. For example, human beings have always needed to eat food to survive; what culture has always deeply influenced throughout history is the kind of food they eat and the way it is prepared. Analogously, the need to attach some supernatural meaning to the surrounding reality and to maintain sophisticated social

interactions emerged as shared impulses of all humans, independently from their culture. Also in this case, what culture influences is how such needs have been declined.

In the literature of focal points, culture is not to be considered as the engine of decision-making and coordination. It is instead the means through which individuals in the same group enact coordination aimed at attaining a certain rational objective, such as the administration of the community's resources. In this regard, Schelling affirmed that "general public opinion may be the only standard for questions of morals because the fundamental basis of social morals is people's need to coordinate" (Myerson 2009, 6). Thus, culture might influence disposition towards certain choices, not the need to make those choices in the first place. In the end, what others will do – or what we expect others will do – becomes of paramount importance in determining individual decisions.

Through this assumption, ideological shifts can be interpreted by recurring to the characteristics of Schelling's focal points. In the moment in which a shift occurs from the mainstream ideology, its direction will be determined by the counter-ideology that the individual perceives as prevalent within her society, especially among her reference groups. In fact, while the Cold War rhetoric of socialism vs. capitalism had been prevalent in the previous decades, in several Middle Eastern countries during the 1970s, people were becoming increasingly exposed to rhetoric and propaganda associated with political Islam.

According to Rapoport, the key to understanding the shift from one terrorism wave to another is the perception of effectiveness of the ideology and of the methods employed by the organizations generated by the new wave. During the Iranian Revolution and later during the mujahidin's struggle in Afghanistan, Islamism proved remarkably effective. After comparing the initial Islamist victories in Iran and Afghanistan with the many defeats of the

leftist organizations of the region during the previous decades, it is not surprising that Islamism came to be considered as far more successful. Furthermore, these two events received widespread media coverage and were accompanied by a significant amount of propagandistic material. People had easy access to the new ideological framework, they could observe and hear about the actions of the people embracing it, including their victories and effectiveness, and could easily deduce that adhering to this new framework could lead to the acquisition of attention, respect and victory for their movement as well as themselves. Elaborating on the words of Olivier Roy, it is possible to briefly describe this period of Middle Eastern history as a "re-Islamization of Middle East's social radicalization" (Roy 2016).

The power of propaganda, media, and communication is striking for the formation of a new wave of terrorism and to make it a successful focal point. Particularly, the ability of organizations to adapt to the contemporary communication means effectively is a salient characteristic for their success.

Propaganda has been a central focus of jihadi movements since their inception. A deep analysis of the history of the jihadist ideology demonstrates how its adepts have continuously modified their military strategies mainly depending on their efficacy on a propagandistic level and the technological means available (Dacrema 2015). The reason for that is intuitive: penetrate the political and social discourse in order to spread and establish a precise view of the world that would lead to more support for the movement's agenda, and constantly updating the means of achieving this result to maintain the organization's competitive advantage in a congested ideological market.

As highlighted previously, in the language of focal points, it is possible to translate these concepts into the attempt to influence the cultural environment in order establish elements that focus the players' attention on one equilibrium that may lead them to expect it, and so rationally to play it. Ideological frameworks perceived as having widespread support and the ability to offer individuals a meaningful role will become more attractive for an increasing number of people.

In the context of a political confrontation, the propaganda activities of one opposition group, even a big one, are usually not sufficient to influence significant segments of the society, especially if its ideology has no strong links to the currently prevalent cultural mindset. In this respect, the development of the Italian Red Brigades in Italy during the 1970s and 1980s would not have been possible if the radical communist discourse had not been present in the national social and political life of the country (at the time, Italy had the biggest communist party in Western Europe and several minor leftist political formations). Equally, the success of the Islamic Group in Egypt would not have been possible if, in the preceding decade, the Islamist discourse had not made a significant comeback into the political and social life as a result of Sadat's policies and, later, of the influences of the (re)-Islamization campaigns propagating from the Gulf.

2.3. From Focal Points to Correlated Equilibria

The concept explored in the previous paragraph changes the environment of our multiple-equilibria game since in its standard formulation, it does not entail any "cultural" or "mediatic" influences. In fact, according to the definition of Nash equilibria, players choose to act or play independently from one another. However, this independence is incomplete if we assume that the players involved are simultaneously exposed to similar cultural symbols

and similar streams of information. By drawing from the same poll of knowledge, most of them will elaborate similar conclusions and similar behaviors, thus creating what Robert Aumann (1987) refers to as “correlated equilibria”.

Correlated equilibria does not mean that people do not retain their decisional independence but “even if everyone is forming beliefs and choosing their actions independently, just the fact that these beliefs and actions stem from publicly available information makes them statistically correlated” (Medina 2007). In the formulation elaborated by Medina (2007), correlated equilibria are to be considered probability distributions among the various possible Nash equilibria that determine which one will be more likely to be selected by the majority of the players.

To better clarify this concept, we recur once again to the “Battle of Sexes”. By enriching its narrative with a cultural and social background we can better determine how the wife and the husband will coordinate easily, without direct communication. For example, if they both know that most of their friends do not like football but are inclined to attend the ballet, it is more likely that they will both end up meeting at the ballet. The fact that their close social environment is more “ballet-oriented” makes the ballet a stronger focal point, and therefore a more likely equilibrium than the football game.

Similarly, an individual could radicalize in many different ways, independently of her temporal and geographical collocation. It would be equally plausible for him to become an extremist leftist, rightist, a Christian fundamentalist, or a jihadist militant; in other words, they are all possible “equilibria”. But once we add cultural and environmental elements to the mix of personal background and current ideological dynamics found in her society (which ideological frameworks are more in vogue at the moment), it is possible to infer

which equilibrium is more likely to be chosen.

