

On the logic of revolution: Strategic games and the fall of regimes

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Abstract

This thesis develops and tests a formal game-theoretic model of regime change, treating political revolution as an n -player strategic interaction under uncertainty. The model frames individual decisions as binary choices: act against the regime or maintain the status quo. Each player's choice is shaped by perceived payoffs, beliefs about regime strength, and expectations of others' actions. Five payoff structures—Functioning Regime, Free-Rider Dilemma, Unacceptable Regime, Stag Hunt, and Weak and Unacceptable Regime—capture the range of strategic environments encountered in real-world revolutions. The model accounts for bounded rationality, limited or incorrect information, and selective incentives, allowing for heterogeneous conditions across a population at a single point in time.

To evaluate the model, the Russian Revolutions of 1905 and 1917 are analyzed as historical case studies. These events demonstrate how shifts in perceived payoffs, triggered by economic shocks, war, and state repression, altered the strategic calculus of individuals and groups. As public perceptions of regime strength declined, and opposition organizations improved their capacity to coordinate and incentivize participation, the population transitioned into payoff-dominant conditions conducive to regime collapse.

The thesis contributes a unified framework for modeling regime change that integrates coordination theory, collective action problems, and information dynamics. By validating the model against empirical data, it offers insights for researchers, policymakers, and stakeholders seeking to understand or anticipate large-scale political transitions.

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Finally, I would like to acknowledge my friends—Romaine, Chase, Brady, Daniel, Zach, Brendan, Michael, Emma, and Elizabeth for their encouragement, service as a sounding board, and willingness to watch “A Beautiful Mind” with me when I needed inspiration.

Dedication

Soli Deo Gloria. For the Author of truth and justice, who calls us not only to understand the world, but to seek its renewal.

Epigraphs

“What has been will be again, what has been done will be done again, there is nothing new under the sun.” — Ecclesiastes 1:9

“The line separating good and evil passes not through states, nor between classes, nor between political parties—but right through every human heart.” — Aleksandr Solzhenitsyn

“The only thing necessary for the triumph of evil is for good men to do nothing.” — Attributed to Edmund Burke

Preface

This thesis began seven years ago, when a high school history teacher, Mr. Murphy, referenced Machiavelli's *The Prince* as an example of realist political theory. In a then-rare moment of self-driven curiosity, I borrowed the book from another teacher and read it multiple times. Years later, after giving my life to Christ and while reconciling the brutal realities of the world with my knowledge of my Lord and Savior, I began to study history and politics to better understand His creation and my place in it. Then, when I discovered game theory, it all clicked into place. I realized the mathematical modeling that I had come to love could be applied to explain people (who I also love) and their decisions. The way I saw the world changed.

This thesis is a product of those intersecting influences—faith, history, and mathematics. It is shaped by the belief that people matter and that their actions, even under pressure, reflect deep strategic thinking and personal values. Game theory offered me a language to describe these decisions, history offered me the evidence of them, and my faith offered me the reason to care. This work is not merely an academic exercise but the intersection of disciplines that reflect how I understand the world: as a place where structure and agency, truth and belief, sovereignty and suffering all coexist. In that tension lies the challenge of political order—not only for stability, but for human flourishing.

It can feel discomfiting, or even dehumanizing, to reduce people's lives and decisions to numbers and matrices. Ironically, the level of empathy for those people that is required to make those numbers and matrices useful is staggering. For as cold and dispassionate as one might expect a work on theoretical math to be, I have never engaged in work as emotionally moving and exhausting as this. This thesis, and the process of creating it, is a deeply human thing, and I

am thankful for the knowledge and experience that has come out of it. I hope it might serve someone else even a fraction as well as it has served me.

Chapter 1 - Introduction

Regime change presents a complex coordination and incentive problem within a population subjected to collective governance. From the perspective of game theory, political revolutions and the collapse of regimes can be modeled as large-scale strategic interactions among rational agents. Each individual must weigh the perceived benefits of successful change, the risks of failure, and the actions of others under conditions of uncertainty. Despite decades of research into the strategic dynamics of political transitions, gaps remain in integrating insights from coordination theory, collective action problems, and informational asymmetries into a unified analytical model.

This thesis proposes a formalized framework for understanding regime change as an n -player strategic game, grounded in game theory and informed by empirical case study analysis. It focuses on the critical conditions under which individuals decide to act against a political status quo and the mechanisms by which coordination or fragmentation among these actors determines collective outcomes. The model is designed to capture heterogeneous beliefs, bounded rationality, selective incentives, and the strategic impact of perceived regime strength.

Building on foundational work in coordination games, including the stag hunt and free-rider problems, the model introduces payoff structures that vary across time and social group, reflecting historical shifts in belief and incentive. The framework is designed to allow for the coexistence of multiple strategic cases—such as the Functioning Regime, Free-Rider Dilemma, and Weak and Unacceptable Regime—within a single population. It models regime strength as an exogenous factor influencing perceived thresholds for successful revolt, while incorporating dynamic belief updating and information asymmetry.

To validate the proposed model, we have applied it to historical data from the Russian Revolutions of 1905 and 1917. These events provide an ideal testing ground due to their well-documented causes, their variation in strategic behavior across populations and time, and their ultimately divergent outcomes. Through retrospective equilibrium analysis of observed actor behavior, this study demonstrates how payoff perceptions evolved in response to exogenous shocks and institutional responses, and how these shifts influenced coordination dynamics.

The contribution of this thesis is twofold. First, it presents a formal game-theoretic model that captures the strategic logic of regime change across a wide range of contexts. Second, it tests the model's explanatory power through historical case study analysis, showing how changes in perceived payoffs and belief structures shaped the likelihood and form of collective action. The framework offers a structured lens through which future researchers and policymakers can evaluate revolutionary dynamics, particularly in environments characterized by uncertainty, repression, and fragmented information.

Chapter 2 - Literature Review

Introduction and Purpose

Regime-change contexts, such as revolutions, democratic transitions, or the collapse of authoritarian regimes, involve strategic interactions among citizens, rulers, and sometimes external actors. Game theory and mathematical modeling provide a framework to analyze how individuals make decisions to support or resist a regime under uncertain conditions. Beginning at least with Thomas Schelling's conclusion that mass uprisings pose a coordination problem [1], scholars have developed formal models to understand why and when people collectively mobilize for regime change. The purpose of this literature review is to survey key academic works that apply game theory to regime-change scenarios. We give equal attention to theoretical models and empirical studies, focusing on applied insights into decision-making rather than abstract mathematics. In particular, we highlight how strategic uncertainty, information (global games), and reputation dynamics affect actors' choices, and how collective action dilemmas (like the stag hunt and free-rider problems) play out in political transitions. By synthesizing these strands, we identify gaps in the literature and propose a conceptual framework for studying regime change as a strategic game, with the aim of informing both scholarly understanding and policy.

Theoretical Foundations and Frameworks

Early work in game theory established the basic strategic dilemmas in regime change. Schelling observed that revolutions often succeed or fail based on whether citizens can coordinate their actions – each individual's willingness to rebel depends on the expectation that others will also rise up [1]. In a purely symmetric coordination game, there can be two equilibria: everyone staying home (status quo) or everyone acting against the regime (successful revolt).

Which outcome prevails hinges on mutual expectations, echoing what Schelling called the problem of achieving a “critical mass” for collective action. Gordon Tullock formalized the “paradox of revolution,” questioning why anyone would join a risky revolt if their individual contribution has little impact [2]. This paradox highlighted that rational individuals might prefer to free-ride, hoping others incur the costs of change. This theme was also generalized by Mancur Olson [3]. His theory of collective action showed that when a public good (like political change) benefits all, individuals have an incentive to let others do the work. As Olson put it, if everyone can enjoy the outcome regardless of contribution, “nobody is interested in bearing the expenses” and each tries to free-ride on the efforts of others. This insight implies that large groups of citizens face serious obstacles in mobilizing against a regime, absent selective incentives or special motivations.

Building on these foundations, scholars explored how shared beliefs help overcome coordination problems. Russell Hardin introduced the idea of the assurance game (or stag hunt) in revolutions: people will only protest if confident enough others will too, requiring a level of trust or common knowledge among them [4]. Barry Weingast provided a formal model of citizen coordination to constrain a sovereign [5]. In Weingast’s sovereign–citizen game, a ruler (“sovereign”) decides whether to transgress citizens’ rights, and citizens decide whether to collectively revolt or acquiesce. A key result is that democracy’s stability is a coordination equilibrium: if citizens broadly agree on red lines and credibly threaten to defend them in unison, the ruler is deterred from overstepping. However, if citizens are divided or unsure of each other, the ruler can violate rights and still survive in power. Weingast frames regime maintenance as a stag-hunt-like scenario where the “good” equilibrium (ruler respects limits) requires citizens to coordinate on punishing transgressions, whereas a “bad” equilibrium (tyranny persists) arises

from coordination failure. This model anchored the idea that shared red lines are crucial for successful regime change or democratic defense.