For example, due to the new policy of economic openness inaugurated by Sadat and the return of many enriched emigrants from the Gulf countries to Egypt, during the 1970s and the 1980s, the southern Egyptian region of Said went through significant socioeconomic changes, which created new classes, "winners" and "losers" (Fandy 1994). In that context, Islamism was the main ideological framework in which this struggle could occur. On the one hand, this was due to contingent reasons, such as the ferocious repression carried out by Sadat against leftist movements and the openness that he granted to Islamist organizations, such as the Muslim Brotherhood to spread their worldview in Egyptian universities. Furthermore, many of the Saidi emigrants had been indoctrinated by Wahhabi preachers during their stay in Saudi Arabia or the UAE. On the other hand, much of the traditional socioeconomic structure of the Said – which many of the "new rich" wanted to change – was permeated by Islamic symbolism. The presence of both contingent and cultural elements led part of the society to radicalize to an Islamist ideology, leading to the creation of the Islamic Group, which would be responsible for the gravest terrorist wave in Egypt between the 1980s and 1990s.

As for today, the "jihadi phenomenon" has transformed into a media magnet which have rendered it a formidable pole of attraction of the public discourse. In this kind of narrative, the meaning of Islam as a religion overlaps often with that of Islam as a culture. Islam is often described as being at odds not only with Christianity, but with the broader "Western culture" entailing a broad range of laical values. Even within Muslim communities, the discourse often polarizes around opponents and supporters (at various degrees) of more radical Islamist discourses opposing Western values and lifestyles, with which the

community members have to deal. By attracting and polarizing the public debate, political Islam and its jihadi degenerations often obstruct the introduction of other kinds of social classifications (and self-classifications) such as those based on nationality, social class, labor and rights, and so on.

Finally, media outlets play a fundamental role in this regard. The constant presence of a religion-linked (especially Islam-linked) narrative into the media divulgation strengthens and amplifies the presence of such elements in a society's discourse. In order to capitalize on this trend, radical groups such as the Islamic State have developed media strategies on which they often spend as many resources and efforts as they do for their military actions. Even their military strategy is often designed in order to attract as much media attention as possible. Their leadership understood that their success in attracting recruits and competing against other organizations (i.e., to become a successful focal point) is often more measured against their capacity to conquer the headlines of news outlets around the world than with actual military success.

2.4. Predicting the wave

The concept of terrorism waves is useful to analyze and anticipate the macro-dynamics of this phenomenon. Furthermore, looking at terrorism through a game-theoretic lens can allow for a clear perception of the relevant psychological factors which might affect radicalization, and the role played by current trends within a society's ideological market. This last element is fundamental since there is no utility function measuring the benefits for undertaking an alternative ideological path if there is no alternative ideological path. Simply put, without the presence of multiple options, there is no decision game. Through this approach, as in a utility function, all these factors can be isolated and, to a certain extent, weighted in order to understand and predict the dynamics of

radicalization.

For a wave to develop, its ideological framework must resonate with the current *zeitgeist*. The Anarchist wave of terrorism emerged after decades of civil turmoil and the spread of new radical ideas. Such ideas were not immediately translated into terrorism; in most cases, such means developed slowly and were employed by the minority of those sympathetic to anarchist ideas. Analogously, the New Left wave emerged following the spread of the communist ideology between the end of the 19th and the beginning of the 20th centuries. Communism as an ideology took several different organized forms – legal or clandestine movements, political parties, worker unions, etc. – before, in some countries, also developing into a violent political movement.

Political Islam followed a similar parabola, developing as political ideology during the first half of the 20° century – with the formation of the Muslim Brotherhood in Egypt and in other Muslim countries. Only later did Islamism provide the ideological framework for several terrorist organizations, from the local Algeria GIA and Egyptian Al-Gamaa' al-Islamiyya in the 1980s and 1990s, to the modern global networks of Al-Qaeda and the Islamic State.

In all these cases, the ideological framework in which these waves of terrorism developed had transformed into focal points attracting the interest of millions of non-violent individuals long before becoming the ideological framework for terrorist activities. Furthermore, these waves of terrorism did not encompass the entirety of the organizations founded on these ideological frameworks. Non-violent leftist movements and parties constituted the majority, even at the peak of the New Left wave. Similarly, a consistent part of Islamist movements do not engage in, or have ceased to utilize, political violence.

Thus, a terrorist wave is usually the byproduct of the main ideological currents dominating a certain period, whose symbols and ideas are widespread among people; such symbols and ideas help people coordinate around common ideological frameworks, a dynamic well captured by the concept of correlated equilibria. The usual length of a terrorism wave, as measured by Rapoport, reflects the ideological changes that often occur between generations and the cultural influences that each generation is collectively subject to.

One important difference between the current Religious wave and, for example, the New Left wave is that in the latter case, the terrorist wave never outdid, in terms of visibility at the global level, the other leftist organizations that chose to remain peaceful. This was due to the presence of a prominent "leading power" – the Soviet Union – that managed, to a certain extent, to centralize, regulate, and coordinate most of the communist movements and parties around the world. It was also due, however, to the specific features of the media landscape at the time, which allowed for high degrees of media centralization in the hands of governments and limited independent communication channels, particularly for radical groups.

On the contrary, especially in the last two decades, the visibility of Islamist-inspired terrorist organizations has largely outdone that of non-violent Islamist ones. This has been certainly due to the lack of a centralized organization, or the presence of only weak ones, such as the International Muslim Brotherhood, not fully supported by any significant international power. But a fundamental role has also been played by the altered nature of the modern media landscape, which is much more pervasive, fragmented, keen to spectacularizing, and much less controlled and controllable by governments than in previous years. The presence of and the meticulous use of modern technological tools, such as social media, has provided jihadists access to a broader and geographically diverse audience. This helped transform the religious and, more specifically, the

jihadi wave into a more visible focal point than the traditional Islamist landscape from which it departed.

The analysis of such dynamics is important to understand the potential trajectories of the global ideological landscape, particularly in relation to the possible future forms political violence may take. In this regard, the concept of terrorism waves is useful to maintain a wide focus on the macro-dynamics involved in the spread of potentially violent ideologies, by looking beyond those currently dominating the scene. In fact, the wave approach helps remember that – beyond its specific ideological and operational features – the macro-dynamics involved in the current wave are essentially similar to the past waves. This paper has provided two game-theoretic concepts – focal points and correlated equilibria – that can enhance our understanding of such dynamics as well as their current and potential development. The next section explores how these and other concepts borrowed from the literature of game theory and rational theory can be used to better isolate such common macro-dynamics within rather different contexts such as the jihadi scene in Tunisia and in the United States.

3. Jihadi radicalization in the United States and Tunisia: Differences and common macro-dynamics

Conjugating Rapoport's waves of terrorism with the insights of game theory, this paper provides additional tools to understand the long-term dynamics of radicalization. In this section, these insights are applied to two significantly different case studies, the United States and Tunisia, with the intent to highlight the common macro-dynamics.

Four main elements emerged in the previous sections, which characterize the dynamics of radicalization regardless of the specific features of the analyzed cases:

- *The presence of clusters:* radicalization rarely occurs in a vacuum. Individuals are often involved in social networks which can provide them with information concerning the new ideology and with a sense of empowered identity and responsibility as part of the new social group. In recent years, the role of social interactions occurring online has become increasingly important. However, empirical evidence demonstrates that physical interactions among members of a network are still crucial (Arnaboldi and Vidino 2015), and, in most cases, the internet retains a complementary role.
- *The effectiveness of the cluster in attracting new recruits is proportional to its size*: the more people adhering to a radical ideology surround an individual, the more attractive and legitimate the ideology can appear to the him/her i.e., the more it will constitute a focal point within a certain social environment.
- *The size of a cluster and, therefore, its effectiveness depend on a variety of factors*: among them, this paper has highlighted three main ones:
    - Cultural resonance: the closer an ideological framework is to an individual's preexisting

social schemes and personal beliefs, the more it will resonate with that individual.

  - The presence of a significant number of people experiencing at various degrees a cognitive opening. This occurs especially when many people belonging to similar social environments fail to match their life expectations. For example, economic crises, refugee crises, and conflicts can determine the presence of big numbers of such individuals concentrated in a relatively small geographical space.
  - The presence of competing ideologies that may constitute more effective focal points.

- *The duration and influence of a wave of international terrorism depends on the effectiveness of the organizations belonging to it in achieving their targets, and in the ability to project a coherent picture to the target audience*: however, according to Rapoport, until now no wave has exceeded the duration of one generation (40 years). Waves of terrorism rise and fall with changes in the historical *zeitgeist* and usually emerge long after those changes have already begun. Therefore, it may be possible to infer some of the features of the next wave by observing the current changes occurring in the international socio-cultural landscape.

In the following section, I will analyze the main patterns characterizing jihadi radicalization in the US and in Tunisia in the last decade, highlighting the existence of the aforementioned macro-dynamics despite the presence of major differences between the two countries. Exemplary cases of specific local clusters and radicalized individuals are considered in order to better isolate such macro-dynamics from the peculiarities of the local environments.

3.1. The Islamic State in America

According to the Program on Extremism of the George Washington University, in June 2017 the people that had been charged of IS-related crimes in the US were 131, while the FBI estimates 250

are the people who left the country to join IS in Syria or Iraq.

Compared to the numbers of other Western and non-Western countries, IS-related illegal activity in America is relatively limited. In fact, the numbers of foreign fighters exhibited by European countries such as France (1700), Belgium (470), or the UK (760) (Vidino et al. 2017), or non-European countries such as Tunisia (2900), and Jordan (3000) (Zelin and Walles 2018; Speckhard 2017) make the US scene appear relatively negligible. Nonetheless, in terms of homegrown mobilization, the number of new recruits and supporters recorded since the inception of IS are unprecedented in the history of American jihadism.

Though there is no discernable profile of the American IS recruit, with individuals differing widely in terms of race, age, level of education or socioeconomic class, it is possible to identify some common features. The majority of them are American citizens or legal residents under the age of 30 (the average age is 27), and 89% of them are men. When the available information allows for a detailed analysis of their radicalization process, most of them tend to emerge as "disenfranchised individuals seeking ideological, religious, and personal fulfillment" (Rasmussen 2015, 2). Such trends are recognizable in most of the available profiles of US recruits. Sometimes they are made explicit in the words of some American IS supporters, posted on Facebook, Twitter, or other social media. For example, in 2014, in a video posted on the internet, the 22-year-old Floridian Moner Abu Salha affirmed that "I lived in America, I know how it is. You have all the fancy amusement parks and the restaurants and the food and all this crap and the cars. You think you're happy. You're not happy. You're never happy. I was never happy. I was always sad and depressed. Life sucked." A similar seek for self-significance and social confirmation emerges from the story of "Alex", a 23-year-old woman from rural Washington. Alex lived with her grandparents after her mother lost

custody of her due to problems with drug addiction. Alex herself had gone through alcoholism and after dropping out from college gained 300 dollars per month babysitting and teaching a Sunday school for children. Isolated in her grandparents' house "in the middle of nowhere", as she described it, she looked for a way out from a life that "had mostly seemed like a blurred series of babysitting shifts and weekends roaming the mall" (Callimachi 2015).

This need for significance and the search for a new social role materialize differently from case to case. It can be the result of socioeconomic marginalization or family issues, and this this diversity does not allow for the construction of one unique profile. However, one common characteristic emerging is a status of psychologic vulnerability.

Similar frustration and search for significance emerge in many other cases of radicalized young Americans. Such feelings may be the cause of the cognitive openings that led several individuals to be susceptible to new radical ideological frameworks. Nonetheless, in the US context, most of the circumstances causing such openings tend to appear very specific to each individual, or to a restricted group of individuals, not allowing the identification of large basins of recruitment characterized by similar social features. Even when radicalized individuals lived in deprived social environments, such as economically marginalized urban or countryside areas, only in limited cases their clusters of radicalization ramified throughout their communities. The reason for the limited appeal of jihadi radicalization to large numbers of people are several. First, the capillary control exerted by US domestic security apparatuses, which since 2001 dismantled most of the recruiting networks in the country. Nowadays, in the US there are no equivalents of organizations such as Sharia4Belgium or Sharia4Germany, which proved crucial to dramatically increase the numbers of jihadi recruits in Europe.