Another foundational concept is preference falsification, developed by Timur Kuran. Preference falsification occurs when individuals publicly misrepresent their true opinions or desires due to social or political pressures. This theory helps explain why revolutions often occur unexpectedly. In authoritarian regimes, many individuals hide their genuine opposition to the government, creating a misleading impression of broad support. Each person privately sets a threshold for joining protests, determined by how many other people they observe expressing dissent. Strategic uncertainty, defined as the inability of individuals to accurately predict the actions of others in a strategic interaction, plays a significant role in this scenario. Even a small event or piece of new information can reveal widespread dissatisfaction, analogous to suddenly realizing that a seemingly powerful ruler lacks genuine support [6], [7]. Once a few individuals publicly express dissent and protests begin to gain momentum, individuals rapidly abandon the regime, having been unknowingly waiting for others to act. This framework, while not a game-theoretic equilibrium model in the strictest sense, still addresses the role of information and belief updates in regime change. It highlights strategic uncertainty: no one knows the true level of opposition due to private preferences, so even a very unpopular regime might endure until an unpredictable moment of collective realization. Kuran's work thus laid groundwork for more explicit modeling of informational dynamics in coordination games.

Global Games and Strategic Uncertainty

In the 2000s, game theorists began applying the concept of global games to regime-change problems. Originally developed by Carlsson and van Damme and popularized by Morris and Shin in economics, global games introduce incomplete information to coordination games

[8], [9]. Each player receives a noisy private signal about the underlying state (for example, the regime's strength or public discontent), rather than knowing it perfectly. This uncertainty can eliminate the multiplicity of equilibria common in coordination games, often yielding a unique equilibrium by which people decide whether to attack the regime. A global game of regime change is essentially "a coordination game of incomplete information in which the status quo – e.g., a currency peg, a bank's solvency, or a political regime – is abandoned once a sufficient fraction of the population attacks it" [9]. In such models, if the underlying public discontent or regime fragility exceeds some threshold and individuals get signals around it, a critical mass will find it optimal to rebel, leading to regime collapse; below that threshold, the regime survives. This approach was attractive because it added realism, since people are unsure of others' exact payoff or willingness to act. Resolving the indeterminacy about who moves first or how expectations form is crucial because these uncertainties can prevent coordination even when a regime is fragile.

A series of theoretical works, primarily in political science and economics, have since applied global games to political uprisings and coups. For example, Egorov, Guriev, and Sonin, working in political economy, examine how incomplete information and media freedom affect authoritarian stability. They developed a theoretical model where dictators choose whether to allow freer media to gain accurate information on bureaucratic performance, but risk facilitating dissent coordination. Their theory predicts that dictators with fewer natural resources, who cannot easily buy loyalty, are more likely to permit freer media to improve governance, while resource-rich autocrats typically suppress information [10]. Other scholars in political economy have theoretically explored how public signals, like elections or economic announcements, can act as coordination devices for citizens. Persson and Tabellini, also in political economy,

modeled the accumulation of "democratic capital," arguing that past democratic experiences establish common knowledge that stabilizes future democracy—or its absence makes future regime change harder [11]. Little [12] and Egorov and Sonin [13] showed how a blatantly rigged election result can act as a public signal of regime weakness, prompting citizens to update beliefs and potentially coordinate protests. Similarly, Edmond, working in economics, developed a theoretical model addressing how regimes manipulate information through propaganda, creating confusion about their true popularity [14]. Edmond finds that even slight propaganda can substantially raise the equilibrium threshold for revolt, making citizens less likely to coordinate against the regime.

Notably, the global games approach typically predicts a unique tipping point for regime collapse, sparking debate about whether this approach overlooks insights from earlier coordination theories. Ethan Bueno de Mesquita, in political science, argues that, while global games offer analytical clarity by producing a single equilibrium, they might inadvertently exclude valuable insights from models that allow multiple equilibria [15].

Reputation Dynamics and Repeated Interactions

Regime-change scenarios play out over time, making dynamic game theory and reputation dynamics—defined as how an actor's past actions influence others' expectations and future interactions—particularly relevant. One strand of literature examines the repeated strategic game between an authoritarian regime and its potential opposition. Acemoglu and Robinson, in their economic theory of democratization, model a repeated interaction where the regime faces a standing threat of uprising from the poor. In their framework, concessions or reforms today are not credible tomorrow unless institutions change – hence extending voting functions as a credible commitment to future redistribution. Their model explicitly represents credibility issues:

concessions or reforms made today may not be trusted by citizens unless institutional changes, such as democratization through voting rights, occur. Without such credible commitments, citizens anticipate future repression or reversal of promises, increasing the likelihood of revolution. In this context, regime change—through institutional reform—is identified as a plausible equilibrium outcome that resolves the credibility issue inherent in repeated strategic interactions [16]. Other authors focus on the reputation of regimes for toughness. For example, some models draw on repeated game insights: a dictator may initially crack down harshly on small protests to build a reputation for ruthlessness, deterring citizens from challenging the regime in the future. If the regime fails to maintain a reputation for enforcing red lines, citizens may grow bolder over time. Conversely, if the regime's threats are believed, citizens continue to stay inert. Empirically, Svobik and others have documented how autocrats use periodic repression or elite purges to signal strength and reduce coup risk [17]. On the opposition side, reputation matters too—opposition leaders or movements gain credibility as coordinators when they consistently mobilize large numbers or weather repression. Meirowitz and Tucker present a dynamic model in which each round of protest reveals information about the regime's resilience and the likely quality of any alternative government. In their model, citizens might be cautious to overturn a regime in one go, preferring to allow a “test” of the regime's response and then update their beliefs. Such dynamic considerations show that regime change is not a one-shot game but an iterative process of signaling and learning.

Taken together, these theoretical frameworks – from one-shot coordination games to global games of incomplete information to repeated reputation games – provide a toolkit for understanding the strategic calculus of regime change. They highlight core factors: the need for shared expectations among citizens, the temptations to free-ride on others' sacrifices, the pivotal

role of information and beliefs under uncertainty, and the way history and reputation can lock in either opposition inertia or mobilization. In the next section, we examine how these theories stack up against empirical evidence and practical insights, and what strategic implications they offer for real-world cases.

Empirical Grounding, Strategic Implications, and Policy Research

A robust body of empirical research has tested these theoretical models, often blending game-theoretic reasoning with data or case studies. One such area of empirical work addresses how information and signals affect collective action in authoritarian regimes. For instance, Georgy Egorov, Sergei Guriev, and Konstantin Sonin not only developed a theory (noted above) but also provided systematic evidence using panel data. They found that in non-democracies, media are significantly less free in countries with abundant oil wealth, even after adjusting for development and other factors [10]. This supports the game-theoretic prediction that resource-rich dictators typically avoid relying on information-sharing to maintain control. This is described as “Gorbachev’s dilemma.” Instead, they directly co-opt or pay off officials. Conversely, resource-poor dictators benefit from allowing some flow of information, as it can enhance governance and reduce the likelihood of unrest [10]. The strategic implication is that a regime's economic and structural conditions shape how it addresses internal and external challenges. Resource-poor regimes use information to motivate bureaucrats and maintain public support, while resource-rich regimes suppress information and motivate bureaucrats materially to prevent coordinated dissent. Policymakers thus conclude that increasing transparency, such as through independent media or internet access, can destabilize secretive regimes—provided those regimes cannot otherwise secure loyalty through economic incentives.

Another empirical thread examines how public signals and focal events spur popular uprisings. Susan Lohmann's study of the 1989 Leipzig demonstrations in East Germany is a seminal example. She showed that as East German citizens received more information about others' dissatisfaction (for example, through rumors or West German media broadcasts), protest participation followed an "informational cascade." Initially small protests exploded into mass protests once a critical mass of people became convinced that many others were privately discontented. Lohmann's data-driven analysis backs the idea that information shocks (such as news of a neighboring country's revolution or a regime policy failure) can change citizens' expectations and trigger a cascade consistent with threshold models [18]. In Tunisia, the self-immolation of Sidi Bouzid served as a common knowledge signal to the broader Tunisian population that the status quo had degraded to a point of intolerability. This serves as a microcosm of broader comparative research on the Arab Spring in 2011, which finds that events like the fall of Tunisia's Ben Ali served as common knowledge signals across the region, emboldening protesters in Egypt, Libya, and beyond. Though large foreign interventions are outside our scope, these demonstrations are exogenous factors that can tip the calculations of domestic actors by reducing strategic uncertainty ("if it happened there, it can happen here" or "he acted so it is safer for me to do so").

The advent of new communication technologies has provided quasi-experiments to test coordination theory. Pierskalla and Hollenbach analyzed African data on cell phone coverage and the occurrence of violent collective action. They found that the spread of mobile phones was associated with more frequent riots and civil conflicts, suggesting that better communication helps people overcome coordination hurdles [19]. In terms of game theory, mobile phones lower the cost of organizing and improve common knowledge (people can quickly share information

about protests or state abuses), thus increasing the likelihood that a latent opposition reaches the critical mass to act. Similarly, Haifeng Huang and others have studied how exposure to outside information (like satellite TV or social media) affects citizens' perceptions of regime strength [20]. Empirical findings show mixed effects: in some cases, outside information about regime failures motivates dissent, while in others it can breed complacency if people realize their situation is not as bad as elsewhere. This aligns with Andrew Little's theoretical point that information and communication technology can cut both ways. It can facilitate protest when it reveals regime weaknesses, but it might also reduce unrest if it uncovers that the regime is more stable or popular than people thought [21]. For example, Western broadcasts into East Germany did not make East Germans uniformly more pessimistic about their regime, perhaps because the content was not interpreted as proof of imminent change. On the other hand, social media use during Russia's 2011 fraudulent elections correlated with higher beliefs in electoral fraud and spurred protest participation [21]. These findings empirically ground the notion that strategic uncertainty (not knowing others' true attitudes) can be alleviated or exacerbated by information flows, thus directly impacting coordination success.