A second reason is the relatively better integration of Muslim communities in the US, especially from a socioeconomic perspective. Contrary to what happens in most European countries, data on American Muslims show an above-the-average income and averagely successful career patterns. This may diminish indirectly the permeability of these communities to extremist propaganda by reducing the number of people who may potentially incur in feelings of disenfranchisement. This may explain why traditional Muslim communities and second-generation Muslims, which in Europe represent the bulk of IS recruits, in the US are underrepresented in comparison to converts[13]. In fact, converts represent 40% of American foreign fighters, while in Europe they constitute only between 6% and 23%, depending on the country considered.

Finally, in the last decade jihadi radicalization in the US saw the growing competition of other kinds of preexisting local radical ideologies such as White Supremacism and the Alt-right, which attracted individuals especially among disenfranchised white communities. Given the importance of converts in the American jihadi context, this competition may have deprived American jihadism of an important basin of potential recruitment. The advantage of these local radical ideologies within these basins is clear, stemming from higher level of resonance that they retain with the widespread preexisting beliefs and feelings of disenfranchised American white communities.

The result of these contextual factors are clusters that usually do not reach 10 members. Bigger groups of radicalized individuals only formed when they managed to extend, although limitedly, to traditional Muslim communities. This is what happened, for example, in Minneapolis, where "nearly two dozen individuals" (Vidino and Hughes 2015, 26) young individuals of Somalian origins left the US to join ISIS in Syria and Iraq (or Al-Shabab in Somalia) or financially supported

[13] Subjects who converted to Islam without having any previous Muslim background.

IS fighters from the US. Most of these subjects frequented the same schools and grew up in the same quartier, a marginalized suburb. It is indicative, however, that their jihadi ideology did not spread beyond their relatively narrow circuit of friends.

Another example is represented by a few members of a Bosnian Muslim community in St. Louis, who either left to fight alongside IS in Syria and Iraq or supported those fighting from the US sending money and materials. Also in this case, however, those who were attracted by the jihadi ideology were only a tiny minority of the 75.000 strong community of Bosnian origin living in St. Louis (Vidino and Hughes 2015).

Among those who left St. Louis to join IS there is Abdullah Ramo Pazara, who traveled to Syria in 2013, shortly after obtaining the US citizenship, became a deputy of Omar al-Shishani, a top IS commander, and led a unit of fighters of Balkan origins. His story is interesting because it represents the macro-dynamics of radicalization is a particularly clear way. Born in a Muslim family in the small Bosnian-Muslim village of Gomjenica, in the socialist republic of Bosnia and Herzegovina, as a teenager Pazara witnessed the outbreak of the war that led to the dissolution of Jugoslavia. Pazara's village was occupied by the ethnic-Serb paramilitary force Vojska Republika Srpska (VRS) and all Muslim residents were asked to swear allegiance and relinquish their weapons. A few complied but most refused, and in the following months VRS initiated a campaign to subjugate and ethnic-cleanse all Muslim villages in the area engaging in mass killing and raping. According to multiple sources, Pazara not only swore allegiance to VRS but even joined them in their military operations against his fellow Serbian Muslims. The reasons for him doing so are not clear. Since most Muslim residents of his village managed not to give allegiance and to flee the area it is unlikely that he was somehow singled out and compelled to do so. Probably, betting on

the victory of the Serbs, the young Pazara thought that aligning with them would have favored his rise in the future post-conflict social hierarchy of the region. However, if this was the reason, it proved wrong soon after the end of the conflict. In 1995, Pazara and his father were banished along with the rest of Bosnian Muslims previously residing in the area and, like many others, decided to emigrate to the United States. Once in America, Pazara attempted once again to rise socially by starting his own trucking company with his wife in 2004. A survivor of a bloody civil war, immigrated to the US, who starts his own business represents the paradigm of the American dream. However, the dream was shortly-lived. In 2008 Pazara filed the bankruptcy of his company and forfeited most of his property to cover for the debts, including his house. Earlier, in 2007, he had filed the divorce from his wife. Short after these personal setbacks, Pazara moved to Utica to live with his family, where he meets Nihad Rosic, a friend of his brother. Their relationship strengthened quickly and with Rosic Pazara approached radical Islamism. Few years after his adhesion to the new ideology, in 2013 he traveled to Syria where he finally achieves his social rise becoming a commander in the organization, directly subordinate to one of its most powerful leaders. He died in September 2014, during the battle for Kobane.

The story of Pazara is meaningful because it shows how the seek for social rise, failures, and fast changing circumstances can lead a person to embark in significantly different undertakings and embrace completely different ideological frameworks; it shows how the ideological market changes radically with changing circumstances and social surroundings. Pazara appears to have first attempted to socially rise by helping slaughter fellow Muslims and died as a commander of one of the most effective organizations in the history of jihadi Islamism.

In sum, the US jihadist scene since the inception of IS has seen the presence of small-size clusters

of radicalization, scarcely ramified within local Muslim communities and particularly effective in radicalizing previously non-Muslim subjects. This particular configuration is due to specific features of the American scene, in which traditional Muslim communities are averagely integrated and socioeconomically well-off, especially in comparison to their European counterparts, and in which other local sources of radicalization compete in attracting recruits. Jihadism as a focal point has been significantly less effective in America than elsewhere; however, the powerful mediatic means employed by IS since its inception have proved more effective in attracting attention and recruits in the US than any previous jihadi organizations.

3.2. Jihadism in Tunisia after the 2011 Revolution

Since 2011, from 3000 to 5000 young individuals have left Tunisia to join jihadi combatant groups, especially in Syria and Iraq. Tunisia has been among the biggest contributors of IS foreign fighters and, with a total population of 11.5 million, shows the highest rate of foreign fighters per capita. Radicalization, especially among the youth, has become a serious issue for the long-term stability of the country. Since 2013 jihadist terrorists have been responsible of several bloody attacks in the country, resulting in a dramatic increase of domestic social tensions and in serious damages for the national economy, especially the tourism sector. With the progressive capitulation of the main IS strongholds in the Levant and in Libya, Tunisian authorities are now increasingly concerned by the hundreds of Tunisian fighters who began coming back to their country, who may soon exacerbate the long-term risks for the country's security.

Some of the main reasons for the current radicalization problem in Tunisia must be tracked back to the recent history of the country. The repression campaigns against Islamists carried out by the Ben Ali regime in the 1980s and 1990s damaged all kinds of organizations not aligning with the

official religion debate sanctioned by the state (Wolf 2017; Cavatorta and Merone 2013), regardless to their attitude toward violence or democracy. Especially the moderate organization Ennahdha, that for decades had been the main reference for Islamists in the country due to the wave of harsh repression and arrests was forced to withdraw its presence from numerous areas and most of its leadership was arrested or exiled. This left a de-facto religious vacuum that, in the right circumstances, could be exploited by other kinds of organizations, including more violent ones.

Such circumstances concretized in 2011, when in few days a country-wide mobilization brought Ben-Ali's 24-year-long rule to an end. The following period of transition to a new democratic system was characterized, especially during the first two years, by institutional chaos and security disruptions (Cavatorta 2015). Many areas of the country were left without centralized monitoring, including several marginalized quartiers of the capital's urban area. In some of them, such as the quartier of Dwar Hicher in Tounis, the police and security forces withdrawn for entire months, essentially leaving the population free to exert autonomous self-government. At the political level, despite the liberalization of the political scene, no new party was able to establish its presence in the most marginalized urban areas and in the poorer governorates of the south. Since the independence and during the autocratic presidencies of Najib Bourghiba and Ben Ali, all the national political scene had been strongly centralized in Tounis and the coastal area. None among the few authorized political parties had been able (or had found convenient) to establish a presence in the more neglected and impoverished areas of the country. The only movement that used to have ties to these areas was the Islamist Ennahdha, whose leaders hailed, in most part, from the southern regions. Its presence, however, had been greatly weakened by the regime's repression.

In sum, after being mostly subject to securitarian policies during the dictatorship, in the new, liberalizing political climate several deprived regions of the country did not have any solid

ideological reference. This became immediately evident with the low turnout of the first elections in several regions of the interior or in the marginalized quartiers of Tounis. In these places, the newly acquired freedom to finally develop local demands and political expression was not matched by any attempt to cooptation by any of the newly formed political parties.

A second factor that rendered some urban areas and southern regions particularly vulnerable to be exploited by new, radical groups is linked to the expectations created among some communities by the revolution. In fact, the revolt started in the regions of the interiors and gradually expanded to the coast, primarily to the deprived marginalized neighborhoods of the capitals. The inhabitants of these areas sustained the heaviest toll in terms of deaths and wounds during the clashes against the regime's security forces. Many of them felt like they had been the real protagonists of the revolution and their expectations for the future increased dramatically after the departure of Ben Ali. Due to the failure to establish ties to the post-revolutionary order, gradually these high expectations were substituted by widespread frustration. A widespread sense of "betrayal" became diffused in these areas along with a new disappointed narrative: the protagonists of the revolution had been left behind once again in favor of the costal elites, long-time complicit of the autocratic regime (Dacrema 2014).

This particularly vulnerable context was ready to be exploited by new, more radical forces. Before 2011 the success of the jihadi propaganda in Tunisia had been limited. Only a few hundred Tunisians had left their country to join the global jihad in Afghanistan, Chechnya, Bosnia, etc. However, a few of them had been able to establish an efficient system of recruitment and propaganda within Tunisia that was still reasonably functioning in the aftermath of the 2011 revolution. Even more importantly, in the years following the fall of Ben Ali jihadi organizations such as Jabhat al-Nusra and IS started to occupy the headlines of the world media, attracting the

world's attention and creating connections with and propaganda products for Muslim communities and Islamist organizations all around the world, including the groups operating in the Maghreb.

In sum, different factors such as high expectations, newly liberalized political space, religious and political vacuum, and increasing visibility of international jihadi Islamism as a credible and effective revolutionary force, all worked together to transform some areas of Tunisia in large clusters of jihadi recruitment. Areas such as Bengardene, Kessrine, Sid Bouzaid, Bizerte and the Tunis neighborhoods such as Dwar Hicher and Al-Tadhamoun account for almost 90% percent of Tunisian foreign fighters. Most of these areas have been historically neglected both politically and economically. Their populations rank at the lowest positions of country's regional economic indexes. However, it is important to notice that not all marginalized regions of the country have seen such a dramatic increase of jihadi recruitment. Governorates such as Tozeur and Kebili, which also rank low in the socioeconomic and development indexes, have seen the formation of small or no cluster of jihadi recruitment. This is because not all of the aforementioned factors have been at work in all these areas. Furthermore, although limitedly, Tunisian foreign fighters also hailed from affluent areas such as the center of Tounis and privileged neighbors such as La Marsa.

In some areas such as the Tounis neighborhoods of Dwar Hicher and al-Tadhamoun, or the border city of Ben Gardene, the high expectations for empowerment and social rise sparked by the revolution were frustrated by the limited capacity of the new democratic regime to answer the demands of these areas and provide them with function representation. In recently conducted surveys many young people hailing from these areas express their frustration especially for their inability find a stable job allowing them to marry and form a family on their own. In many southern

Mediterranean societies, marriage is socially considered the moment marking the official access of an individual to adulthood (Dhillon and Yousef 2011). According to widespread social rules, marriage requires, especially from the man, the presence of a stable source of income to provide for the needs of the future family and the capability to acquire a house. As many young men in several other MENA countries, in the last two decades young Tunisians have increasingly struggled to comply with these traditional requirements, due to the radical transformations occurred in the job and real estate markets. In fact, dramatic increases in real estate prices have been coupled with the transformation of the job market, previously dominated by stable public jobs, and nowadays more and more characterized by unstable and underpaid jobs in the private sector. The increasing impossibility to match social expectations, to leave the family, and to be regarded as an adult have emerged as the main source of youth frustration in most MENA countries (Dhillon and Yousef 2011). Research conducted on the field have highlighted how the same kind of grievances have been pointed to by young jihadi recruits to explain their initial interest in the jihadi ideology. In response to these widespread grievances coupled with the high expectations initially sparked by the revolution, in most of these areas no new political party was able to provide credible answers and representation, due to the inability to establish a stable presence.