These two examples from East Germany are not contradictory but instead show the context-dependence of informational effects. Lohmann's findings emphasize how information that credibly signals widespread dissatisfaction can trigger rapid mobilization. In contrast, other broadcasts, despite offering critical content, may fail to prompt action if the audience does not interpret the signal as actionable or if it lacks credibility. The key distinction is not whether the information is oppositional, but whether it shifts beliefs about the likelihood of successful collective action.

Quantitative studies with large numbers of players have also shed light on collective action and regime change. Erica Chenoweth and Maria Stephan compiled a global dataset of resistance campaigns, comparing nonviolent and violent uprisings. They found that nonviolent campaigns succeeded roughly twice as often as violent insurgencies in effecting regime change or secession. A game-theoretic interpretation is that nonviolent campaigns lower the barrier to participation (lowering the perceived cost for individuals, thereby mitigating the free-rider problem) and often create broader coalitions, increasing the likelihood of tipping the regime. Their work implies that the mode of collective action influences strategic dynamics: when individuals can participate with less personal risk (e.g., joining strikes, boycotts, mass demonstrations), the coordination game tilts toward the high-participation equilibrium, and even those who would otherwise free-ride may join in. Moreover, Chenoweth and Stephan argue that regimes are less able to violently repress extremely large, diverse movements, which again encourages people to overcome fear. The policy takeaway is significant: encouraging nonviolent methods and broad-based movements can enhance collective action potential and thus regime vulnerability. Conversely, regimes have adapted; recent data suggests that autocrats deploy more sophisticated “carrot and stick” responses – selective repression, internet shutdowns, or propaganda – to counter these coordination advantages of modern movements [22].

Specific case studies also enrich the empirical grounding. Mehdi Shadmehr and Dan Bernhardt built a formal model of protest with uncertain payoffs and then discussed historical patterns found in Iran’s revolution and Tiananmen Square [23]. Their model predicted that harsher expected punishments can, under some conditions, increase the incidence of protests and punishments [23]. The intuition is that when a regime is known to be extremely punitive, initial dissenters might be very motivated, and once they act and are punished, it generates outrage or

boldness in others – a phenomenon observed when regimes overreact. They also found that more accurate public information does not always help rebels: sometimes less accurate information about the regime’s weakness can make revolt more likely, as optimism is more easily maintained in uncertainty. These counterintuitive implications were illustrated with examples such as how misperceptions in the late Soviet Union or Middle East might have contributed to unexpected uprisings.

Overall, empirical research largely supports the key insights from theory while also informing us of real-world complexities. Communication technology and media access stand out as external factors that influence coordination. Economic shocks and resource constraints alter the payoff calculations of regimes and of citizens. The success or failure of one uprising can send ripples through other countries as a learning experience or signal. Policymakers interested in promoting peaceful regime change glean from this literature that fostering information transparency, protecting communication among dissidents, and reducing the perceived risks of participation (for example, via international attention or guarantees of safety) can tilt the game in favor of mass coordination. At the same time, they learn that movements need to solve internal collective action problems – often via organization, trust-building, and narratives that create common knowledge. The next section zooms in on two fundamental game-theoretic representations of these dilemmas: the stag hunt and the free-rider problem, and how they manifest in political transitions.

Specific Game Cases

Some specific regime-change situations can be usefully analogized to classic games like the stag hunt (assurance game) and the free-rider problem. These models capture different aspects of the strategic calculus facing would-be revolutionaries.

Stag Hunt (Assurance Game)

The stag hunt represents a situation where everyone benefits most if enough people act together. In this setting, the best outcome depends on coordination. If a critical mass acts against a regime, the effort succeeds and benefits are widely shared. But if too few join, those who do may be punished while the regime remains. This leads to two possible stable outcomes: broad participation or broad passivity. People may stay home not because they support the regime, but because they doubt others will act. The fear of standing out alone makes inaction a rational choice.

Importantly, success in a stag hunt does not always require full participation. What matters is whether enough people join to surpass a threshold related to the strength of the regime. The idea is not that everyone must act, but that each person needs confidence that enough others will act. That is why revolutions often depend on shared expectations and signals. For example, the fall of the Berlin Wall showed East Germans that change was possible and encouraged mass participation. In models like Weingast's, citizens coordinate to punish regime overreach only when they believe others will also respond. A common understanding of what counts as unacceptable behavior from the regime—and a shared belief that others will act—helps people coordinate on challenging the regime instead of remaining passive [15].

Free-Rider Dilemma (Collective Action Problem)

The free-rider problem highlights a different challenge. Here, the focus is on individual incentives rather than coordination. Regime change is treated as a public good: if the regime falls, everyone benefits, even those who did not participate in the effort. This creates a temptation to let others take the risks. Individuals may decide that protesting is too costly—especially if participation could lead to arrest, job loss, or violence—while still hoping to enjoy

the benefits if others succeed. In large groups, where one person's contribution is unlikely to determine the outcome, this logic becomes even more compelling.

This dilemma explains why movements may fail even when many people agree that the regime should be replaced. Mancur Olson identified this reasoning as central to collective inaction [3]. Each person's participation has a negligible chance of determining the outcome, especially in a large population, but could carry significant personal risk (imprisonment, losing one's job, or worse). Rational, self-interested individuals would thus prefer someone else to bear those costs – leading to inaction by all, even if everyone would be better off if they collectively rose up. This is the classic rebel's dilemma: people agree the regime should change, but any single protester's contribution is small, so it feels rational to free-ride. Mark Lichbach explored how groups attempt to overcome it through selective incentives—rewards for those who act or punishments for those who do not [24]. For instance, rebel groups may offer land or positions of power to fighters, while social movements may rely on norms of solidarity or public shaming. These mechanisms adjust the payoffs, making participation more attractive than passivity. In contrast to the stag hunt, where success depends on expectations about others' behavior, the free-rider problem depends on changing individuals' cost-benefit analysis.

Identified Gaps in the Literature

Despite substantial progress in understanding regime change via game theory, several gaps and open questions remain in the literature:

- **Integrating Multiple Strategic Dilemmas:** Many models focus on one dimension of the problem, either coordination under uncertainty or collective action incentives, in isolation. Real-world regime changes involve both coordination and cooperation challenges simultaneously. There is a need for frameworks that combine previous

insights gleaned from stag-hunt and free-rider research – for example, allowing heterogeneity where a critical mass must coordinate (coordination game) but also considering variability in individuals’ willingness to bear costs (public goods game). Identifying the microcosmic instances in which these cases exist may add additional utility to the model, as past insights into these games can be applied when appropriate and avoided when inappropriate.

- **Dynamic and Repeated Interaction Effects:** While some studies consider repeated games and reputation, more work is needed on longitudinal dynamics of regime contention. Many countries experience protest cycles or multiple failed attempts before a successful regime change. How do past failures or repressions inform future strategy? Do citizens learn and adapt their beliefs in ways our current models capture only crudely? The global games framework typically provides a one-shot prediction (the regime falls if fundamentals cross a threshold), but it does not capture what happens if that threshold is not crossed this time – do fundamentals or beliefs evolve for the next round? Empirically, we see phenomena like revolutionary fatigue or conversely anger escalation after crackdowns, which suggest more complex dynamics [25], [26]. The literature could benefit from models that include learning or evolutionary dynamics of strategies across episodes of contention. This also ties into how reputation is built or eroded over time, which has only been partially addressed so far.
- **Practical Testing of Common Assumptions:** In much of the existing literature on theoretical models, simplifying assumptions and algorithms are not validated against real-world events. While these models produce mathematical insights, their applicability to real-world situations is untested.

In identifying these gaps, we see an overarching theme: the need to create more useful models without losing their analytical clarity, and to test those models against diverse real-world scenarios. The final section sketches a conceptual framework for regime change that attempts to address some of these gaps, combining insights from across the literature and indicating the potential research contribution of such an approach. From these gaps, we have formulated the following research questions:

1. What policies or heuristics can we glean that could be applied by stakeholders, particularly regimes and entrepreneurs, to better reach their strategic goals in games of regime change?
2. Can historical case studies offer an advantageous method of validating game theoretic insights into political games?

Proposed Conceptual Framework and Research Contribution

Regime Change as a Repeated Global Coordination Game

The foundation of this framework is the repeated n -player regime change game, in which individuals decide whether to act against the regime or maintain the status quo. This decision is shaped by perceptions of regime strength (denoted as k') and the expected level of participation from others. If a critical threshold (k) of participation is surpassed, the regime collapses; otherwise, it survives. A critical distinction in this model is that k is not known with certainty, reflecting real-world informational asymmetries and strategic uncertainty.

This formulation builds on previous applications of global games to regime change [9], [27] but introduces a modification: bounded rationality. Agents in the game do not have perfect knowledge of regime stability and must rely on available signals, which are often distorted by state-controlled propaganda. This mechanism captures a fundamental challenge in regime-

change scenarios—individuals hesitate to act due to uncertainty about whether collective resistance will be successful, which in turn sustains authoritarian stability.