Gradually, Salafi preachers managed to establish themselves as credible interprets of the local grievances. Many young people were attracted by their set of revolutionary ideas that appeared able to satisfy their expectations after the revolution had failed to do so (Merone 2015; Dacrema 2014). In a short time, Salafism – so far still mostly "quietist" – became a source of legitimacy in areas where many inhabitants perceived the current political system as a corrupt continuation of the previous one. In Dwar Hicher, where the police had withdrawn for months after the riots that followed the departure of Ben Ali, local youth gangs, previously engaged mostly in petty crimes,

started to take control of the streets wearing Salafi-style cloths and checking on the correct application of Sharia rules on dress code. Adhering to Salafism gave them the legitimacy, in the eyes of local inhabitants, to obtain empowerment in absence of any state power representation. They began dominating the neighborhood collaborating closely with the new young preachers that had started operating in the local mosques after expelling the regime-appointed imams: for the young people of this area, Salafism had become the new trend to follow to be regarded with respect. On the minaret of the Al-Nour mosque, the biggest mosque of Dwar Hicher, for months waved the black flag of Ansar Al-Sharia, the new national Salafi movement founded by the Tunisian veteran of jihad in Afghanistan and Bosnia Seifallah Ben Hassine (aka Abou Ayaad).

Since its inception, Ansar al-Sharia maintained an ambiguous relationship with the newly established democratic regime, and especially with the moderate Islamists of Ennahdha. While, on one side, its leaders, especially Abou Ayaad, declared Tunisia "a land for preaching" and not for jihad, where the use of violent means was not legitimate, on the other, they openly supported and encouraged violent jihad in other countries such as Syria and Iraq. Furthermore, Ansar al-Sharia activists participated in several political demonstrations (for example, against a Tunis cinema projecting a movie considered "blaspheme" in 2012) that often transformed into violent mobs. However, when asked, leaders and prominent activists were always vocal in distancing the movement from any violent act. Many of them admittedly wanted to avoid confrontation with the state and keep on enjoying the climate of unprecedented political freedom created by the revolution. However, tensions reached the breaking point following the assassinations of two prominent secular political leaders in 2013, for which Salafi militants were immediately accused. The Ennahdha-dominated government, under dramatic pressure from the other political forces and the public opinion, declared Ansar al-Sharia illegal in June 2013. The weak structure of the

organization, loosely organized in a decentralized hierarchy, could not withstand the heavy crackdown carried out by the state security forces in the following months. It is in this period that most of its members, who lost any hope to carry on their activities at home, began leaving the country to join the jihad abroad, especially in Syria, Iraq and Libya. Many previous members of Ansar al-Sharia's hierarchy fled to Algeria and Libya where they maintained active links with Tunisia. mostly for recruiting activities, mainly in the areas where the organization had been particularly strong.

Since then, radicalization in Tunisia has been characterized by the presence of several major clusters in the areas where the Salafi phenomenon had been prominent until the 2013 crackdown. Areas such as Dwar Hicher and Al-Tadhamoun, Ben Gardene, Kassrine and Bizerte have provided the majority of Tunisian foreign fighters. In these areas, young people joining jihad abroad are usually from the same social circuits, streets, quartiers and schools. In a neighborhood such as Dwar Hicher it is hardly possible to find a person who does not know at least one individual who left to join jihad in Syria.

Hence, the Tunisian case differs from the American one for the presence of clusters composed by tens, even hundreds of individuals. This is due to the presence of specific local contingencies that made some areas particularly vulnerable to the spread of radical Islamist ideas: a mix of old socioeconomic grievances, new frustrated expectations sparked by the 2011 revolution, the inability of the new democratic political forces to provide viable alternative ideological frameworks, and the simultaneous rise in mediatic prominence of radical Islamism as an effective and credible revolutionary force. The new free democratic institutions of the country – Tunisia was

the first Arab country to be classified "free" by Freedom House – did not allow for the same level of surveillance and repression of the previous autocratic rule, allowing more freedom of movement and association to any kind of new social movements, including radical ones. As pointed out by George Packer of The Newyorker in a long reportage on Dwar Hicher "Democracy didn't turn Tunisian youths into jihadis, but it gave them freedom to act on their unhappiness".

However, in other areas of the country less subject to these factors, such as the Tunis city center or the medium-high class coastal neighborhood of La Marsa, the patterns of radicalization resemble more those observed in the US: clusters usually not surpassing 4-5 members, prominent role of the internet, and radicalization patterns mostly occurring in isolation from the surrounding social environment. In La Marsa, a small cluster of young people between their teens and their early twenties, all from the same high school, captured the attention of public media. In 2014 Henda Saidi, a 21-year-old resident of La Marsa, was killed when Tunisian police stormed a house in the capital that a small jihadi cell had used for its operations (Gall 2014). Henda was the third person from her La Marsa high school who died either in confrontations with Tunisian security forces or fighting for IS in Syria. Her story reminds those of several American subjects, such as that of "Alex". For one year and half she had started to spend longer hours than before in her room, reading and chatting on her computer; she abandoned jeans and makeup and began covering in full black and wearing gloves. But contrary to "Alex", who could not have any contact in person with her interlocutors, Henda devised a way to leave her house to meet likeminded people without letting her parents know.

Henda's story is one of the few for which some more details are available, due to the New York Times coverage it received. The Tunisian government has kept the numerous investigations on radicalized youths mostly secret. In another rare reportage by The Middle East Eye, another young

boy from the same La Marsa high school was described as introverted and very insecure, isolated from the rest of his social surrounding (Bendermel 2015).

Although in Tunisia it is not possible to talk properly about "converts", since Sunni Islam is officially the religion of the entire population – apart for a tiny minority of Christians – it is important to notice that many individuals who have embraced radical Islamism in the last years, especially in the more affluent areas such as La Marsa, come from mostly secularized families. Knowledge of the basic symbols and messages of the Islamic religion has played certainty a prominent role in making the jihadi message more culturally resonant among the Tunisian society than in the American one. However, although it has not been possible to obtain precise data on this issue, it appears that a considerable – if not majoritarian – part of radicalized Tunisians has only a very basic knowledge of Islam. A story that exemplifies this concept is that of "Mounir" (the real name has been changed to protect the real identity of the subject), lower-middle class man in his twenties from Bizerte. Hailing from a secular family and social environment with little religious education, during his teens and first twenties he used to shave, drink beer, and look for girls in night clubs. His situation started to change while approaching his mid-twenties and his entry in the job market. He began complaining about the impossibility to find a stable job, marry, and become a man. "*Rajuliyya*" (manhood), is a word he often repeated to explain the source of his frustration toward society. Around 2012, together with a few of his friends from school, he started to grow his beard, spend time at the mosque, and wear the typical jihadi robe. He soon loosened ties with his secular friends and his family; especially with his sister, who he accused to be too independent and to have too many male friends. His main social circuit became the local Salafi scene, particularly active in Bizerte. For almost a year he was a local Salafi leader in his neighborhood, he was paid for his preaching, and became particularly popular among local girls. When the state's crackdown

on Ansar al-Sharia and the other radical Islamist groups started in 2013, some of his comrades decided to flee the country to Libya, or to join IS in Syria. Instead, Mounir was convinced by his family to hide in their house and stop wearing Salafi symbols. By so doing, despite his militant past, he avoided troubles with the authorities. However, four years later he has not yet been able to find a stable job and start a family; a condition that makes Mounir, as thousands of others in Tunisia, still extremely vulnerable to be lured into radicalization.

3.3. Similar but not quite the same: macro-dynamics and local factors

Beyond the significant contextual differences characterizing the Tunisian and the American scenes, it is possible to identify some important common dynamics: the presence of clusters, the importance of the internet and the mediatic scene, and the ability of a radical ideological framework to attract adepts depending on the resonance of its ideology within the local culture and the presence of competing ideologies. In both cases, we observe people trying to coordinate with other people to answer needs for social acceptance, significance and identity. In order to do so, they look for valid focal points that allow them to coordinate in situation of imperfect information. Nowadays, Rapoport's religious wave, in its jihadi declination, represents a main focal point for coordination. However, according to the context, it is able to exert various degrees of attractiveness. For example, it may be curbed by the presence of local competing ideologies, it can result only limitedly resonant within the local culture, or it can be amplified by the presence of local grievances lacking alternative ideological frameworks to be channeled.

In both the countries analyzed, such macro-dynamics intertwined with local factors in shaping the radicalization dynamics. In the US, the scarce resonance of the jihadi message with the local culture, together with the presence of competing radical ideologies, has limited the attractive capacity of the jihadi message. In Tunisia, the same dynamics were amplified by the grievances

generated by the post-revolution period, especially in some neglected areas of the country. In both cases, the mainly securitatian response of the authorities has not deteriorated the attractiveness of the jihadi message as a focal point, in particular of the young people. Especially in Tunisia, this inability of the new democratic system to provide alternative non-anti-systemic social and political tools to channel local grievances is transforming jihadism in one of the biggest risks for the social stability of the country.

Conclusion

Game theory is not useful solely to build new theoretical frameworks relevant for various disciplines from scratch. In some cases, it can be used to address existing theories, observe their content from a different angle, and extrapolate their essential dynamics. In the previous sections, this paper has provided an alternative systematization of Rapoport's terrorism waves utilizing a game theory framework. It has shown that the diverse ideologic waves analyzed by Rapoport – which in various phases of the last century animated transnational radicalism – can be seen as solutions of coordination games, which radicalizing individuals have found in order to embrace ideologies that they expected (and knew) were those that other people in the world had adopted. In this framework, ideologies become nothing else than correlated equilibria, which people choose in order to collectively coordinate with other people they cannot directly communicate with.

This approach builds on Jacob Olidort's previous work, which applies Thomas Schelling's focal points to analyze the process of radicalization. Until now, Olidort has been the only scholar who has consistently applied game-theoretic principles to the study of radicalization. This paper aims to add on to this small strand of literature, which deserves further development in the future. In fact, this approach has the merit of clearly extrapolating those universal dynamics that characterize

the process of radicalization from those dynamics that are inherent to the specific geographic, social, cultural contexts in which radicalization occurs. In order to show how such universal dynamics can be filtered from local factors, this paper has presented a comparison of two rather diverse contexts in which Islamist radicalization has occurred: The United States and Tunisia. It has found that, despite the existence of major differences, similar mechanisms are at work. Such mechanisms emerge as intrinsic in the phenomenon of radicalization and should be the target of future research.

An implicit, yet fundamental, assumption in this approach is the notion of radicalization as phenomenon inherent to the human nature, which as such should be investigated. The entire human history is punctuated by movements opposing the institutionalized order using more or less violent means, carried out by groups following an anti-systemic worldview. In the relatively rare cases they are victorious, they transform into the new institutionalized order, which, with time, may become itself the target of new organizations animated by new anti-systemic ideologies. In contrast, when they are defeated, radical groups and their ideologies are usually recorded in history as the product of flawed minds and ideas. If, on the one hand, this approach is useful to a dominant system to support solid public narratives it is, on the other, faulty when it comes to scientific inquiry. Applying the simple logic underlying game theory helps keep a neutral approach to this phenomenon. It helps highlight, in particular, those universal dynamics inherent to human nature, which are at the core of several other phenomena diversely labeled in the public debate, such as revolutions and uprisings. In this way, it becomes easier to see the study of terrorism and radicalization as part of the broader field of contentious politics.