Empirical Contributions: Historical Case Study Validation

The theoretical model is validated through empirical analysis of historical cases, particularly the Russian Revolutions of 1905 and 1917. These cases illustrate how shifting public perceptions of personal utility, shaped by quality of life, reforms, repression, and exogenous influences, played a decisive role in mobilization dynamics.

Evaluation of Evolutionary Strategy Dynamics in Repeated Interactions

Beyond single-moment regime changes, this study extends its model to consider the evolution of strategic approaches by the populace. This allows us to consider the impact of gradual changes in their perception of payoff values over time, as well as the choice of strategies employed by various demographics or organizations.

Contributions to the Literature

This research makes several significant contributions to the study of regime change:

1. Consider the Evolution of Choice of Strategy

By modeling regime change as a repeated coordination game, this study incorporates how individual and group strategies shift over time. It accounts for changing perceptions of payoffs, regime strength, asymmetric payoffs, and the influence of prior outcomes—providing a more realistic and temporally grounded understanding of mobilization dynamics.

2. Validate the Model with Historical Case Studies

The model is applied to the Russian Revolutions of 1905 and 1917 to assess its explanatory power. These cases serve not only to test theoretical claims but also to trace how strategic conditions and perceived payoffs evolved during episodes of mass contention.

3. Draw Widely Applicable Conclusions

The framework identifies generalizable payoff structures and decision dynamics that recur across various instances of regime change. These insights support comparative analysis and extend the applicability of game-theoretic tools to both historical and contemporary political transitions.

Chapter 3 - Methods

Political Revolution as a Regime Change Game

Game Structure

In this paper, we present a global regime change game. In this game, a population of n rational, self-regarding players has a choice of two strategies. Agents can either act against the status quo or not act against the status quo. If a sufficiently large number of players acts against the status quo, then it collapses.

Players

This research considers a game of n players. To draw conclusions from the model, analysis will center around examining an individual player's payoffs as a representation of the payoffs considered by each member of the group in question. The group playing the game will be referred to as the "populace", or "players".

Players may be subdivided into smaller groups by geographical, socioeconomic, ethnic, or other divisions. Such divisions will be considered on a case-by-case basis, and the size of one or more of these groups relative to the threshold needed to accomplish regime change will be the primary consideration.

Actions

The strategies in this game are framed as a binary choice: players can either take action against the regime or not.

Although the model is structured as a binary choice, it allows for variation in how these actions are carried out. The action space is intentionally simplified to highlight the fundamental trade-off between maintaining the status quo and initiating change. We will operationally define *acting against the regime* as any action taken with the explicit intent of undermining, replacing,

or removing an existing entity possessing power or authority. Those who act against the regime might participate in protests, strikes, or other forms of resistance. Timing also plays an important role—early participants often take greater risks but have more influence over the movement, whereas latecomers face less uncertainty but may have a reduced impact. The decisions of all players are shaped by their perceptions of the costs and benefits of acting, as well as the collective effort needed to reach the critical threshold.

This binary framework simplifies complex scenarios to make it easier to study how individuals make choices under uncertainty. It also provides a basis for analyzing the challenges of coordination and the interplay of individual and group decisions in regime change.

Let

n_i = Number of players considered to be part of the populace at time i .

S_i = A player's choice of strategy at time i

The choice of strategies will be presented as:

A = Act against the regime

Q = Support or passively maintain the status quo

k_i = Number of players required to act at time i to successfully end status quo

k'_i = Number of players believed to be required to act at time i to successfully end status quo.

Differentiating k'_i from k_i allows us to capture the dynamics of imperfect information about regime strength.

j_i = Number of players that chose to act against the status quo at time i

Payoffs

Let

$U_i(S_i)$ = The payoff received or incurred by the player as a result of the outcome associated with all players' strategy choices, given by these expressions:

$$U_i(A) = \begin{cases} R & \text{if } j_i \geq k_i \\ F & \text{if } j_i < k_i \end{cases}$$

$$U_i(Q) = \begin{cases} X & \text{if } j_i \geq k_i \\ N & \text{if } j_i < k_i \end{cases}$$

R = The agent acts against the status quo, and sufficient players also act against the status quo to bring about its end

X = The agent did not act against the status quo, but enough other players mobilized to bring about the end of the regime

F = The agent acted against the status quo, but was unsuccessful in bringing about its end

N = The agent participates in status quo, and status quo is maintained

The payoffs and their relationship to the outcome determined by all players' actions is summarized in Table 3.1.

Table 3.1 Individual Player Payoff Matrix

Payoffs	Regime/status quo ended	Status quo maintained
Act against the regime	R	F
Participate in status quo	X	N

Decision Rule

Players act to maximize their utility U_i according to their beliefs about payoff values.

Assumptions

The Regime as an Exogenous Influence

In other games of regime change [27], [28], a single, long-lived agent (the regime) takes actions that affect the payoffs of the game being played by the populace. We take an alternative approach and treat the regime's actions as an exogenous force on the payoffs of the game. Treating the regime's influence on the game as exogenous and therefore equivalent in its nature to other influences on the game provides a conceptually consistent basis for modeling its influence on the payoffs and outcomes in revolutionary and pre-revolutionary circumstances. This modeling approach can be used to analyze such circumstances, including the influence of political or military entities besides the regime, cultural forces or trends, or indeed the actions of the regime towards the populace, by recognizing that all such factors may influence the payoffs of the game played by the populace.

Limited Information

Perceived regime strength (k'_i) plays a critical role in shaping player decisions in the regime change game. Players form beliefs about the minimum number of participants (k_i) required to overthrow the regime. These beliefs are influenced by several factors, including historical experiences of uprisings and revolts, regime propaganda designed to project strength and suppress dissent, and observations of smaller-scale protests or symbolic actions that may indicate regime vulnerability.

Misjudgments of k_i can lead to different outcomes. Overestimating k_i leads players to believe that revolt is futile, discouraging action and reinforcing the status quo. On the other hand, underestimating k_i can result in premature attempts at action without sufficient support, increasing the likelihood of failure and the associated risks of harsh retaliation.

The distribution of information about k_i is rarely uniform, resulting in significant asymmetry among the population. Uneven access to information forces players to rely on

heuristics, such as observing participation in protests or interpreting rumors about the regime's weaknesses. This is also affected by social dynamics. In some cases, misinformation campaigns by regimes amplify this asymmetry by distorting perceptions of k_i , often inflating it to discourage collective action.

External shocks, such as military defeats, economic crises, or natural disasters, can significantly alter public perceptions of k_i . These events expose weaknesses in regime strength, reducing the perceived threshold and creating opportunities for collective mobilization. Such shifts may act as tipping points, where the perceived rewards of revolt (R) outweigh the risks (F), leading to a convergence toward widespread revolutionary action.

Bounded Rationality

Bounded rationality refers to the cognitive limitations that influence how players perceive payoffs (R , F , N , X) in the regime change game. Rather than relying on objective realities, players act based on subjective interpretations shaped by various factors. These include cultural norms and societal values, which determine the prioritization of risks and rewards, as well as religious and circumstantial beliefs that shape individual motivations. Additionally, propaganda and misinformation can further skew perceptions, inflating the perceived risks (F) of rebellion or minimizing its potential rewards (R).

Players often overvalue maintaining the status quo (N) due to fear of retaliation or failure and limited ability to predict the long-term outcomes of regime change. However, bounded rationality also explains why players might take seemingly irrational risks, especially when their perceptions align with urgent cultural, religious, or personal priorities.

Predicting individual perceptions in real time is challenging due to the dynamic nature of information flow and contextual changes. Retrospective analysis of observed actions provides a

more practical approach to understanding how players assessed their payoffs at the time of decision-making.

As conditions evolve and new information becomes available, players reassess their strategies dynamically. Regime propaganda may temporarily stabilize perceptions, but credible opposition narratives can undermine this effect. Successful actions by opposition groups often incentivize further revolt by reducing perceived risks (F) and increasing the perceived rewards (R). This iterative reassessment process highlights the fluid and adaptive nature of player decision-making in the context of regime change.

Regime Change with Three Players

To illustrate the model, we describe the actions, outcomes, payoffs, and equilibrium solutions for the game with three players. Table 3.3 summarizes a 3-player game with:

$$k_i = k'_i = 2:$$

Table 3.2 Three-Player Payoff Matrix

Player 3	Act (3A)		
		Player 2	
		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	(R, R, R)	(R, X, R)
	Accept SQ (1Q)	(X, R, R)	(N, N, F)

Player 3	Accept SQ (3Q)		
		Player 2	

		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	(R, R, X)	(F, N, F)
	Accept SQ (1Q)	(N, F, N)	(N, N, N)

We have chosen to focus our experimental analysis on five cases.

1. The “Functioning Regime” where $N > X \geq R > F$
2. The “Free-Rider Dilemma” where $R = X > N > F$
3. The “Unacceptable Regime” where $R = X > F > N$
4. The “Stag Hunt” where $R > X > N > F$
5. The “Weak and Unacceptable Regime” where $R > X > F > N$

Any combination of relationships between payoffs could be described as a unique case, but these five cases were found to occur most frequently in historical examples of the regime change game discussed here. Other combinations, while possible, are either very uncommon, require outside exogenous effects (most typically because of the existence of multiple regimes), or are unrealistic, none of which fall into the scope of this research.

Equilibrium Analysis

*Nash Equilibrium

**Payoff-Dominant Nash Equilibrium

***Risk-Dominant Nash Equilibrium

Functioning Regime ($N > X \geq R > F$)

Table 3.3 Three-Player Functioning Regime Payoff Matrix

Player 3	Act (3A)		
		Player 2	
		Act (2A)	Accept SQ (2Q)

Player 1	Act (1A)	(R, R, R)	(R, X, R)
	Accept SQ (1Q)	(X, R, R)	(N, N, F)

Player 3	Accept SQ (3Q)		
		Player 2	
		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	(R, R, X)	(F, N, N)
	Accept SQ (1Q)	(N, F, N)	$(N, N, N)^*$

The Functioning Regime case is characterized by $S_i = Q$ constituting a dominant strategy for each player, resulting in a unique Nash equilibrium of unanimous inaction. A functioning regime is able to prevent organization against itself and therefore prevent a party from offering selective incentives for revolutionary action, which creates the dynamic of $X \geq R$. It is also able to harshly punish those who act against it, which means that F is the worst payoff outcome for a player.

Free Rider Dilemma ($R = X > N > F$)

Table 3.4 Three-Player Free Rider Dilemma Payoff Matrix

Player 3	Act (3A)		
		Player 2	
		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	$(R, R, R)^{**}$	$(R, X, R)^{**}$
	Accept SQ (1Q)	$(X, R, R)^{**}$	(N, N, F)

Player 3	Accept SQ		
		Player 2	
		Act	Accept SQ
Player 1	Act (1A)	$(R, R, X)^{**}$	(F, N, N)
	Accept SQ (1Q)	(N, F, N)	$(N, N, N)^{***}$

The Free-Rider Dilemma case is characterized by an individual who would benefit from regime change as compared to the status quo ($R > N$) but has no prospective selective incentive to take action to make such regime change happen ($R = X$). In this case, the regime is still able to punish action against itself in a way that less preferable to the status quo ($N > F$). This results in a risk-dominant Nash equilibrium where no player acts, and payoff-dominant equilibria whenever k or $k - 1$ players take action against the regime. In the risk-dominant equilibria, no player is incentivized to take isolated action, since more players are required to successfully obtain the higher utility payoff (R). In the payoff-dominant equilibria, either all players act, or no player is incentivized to act if the rest of the players do, since R offers the same utility as X .

Unacceptable Regime ($R = X > F > N$)

Table 3.5 Three-Player Unacceptable Regime Payoff Matrix

Player 3	Act (3A)		
		Player 2	
		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	$(R, R, R)^{**}$	$(R, X, R)^{**}$
	Accept SQ (1Q)	$(X, R, R)^{**}$	(N, N, F)

Player 3	Accept SQ (3Q)		
		Player 2	
		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	$(R, R, X)^{**}$	(F, N, N)
	Accept SQ (1Q)	(N, F, N)	(N, N, N)

The Unacceptable Regime case is characterized by an individual who is experiencing a status quo worse than the punishment that the regime can mete out for those who act against it ($F > N$). No selective incentives exist in this case, which maintains $R = N$. This results in a payoff-dominant equilibria whenever k or $k - 1$ players take action against the regime. In these payoff-dominant equilibria, either all players act, or no player is incentivized to act if the rest of the players do, since R offers the same utility as X . This echoes the free-riding dynamic from the previous case but lacks the risk-dominant equilibrium of that case.

Stag Hunt ($R > X > N > F$)

Table 3.6 Three-Player Stag Hunt Payoff Matrix

Player 3	Act (3A)		
		Player 2	
		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	$(R,R,R)^{**}$	(F, N, N)
	Accept SQ (1Q)	(X, R, R)	(N, N, F)

Player 3	Accept SQ (3Q)		
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		Player 2	
		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	(R, R, X)	(F, N, F)
	Accept SQ (1Q)	(N, F, N)	(N, N, N)***

The Stag Hunt case has two Nash equilibrium solutions. The first, commonly called the payoff-dominant equilibrium, is the solution in which all players act against the regime. The second, the risk-dominant equilibrium, occurs when all players choose inaction. Each player is offered selective incentives in return for action against the regime ($R > X$), referred to in the classic stag hunt game as “hunting stag.” If enough other players do not take the risk of hunting stag, the individual is better served not acting against the regime, which would be referred to in the classic game as “hunting rabbit.” This presents a coordination dilemma for the group of players in its entirety.

This case differs from the traditional stag hunt because if k_i players hunt the stag, the option to hunt the rabbit is voided, and a player choosing to hunt the rabbit will receive payoff X instead of payoff N . This modification to the traditional stag hunt game more closely resembles the realities of regime change, where the successful overthrow of an existing regime changes the status quo for both participants and nonparticipants. This modification results in a Stag Hunt case where any player playing a different strategy than the other players would be better served altering their strategy to match the other players.

Weak and Unacceptable Regime ($R > X > F > N$)

Table 3.7 Three-Player Weak and Unacceptable Regime Payoff Matrix

Player 3	Act (3A)		
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		Player 2	
		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	$(R, R, R)^*$	(R, X, R)
	Accept SQ (1Q)	(X, R, R)	(N, N, F)

Player 3	Accept SQ (3Q)		
		Player 2	
		Act (2A)	Accept SQ (2Q)
Player 1	Act (1A)	(R, R, X)	(F, N, N)
	Accept SQ (1Q)	(N, F, N)	(N, N, N)

The Weak and Unacceptable Regime is characterized by $S_i = A$ constituting a dominant strategy for every player, resulting in a sole Nash equilibrium of unanimous action. An individual experiencing this case would prefer the consequences of failed action against the regime to continuing to exist in the status quo. The regime is called “weak” in this case, because it is unable to mete out a punishment that is sufficiently worse than the status quo, resulting in $F > N$. This case also indicates that selective incentives exist for action against the regime ($R > X$). No matter what other players do, an individual experiencing this case is best served by acting against the regime.

Any player not acting against the regime in this case is better served by taking action, because regardless of any other players’ actions, they could change their payoff from N to F (an increase in utility) or from X to R (an increase in utility).

These equilibria analyses for the 3-player game allow for a more robust understanding of the equilibria when considered for the n -player game.

Regime Change with n Players

The goal of extending the game to examine n players is to increase its validity in examining instances of regime change observed in the past. In the n -player game, beliefs about payoffs will be informed by an adaptive approach [29]. Generally, this means that players' expectations of future actions and outcomes are informed by observations of past actions and outcomes. This contrasts with the more common, but idealized assumption that people are generally rational and have an infinite capacity to reason through complex economic or political problems.

Payoff Heterogeneity at Time i

Additionally, with n players, we consider the payoff cases on an individual basis. This means that within the populace, there may be one player experiencing a Free-Rider Dilemma case, and another player experiencing a Stag Hunt case, for example. This extends to any other combination of any or all of the cases. This allows the model to capture the impact of different value systems, socioeconomic factors, and other influences, and how these varied payoff conditions affect coordination efforts and outcomes.

This affects the equilibrium of the game significantly. When payoffs are asymmetric, Nash equilibria may be added or removed relative to the “pure” case. This can produce unique or multiple equilibrium solutions that vary from any of the pure cases when considered individually. Since our intended application is the description of past events, we can retroactively analyze individuals with varying relationships between payoffs, and how this affects mobilization dynamics.

Equilibrium Analysis with n Players

When the game is extended to consider n players, the total number of possible outcomes scales according to 2^n .

Functioning Regime

When expanded to n players, the Functioning Regime case maintains a dominant strategy equilibrium of unanimous inaction. This results in a single Nash equilibrium solution where all players are offered the highest utility by not acting.

Free-Rider Dilemma

When extended to consider n players, the number of unique Nash equilibria outcomes scales according to $NE(n, k) = \sum_{j=k}^n \binom{n}{j}$. The ratio of all possible outcomes to Nash equilibrium outcomes scales as a function of k/n representing the proportion of the population

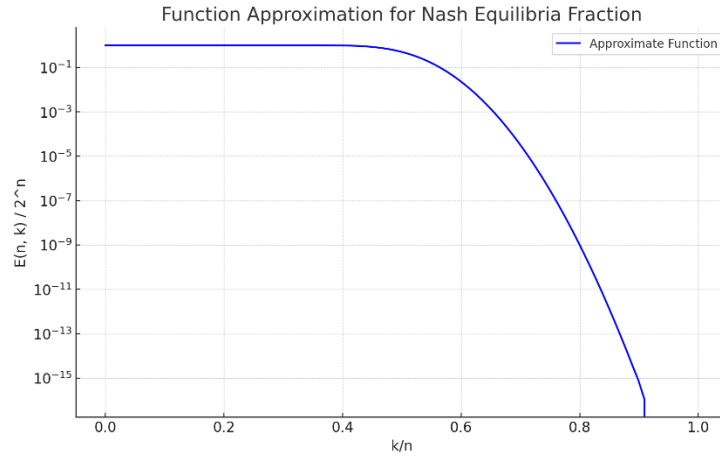


Figure 3.1 Nash Equilibrium Scaling Approximation

required for successful regime change, which can be approximately visualized as:

$$f\left(\frac{k}{n}\right) = 1 - \Phi\left(\frac{\frac{k}{n} - .5}{\frac{.5}{\sqrt{n}}}\right).$$

The graph in Figure 3.1 shows a graphical approximation (as opposed to the computationally intensive accurate enumeration) of this relationship. This means that in circumstances when regime change is difficult ($k \rightarrow n$), the number of Nash equilibria

decreases. It also shows that the populace's cognitive load of processing possible outcomes decreases as successful regime change requires greater mobilization. As k increases relative to n , the coordination problem decreases, but the mobilization problem increases. This reduction in Nash equilibria as regime strength increases indicates the elimination of free-riding opportunities. As these opportunities are eliminated, an increasing subset of the population must be mobilized to realize any payoff-dominant Nash equilibrium.