Conclusion

The main aim of this dissertation has been to establish the validity and the practicality of rational approaches and quantitative analytical tools to the analysis of contentious politics, with a special focus on the socioeconomic issues in the Middle East region. More specifically, I have sought to demonstrate that such approaches are suitable to fully capture the complexity of contentious politics phenomena, providing frameworks of analysis that are, at the same time, complete, complex, logical, and parsimonious.

This work is meant to be both a contribution to and a critique of the existing literature on contentious politics and, especially, the scholarship focusing on Middle East countries. Beyond the value of the specific findings of the three papers contained within it, my hope is that the dissertation contributes in a more general sense by pursuing research directions that have as yet been insufficiently explored in the field. In so doing, I advance a constructive critique of the field, which has hitherto denied the full potential of rationalistic frameworks and quantitative methods to address critical questions. This stems from two specific structural shortcomings in the fields of contentious politics and Middle East studies. The first is that the study of contentious politics, especially when focused on Middle East countries, is dominated by disciplines that favor qualitative approaches – such as anthropology, political science, and sociology. The second is what I feel is an outdated belief in the field that rationalistic theoretical frameworks are unsuitable because of their particular theoretical and analytical underpinnings. This stance is primarily driven by the assumption that rationalistic approaches are synonymous with the neoclassic literature in economics – commonly referred to as neoliberalism – which is generally considered to be fundamentally flawed. In the first places, such approaches are – wrongly, as I have hope to have

shown in this thesis – seen to be overly simplistic and reductionist. Second, especially in the Middle East studies' debate, the framework is itself viewed askance since it underpins many of the economic measures that over the last three decades have produced the very socioeconomic decline in the region that many scholars investigate.

In my opinion, this mainstream position is suboptimal, for two reasons. First, it stems from an overly ideological approach. Critiques of neoliberalism – even if theoretically correct – often depart from positions that are ideologically determined, which risks jeopardizing the scientific objectivity of any scholar's work. Research influenced by ideology may lead to distortions both in research design and in the interpretation of the results. In fact, there is an essential difference in approaching a research expecting to find certain results and approaching a research *aiming* to find certain results. In the second case, when the results we are looking for are meant to sanction our ideological view of the world, our confirmation bias may lead us, even involuntarily, to distort or neglect those findings we do not like. Second, the rejection of rationalistic frameworks is often ideologically assumed without a real knowledge of the matter – sometimes it may even constitute a tacit alibi not to engage in techniques one is not very familiar with. Overall, these factors lead many scholars to neglect the diversity and the complexity of rationalistic approaches and quantitative analytical tools which in the last decades have gone far beyond the simplistic assumptions and analysis techniques employed by the neoliberal literature and have begun encompassing concepts and methods rather more sophisticated.

This is not a minor issue. This misinterpretation risks informing incorrectly policies in response to historic events and do great harm as a result. One significant example of the effects of these biases is the debate on the role of socioeconomic inequality in sparking the 2011 Arab uprisings, which is illustrated in detail in the second paper of this dissertation. More than eight years after the 2011

uprisings, the mainstream narrative within the scholarship still portrays increasing inequalities as playing a crucial role in generating the protests. This still occurs despite the countless quantitative studies, some even conducted by universal specialists on economic inequalities such as Piketty and Alvaredo, that sanctioned exactly the contrary: in most Arab societies inequalities were low and not growing. The decision to ignore this simple fact – while being incapable to provide any proof otherwise – is an example of the distortions generated by the ideological approach common within the scholarship.

In addition, I hope this this work will help debunk the idea that there exist essential differences between social processes occurring in contexts such as the Arab countries and the social processes occurring in Europe or any other part of the world. This is a notion still partially diffused in the academia although, as illustrated in the first paper of this dissertation, the literature of contentious politics aims precisely to isolate the universal dynamics of contention valid across different social contexts. Nevertheless, it is often the case that comparative studies circumscribe their scope to countries belonging to the same cultural and/or geographic region. As illustrated in the literature review of the first paper, a great share of the studies published in the field of contentious politics concentrate their attention on sets of similar societies. This stems from rather understandable factors. For instance, scholars tend to acquire linguistic and cultural skills suitable to study proficiently a limited number of similar societies. Furthermore, the habits of academic socialization tend to encourage exchanges among scholars focusing on the same geographical regions. Regional studies have the merit of highlighting those social dynamics generated by the specific common cultural features of similar countries. However, if the general aim of the contentious politics scholarship is to isolate those universal mechanisms and processes

characterizing any human collectives, comparative work that goes beyond socio-culturally similar societies should be more encouraged. Furthermore, regional specialists tend not only to concentrate on their regions mostly ignoring what occurs elsewhere; they also mature the tendency to establish habits of socialization and career patterns that greatly influence their scientific approach and, in some cases, even the development of common ideological standards. This can generate great distortive effects on research work; social homologation may lead people to reject research methods and theoretical approaches – which are fully accepted and utilized by other scholarships – without real scientific bases. Instead, they would adopt other methods and approaches that are maybe less fit for their specific research goals but more socially acknowledged within their scholarship. In order to avoid such scenarios, in my opinion it is necessary to apply more critique on established research patterns within single scholarships and encourage the collaboration and the socialization among researchers specialized in diverse regions and disciplines.

As explained in the introduction of this dissertation, my original research design was rather different from the final version. Its subsequent evolutions occurred in reaction to specific circumstances I encountered during the development of my work. Among them, the impossibility to make sense of some facts regarding the episodes focus of my inquiry though the mainstream narratives, the fruitful confrontation with scholars and academic works from other disciplines such as economics, rational theory, psychology, and even biology, and the chance offered by my university and my supervisor to explore diverse research tools, including game theory and agent-based modeling, played a crucial role.

I do not expect that this work can significantly contribute to change any of the limitations that, in my opinion, characterize the academic scholarship I have encountered during the last four years. But I hope that, for those who will read it, this dissertation can represent an opportunity to observe the dynamics of contentious politics from a different, neglected, yet valuable angle. For me it surely was.

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