The lack of an incentive to act (since $R = X$) if enough other players act to produce successful regime change is still present and must be overcome by an increasing fraction of the players as $k \rightarrow n$ if regime change is to be realized.

Unacceptable Regime

The Unacceptable Regime case extends to the n -player game in the same way as the Free-Rider Dilemma case, except for the lack of a risk-dominant equilibrium of unanimous inaction. Still, no player is incentivized to act, which retains the free-riding dynamics of the previous case.

Stag Hunt

In the n -player extension of the Stag Hunt case, the core features are consistent with the 3-player analysis. Specifically, the presence of two distinct Nash equilibria persists: the payoff-dominant equilibrium, characterized by collective action against the regime, and the risk-dominant equilibrium, defined by unanimous inaction. Selective incentives continue to be provided, maintaining the condition that the reward for successful collective action (R) surpasses the payoff for abstaining from participation (X). The modified payoff structure also remains intact, wherein successful regime change eliminates the safer payoff (N) for those who do not participate.

However, the n -player scenario introduces new considerations. Most notably, coordination complexity increases, driven by heightened uncertainty as each player attempts to anticipate the actions of a larger group. As group size expands, the marginal impact of an individual's decision diminishes, which intensifies coordination challenges. Practically, this dynamic renders the payoff-dominant equilibrium increasingly challenging to achieve, while simultaneously making the risk-dominant equilibrium more appealing. Additionally, the condition where the threshold of players required for regime change (k) is less than the total group size (n) further complicates strategic considerations. It allows for successful regime change without unanimous participation, but since any player who initially opts to free-ride would be incentivized to switch to participation (given that R exceeds X), no stable equilibrium emerges from partial mobilization. Thus, the only equilibria remain the two extremes—unanimous action or unanimous inaction.

Weak and Unacceptable Regime

In the n -player extension of the Weak and Unacceptable Regime case, the dominant strategy equilibrium of unanimous action persists, as action against the regime remains the best choice for every individual player regardless of the choice of strategy played by others.

Dual Payoff Spaces Defined by k_i

When the number of players (n) is less than the threshold required for successful regime change (k_i), the strategic interdependence between players is eliminated, as payoffs no longer depend on the actions of others. In this scenario, payoffs R and X become unattainable, leaving only outcomes determined by the relative values of F and N . In this case, equilibrium analysis simplifies significantly, as players' optimal choices are independent of collective action, which effectively removes the game-theoretic considerations.

Chapter 4 - Case Studies

Case Studies as an Experimental Method

We chose to use case studies as a means of testing the model against a past example of the situation which we hope to offer prescriptive insights into. As noted previously, published analyses of regime change are most often descriptive in nature. In contrast, the use of historical case studies allows for both prescriptive and descriptive insights. This approach not only tests the model's validity against the complexities of human conflicts but also provides a framework for interpreting outcomes in a way that bridges theory and practice.

Despite their utility in this research, case studies are not without their risks and challenges. The primary risk in using case studies as experimental validation lies in the temptation to use an ungeneralizable event to support a generalization. In other words, seeking to use an exception to prove a rule. This risk has been mitigated by engaging with case studies and modeling approaches with intellectual humility, consulting experts in political science, game theory, and the mathematical modeling of conflicts, and clearly communicating the limitations of our analyses.

Choice of Case Studies

We chose to study the Russian Revolutions of 1905 and 1917 for the following reasons.

1. The events are well studied and well documented
2. The actions of the populace resulted in regime change
3. Compared to other historical examples of regime change, the Russian Revolution(s) offered a larger variety of root causes (originating both inside and outside the country), and would therefore serve as a better validation testing for our model

Method of Evaluation

The goal of this analysis is to investigate the conditions under which strategic interactions among a population lead to the onset of collective action sufficient to overturn a regime. We are specifically interested in the initial convergence toward collective revolt, rather than on the duration, termination, or severity of ensuing instability. Our focus is on the transformation of stability into regime collapse, characterized by the convergence of a significant portion of the populace to a payoff-dominant equilibrium.

We seek to determine how the payoffs perceived by the player population evolve over time. Payoffs are evaluated in relation to one another, rather than through explicit enumeration. This approach positions our study as a game-theoretic examination of strategic-level issues, intended to complement more detailed analyses of past conflicts. By adopting this relative approach, we aim to identify equilibria, critical relationships, patterns, and conclusions that can be more clearly communicated, including to non-subject matter experts.

It is difficult to determine when a conflict truly begins, as its causes can stretch back centuries. However, for this case study, we focused on the period where underlying structural changes created new strategic dilemmas for both the populace and the regime. The 1861 peasant emancipation marked a fundamental shift in Russian society, restructuring land ownership and economic obligations in ways that heightened tensions rather than resolving them. While earlier grievances existed, the legal and economic restructuring introduced new uncertainties, altering the strategic calculations of all actors. This analysis, therefore, begins at the point where these shifts began to directly influence the decision-making processes that ultimately led to regime instability and collapse.

Implementation

These cases are used not only to test the model's structure but to examine how changes in perceived payoffs and regime strength shaped the strategic environment faced by the populace. The analysis proceeds by identifying key population groups—such as peasant farmers, urban workers, minority communities, intellectuals, and the armed forces—and tracking how the relative attractiveness of different outcomes (e.g., maintaining the status quo, successful or failed revolt) evolved for each group over time. Payoff values (R, F, N, and X) are evaluated qualitatively based on historical conditions, policy changes, and events such as repression, war, famine, and regime concessions. By reconstructing these shifts in strategic conditions, we assess whether and how different segments of the population converged toward dominant strategies or coordination thresholds consistent with the model's predictions. This approach enables a detailed test of the model's ability to explain the onset of revolutionary action under real-world circumstances.

Russian Revolutions of 1905 and 1917

1861-1891

Peasant Emancipation (1861)

The abolition of serfdom in 1861, championed by Tsar Alexander II, was a landmark reform aimed at modernizing Russia's feudal economy and preventing peasant uprisings. However, rather than alleviating social and economic pressures, it introduced new instability. Emancipated peasants were granted small land allotments but were burdened by redemption payments, which, in practice, functioned as a long-term tax on their economic productivity. The state-controlled mir system of communal land ownership ensured peasants could not easily sell or mortgage their land, which tied them to economically inefficient agrarian structures [30].

This structure exacerbated resentment, as peasants were now legally free but remained functionally dependent on the landowning class and the state. Their increasing desperation made regime change a more attractive proposition, particularly when faced with environmental or economic shocks. Scholars argue that this latent unrest would form a crucial foundation for the revolutionary potential of the countryside [31].

The Agrarian Problem (1861–1891)

The agrarian system's inherent contradictions became more visible over the next three decades. Despite emancipation, many peasants were unable to produce enough food to sustain their families, let alone generate surplus for trade. The lack of private land ownership further limited economic mobility, creating conditions in which even minor economic downturns led to widespread distress.

The 1891 famine exemplified the fragility of peasant survival. A devastating drought reduced grain yields, and the government's decision to continue exporting grain rather than alleviating domestic shortages worsened the crisis. Scholars note that famine-driven desperation often results in high-risk collective action, as the cost of inaction (starvation) becomes unbearable [32]. The famine also highlighted the state's failure to provide basic economic security, reinforcing the perception that the status quo was untenable.

The Labor Problem: Industrialization and Worker Unrest (1861–1905)

Industrialization under Finance Minister Sergei Witte's policies (commonly referred to as the "Great Spurt") resulted in rapid urbanization, but it did so without adequate social and physical infrastructure to allow for a high quality of life. Russia's newly formed urban working class faced:

- Extremely low wages that barely covered subsistence costs.

- Excessive working hours, often exceeding 12–14 hours per day.
- Overcrowded housing, where entire families lived in single-room apartments with poor sanitation.

These conditions mirrored patterns observed in other industrial revolutions, where urban workers with no legal recourse began forming underground networks for collective bargaining [33]. In Russia, the state attempted to suppress labor agitation rather than mediate it, pushing workers toward radicalization. The lack of legal political avenues forced workers into illegal strikes and demonstrations, a precursor to the widespread revolutionary activities of 1905.

The Nationality Problem and Russification (1861–1905)

The empire's vast ethnic diversity made governance difficult, and the late 19th century saw increasingly aggressive Russification policies aimed at unifying disparate cultural and linguistic groups under a single Russian identity [34]. Russification followed three primary strategies:

1. Linguistic and educational suppression – Local languages were banned in schools and government institutions.
2. Religious homogenization – Non-Orthodox Christian and Muslim populations faced pressure to convert.
3. Political disenfranchisement – Certain ethnic groups, particularly Poles and Baltic Germans, saw their local political structures eroded.

While Russification sought to strengthen the empire, it alienated large segments of the population. The Polish Uprising of 1863 had already demonstrated that cultural repression could lead to violent resistance. By the early 20th century, these tensions contributed to localized revolts and weakened the regime's ability to project a unified image of strength.

The Educated Class and Intellectual Radicalization (1860s–1905)

Alongside industrialization, Russia saw the emergence of an educated middle class, which demanded increased political participation. This class grew out of a series of state-sponsored reforms in the mid-19th century, including the expansion of universities, the liberalization of censorship laws under Tsar Alexander II, and the creation of new administrative and technical roles to support modernization. The 1860s witnessed the formation of a public sphere where academics, journalists, and professionals debated issues of governance and reform. This led to an expansion of liberal and socialist thought that openly criticized autocracy.

However, in 1861, the state responded to student activism with harsh crackdowns, including university closures and bans on student organizations [35]. Such measures radicalized many young intellectuals, some of whom embraced revolutionary terrorism as a means of enacting change. The assassination of Tsar Alexander II in 1881 by Narodnaya Volya exemplified this turn toward direct action, demonstrating that segments of society were willing to use extreme measures to achieve reform.

By the early 20th century, these educated revolutionaries formed the leadership of various opposition movements, including the Bolsheviks and Mensheviks. They played a critical role in coordinating and communicating revolutionary ideology to broader social groups.

Famine of 1891

The famine of 1891–92 devastated the rural population, with millions facing starvation and disease. The state's slow and inadequate response severely damaged its credibility. Relief efforts were hampered by bureaucratic inefficiencies, and many blamed the government's continued grain exports for worsening the crisis [31].

1891-1905

Witte's Great Spurt and the Consequences of Industrialization

Sergei Witte's economic policies in the 1890s initiated a period of rapid industrialization known as the "Great Spurt." Seeking to modernize Russia's economy, Witte emphasized railway expansion, foreign investment, and heavy industry, particularly in coal, steel, and oil. These policies successfully increased Russia's industrial output but came at a cost. While urban centers grew as peasants migrated to cities in search of work, the infrastructure to support this urban expansion remained inadequate.

The working conditions in these newly industrialized cities were brutal. Factory laborers worked long hours in poorly ventilated, overcrowded spaces for meager wages. Housing shortages led to slum-like conditions, with multiple families crammed into single-room apartments. The lack of worker protections meant that industrial accidents were common, and wages remained stagnant despite rising productivity. The Russian government introduced limited labor reforms, such as the 1897 law capping the workday at 11.5 hours, but these measures were insufficient in addressing widespread discontent [25].

Attempts to establish organized labor movements were met with repression. Strikes were frequent, but without legal protections, workers who participated faced dismissal, blacklisting, or arrest. However, the growth of a more politically conscious working class was an unintended consequence of industrialization. Urban workers, increasingly aware of their collective grievances, became susceptible to revolutionary ideologies as potential alternatives to the regime became more attractive than the status quo. The Russian Social Democratic Labor Party (RSDLP) and other radical groups began gaining traction, particularly in industrial hubs like St. Petersburg and Moscow.

The Russo-Japanese War (1904–1905)

The outbreak of the Russo-Japanese War in 1904 was initially intended as a means for the Russian government to bolster national unity and distract from domestic problems. Instead, it served as a catalyst for revolution. The war, fought over control of Manchuria and Korea, exposed deep structural weaknesses in the Russian military and administration. Japan, a smaller and less industrialized nation, inflicted humiliating defeats on the Russian Empire. The fall of Port Arthur in January 1905 and the catastrophic naval defeat at Tsushima in May 1905 shattered the image of Russian military strength [36].

For the Russian populace, and particularly for the military, the war was a disaster. Soldiers endured poor leadership, outdated equipment, and logistical failures that led to unnecessary casualties. Many conscripts, drawn from peasant backgrounds, already harbored resentment toward the state due to land shortages and economic hardship. The war further alienated them, as they witnessed firsthand the incompetence of the Tsarist regime.

Discontent spread beyond the battlefield. Military defeats abroad undermined the perception of the regime's strength at home. The belief that the autocracy was invulnerable had long been a deterrent to open resistance; now, that perception eroded. If Japan—a nation that Russia had underestimated—could challenge the empire, then perhaps so could the Russian people. The war created a situation where soldiers, workers, and even segments of the middle class began reassessing their tolerance of the status quo. This shift in perceived regime strength was critical in enabling the events of 1905.

1905-1907

December 25, 1904 – Nicholas II's Initial Concessions

Amid growing public unrest and calls for reform, Tsar Nicholas II issued a manifesto on December 25, 1904, attempting to address demands for local governance. The document introduced minor administrative adjustments, promising an expansion of local self-government, more equitable application of the law, and limited improvements in worker conditions. However, it failed to address the most crucial demand: a representative national legislature with actual authority [37]. The absence of this fundamental reform immediately undermined the credibility of the manifesto among opposition groups, who viewed it as an empty gesture. Instead of placating dissent, this partial concession emboldened reformists and revolutionaries, reinforcing their belief that only escalated action would yield meaningful change [37].

January 22, 1905 – Bloody Sunday

On January 22, 1905, approximately 150,000 unarmed workers and their families, led by the priest Georgy Gapon, marched toward the Winter Palace in St. Petersburg to present a petition directly to Nicholas II. The marchers, numbering in the tens of thousands, sought improved working conditions, fair wages, and a constitutional government. Rather than meeting them with dialogue, the authorities responded with gunfire. Estimates of the dead range from several hundred to over a thousand [25], [37].

The immediate consequence of Bloody Sunday was a psychological shift in how the Russian populace viewed their relationship with the state. Many had approached the Tsar with the belief that he was a paternal figure who, if made aware of their suffering, would enact reforms. The massacre shattered this perception. Rather than being a protector, the Tsar was now seen as an enemy of the people. This shift undermined the legitimacy of the regime in the eyes of those who had previously sought change through legal means [37].

The political fallout was severe. Strikes erupted across the empire, universities became hotbeds of protest, and even segments of the military mutinied. Bloody Sunday revealed the regime's strategy of indiscriminate repression. By punishing even those who sought peaceful reform, the state inadvertently removed any incentive for moderates to remain within legal channels. The logic became clear: if dissenters would be punished regardless of their approach, then radical action was no riskier than peaceful petitioning. This dynamic played a key role in the escalation of revolutionary activity.

Bloody Sunday serves as a textbook example of poorly targeted repression. The regime's actions did not deter dissent; instead, they increased revolutionary participation by eliminating the perceived viability of non-violent alternatives. This is a classic failure mode in regime maintenance: rather than reinforcing compliance, repression in this instance served as a coordination mechanism for the opposition.

May-July 1905 – Naval Mutinies

The wave of unrest spread to the armed forces, where poor conditions, resentment over the humiliating Russo-Japanese War defeat, and revolutionary agitation led to several mutinies:

- June 14, 1905 – The *Potemkin* Mutiny: Sailors aboard the battleship *Potemkin* in the Black Sea revolted after an officer ordered the execution of crew members who refused to eat maggot-infested meat. The mutineers seized control of the ship, killed their officers, and attempted to rally support at the port of Odessa, where workers had already begun striking. The regime responded by ordering the army to restore order, resulting in an estimated 2,000 deaths in Odessa [37]. The *Potemkin* eventually surrendered to Romanian authorities.

- November 11-15, 1905 – Kronstadt and Sevastopol Revolts: Inspired by *Potemkin*, sailors at Kronstadt, near St. Petersburg, and Sevastopol on the Black Sea launched mutinies demanding an end to autocracy and better living conditions. The government crushed both uprisings with military force, executing the ringleaders [37].

Despite these mutinies, the army remained mostly loyal to the tsar, which proved to be a crucial factor in the regime's survival [38].

October 1905 – The General Strike and the Formation of the St. Petersburg Soviet

Between September and October 1905, labor unrest escalated into a coordinated general strike. On October 7, railway workers initiated a strike that quickly spread to industrial centers, halting economic activity across the empire. The strike culminated in the formation of the St. Petersburg (also known as “Petrograd”) Soviet on October 13, 1905, a worker-led council that coordinated strikes and called for continued resistance against the regime [39]. The Soviet issued proclamations urging workers to demand political reforms, threatening the government's control over urban centers.

October 17, 1905 – The October Manifesto and Temporary De-escalation

Faced with paralyzed industry and growing disorder, Nicholas II issued the October Manifesto, drafted by Prime Minister Sergei Witte. The manifesto promised civil liberties, freedom of speech, association, and, most notably, the creation of a legislative body, the Duma [37]. The announcement successfully split the opposition—liberal groups and moderate reformists accepted it as a step toward constitutional government, while socialists and radicals rejected it as an insincere measure designed to preserve autocracy [37]. The manifesto's guarantees were vague and subject to reversal, leading many workers and peasants to view it as a temporary concession rather than a structural transformation [37].

December 1905 – The Moscow Uprising and the Turn to Repression

The revolution's most violent phase occurred in December 1905, when armed insurrection broke out in Moscow. On December 7, workers declared a general strike, which escalated into street battles between revolutionaries and government troops. By December 10, the government deployed heavy artillery, shelling working-class districts and killing over 1,000 people. The insurrection was crushed by December 18 [37]. Following this, the government intensified repression, arresting thousands of revolutionaries and dissolving workers' councils.

April 27, 1906 – The First Duma and the 1906 Constitution

In accordance with the October Manifesto, the First Duma convened in April 1906. However, its powers were strictly limited. The new "Fundamental Laws" issued by the tsar reaffirmed his absolute authority, including his right to dissolve the Duma at will [38]. When the elected representatives pushed for land reforms and constitutional limits on monarchy, Nicholas dissolved the Duma on July 21, 1906 [37]. This move signaled that the regime had no intention of allowing real parliamentary influence.

The Electoral Coup

After dissolving the Second Duma in June 1907, Nicholas II unilaterally changed the electoral laws, dramatically reducing representation for peasants and workers while strengthening the influence of landowners and nobles [37]. This effectively ensured that future Dumas would be compliant with the monarchy, marking the final rollback of revolutionary gains.

Conclusion

The events of 1904-1907 constituted a fundamental test of the tsarist regime's resilience. Although mass strikes, mutinies, and armed uprisings seriously threatened Nicholas II's rule, the

regime managed to suppress dissent through selective concessions, military force, and political manipulation. The revolution ultimately failed to achieve systemic change, but it established a precedent for mass mobilization and exposed the monarchy's dependence on repression to maintain order.

From a game-theoretic perspective, the revolution's failure suggests an instance where opposition forces lacked the coordination necessary to force a regime collapse. The government's strategy—combining limited concessions with major crackdowns—enabled it to maintain control. These patterns of interaction will be formally analyzed in the following sections.

1907-1917

Economic Recovery

Following the economic downturn caused by the Russo-Japanese War and the 1905 Revolution, Russia's economy began to recover in the years leading up to World War I. Industrial output increased, particularly in sectors tied to state investments in heavy industry and military production. Between 1909 and 1913, Russian industrial production grew at an average rate of about 6% per year, with expansion particularly notable in coal, iron, and oil [40].

For some segments of society, this economic upswing brought tangible benefits. A growing urban working class found new employment opportunities, and wages rose modestly in certain industries. However, these gains were largely offset by inflation, poor working conditions, and the continued strain of rural poverty [41]. The limited economic improvements did little to alleviate the longstanding structural issues facing Russia's peasantry. Although industrial expansion created a greater demand for grain and agricultural products, rural

conditions remained harsh. Land redistribution efforts had failed to provide most peasants with sustainable farms, and population growth placed increasing pressure on arable land [25].

In urban areas, the influx of peasants into industrial jobs led to overcrowded living conditions, rising rents, and increased social unrest. Factory workers faced long hours, low pay, and dangerous conditions, and strikes became increasingly common. The state attempted to suppress labor unrest with repression rather than reform, leading to further alienation between workers and the regime [42].

Russia Enters World War I

When Russia entered World War I in 1914, there was an initial surge of patriotic enthusiasm. Unlike the unpopular and humiliating Russo-Japanese War, which had been fought for imperial expansion in the Far East, the conflict in Europe was framed as a defense of Slavic Serbia against Austro-Hungarian aggression. The tsarist government positioned itself as the defender of Slavic unity, and for a brief period, this narrative resonated with the Russian population [43].

Additionally, the military reforms enacted after the Russo-Japanese War gave Russia a stronger initial position in the early phases of the war. Lessons had been learned regarding logistics, mobilization, and coordination, and early Russian offensives in Galicia in 1914 were initially more effective than many expected. However, these early gains were quickly overshadowed by strategic failures, logistical breakdowns, and devastating losses on the battlefield.

Military Failures and Defeats

Despite early optimism, Russia's war effort quickly soured. The Russian army suffered massive casualties in the opening years of the war, particularly in the disastrous defeat at

Tannenberg in 1914 and the Gorlice-Tarnów Offensive in 1915, which resulted in a forced retreat from Poland [44]. These failures exposed fundamental weaknesses in the Russian military—poor coordination between units, outdated logistical infrastructure, and a reliance on poorly trained conscripts.

Rather than addressing these problems through systemic reforms, Tsar Nicholas II made one of the most disastrous political decisions of his reign: in September 1915, he assumed direct command of the Russian military, making himself personally responsible for the war effort. This move was intended to project strength and rally national confidence, but it backfired catastrophically.

- The tsar was not a capable military leader. He lacked the strategic-level skills to lead effectively and became a figurehead for all military failures.
- His absence from Petrograd created a power vacuum, shifting day-to-day governance into the hands of Empress Alexandra and her inner circle, particularly the increasingly unpopular Rasputin.
- The military continued to suffer defeats, reinforcing public perception that Nicholas II was incompetent and disconnected from reality [45].

As the war dragged on, desertion rates skyrocketed. Many soldiers—particularly peasant conscripts—felt little allegiance to the cause and resented being used as cannon fodder. By 1916, entire units were abandoning their posts, refusing orders, or engaging in mutinies, undermining the army's effectiveness and contributing to the growing instability on the home front [46].

Political Conflict Between the Tsar, Duma, and Bureaucracy

The war exacerbated the already tense relationship between the tsar and the Duma. While the Duma had always been a limited institution, the war forced it into an increasingly active role

in governance. The need for rapid decision-making and resource allocation gave the Duma more influence, particularly through the formation of war industries committees, which coordinated production for the war effort. However, rather than seeing this as a necessary wartime adaptation, Nicholas II viewed it as an encroachment on his authority.

This dynamic created several key conflicts:

- The tsar and his ministers obstructed Duma initiatives, fearing that increased parliamentary authority would weaken the regime.
- The military leadership often refused to cooperate with civilian bureaucrats, further disrupting war logistics and contributing to supply shortages.
- Workers who gained limited representation through war industries committees used this platform for political opposition, especially as wartime conditions worsened [42].

By 1916, these tensions reached a breaking point. A growing number of Duma members—including those who had previously supported the monarchy—began advocating for Nicholas II's abdication. Political moderates and liberals in the Duma saw the tsar's removal as a necessary step to preserve stability and prevent revolution.

Economic Crisis and Home Front Hardships

The war placed immense strain on Russia's economy. The loss of access to foreign trade, combined with poor wartime economic policies, led to severe inflation, skyrocketing food prices, and chronic shortages of fuel and essential goods [40]. The Russian railway system, already overburdened in peacetime, was unable to efficiently transport supplies to both the front lines and civilian populations, leading to supply chain breakdowns.

By the winter of 1916-1917, conditions had become dire:

- Bread rationing was introduced in major cities, leading to long lines and frequent shortages.
- Fuel shortages left homes and businesses unheated during harsh winters.
- Urban workers faced declining real wages as inflation outpaced earnings.
- Peasants hoarded grain rather than selling it at fixed government prices, exacerbating food shortages in cities [47].

These crises were not just logistical problems—they represented a fundamental breakdown in the social contract between the state and the people. Hunger and economic desperation radicalized the urban population, setting the stage for mass protests and strikes. Many soldiers, drawn from the peasantry, became unwilling to suppress unrest at home while their own families suffered.

By early 1917, a convergence of factors—the military’s disintegration, economic collapse, political deadlock, and widespread social unrest—created the conditions for revolution. The February Revolution was not the result of a single event but rather the culmination of years of systemic failures, each compounding the next, until the autocratic state could no longer sustain itself.

1917

February Revolution

On International Women’s Day, what began as small gatherings rapidly transformed into large-scale political demonstrations, fueled by striking industrial workers. The composition of the crowd—women, students, and workers—made the army reluctant to intervene. By March 10, nearly every industrial enterprise in Petrograd had ceased operations. The city’s commercial and service sectors also shut down, as students, white-collar employees, and teachers joined the

movement [42]. The demonstrations reflected broad grievances beyond working conditions—years of economic hardship, food shortages, and government repression had culminated in mass unrest that could no longer be contained.

The following day, Tsar Nicholas II ordered the military to suppress the unrest. However, rather than quell the protests, this directive led to mass defections among the troops, who refused to fire on civilians. Many of these soldiers were peasants in uniform, who sympathized with the demonstrators rather than the government that had conscripted them into an unpopular war. With the army's loyalty in doubt, Nicholas prorogued the Duma, hoping to reassert control. The deputies, defying the Tsar's orders, formed the Temporary Committee to maintain order in Petrograd. At the same time, socialist factions seized the moment to establish the Petrograd Soviet, positioning themselves as the representatives of workers and soldiers [45]. The rapid emergence of dual power revealed the extent of the Tsarist regime's erosion; workers and soldiers no longer looked to the monarchy for leadership.

Though the Tsar's authority was disintegrating, power remained contested. The Provisional Government, formed by the Duma, claimed to represent Russia's official leadership. Yet, the Petrograd Soviet—controlled in part by socialist revolutionaries—challenged its legitimacy. This dual power structure created immediate instability, as neither body had undisputed control over the armed forces or the broader population. Prime Minister Alexander Kerensky faced immense opposition. Soldiers, workers, and peasants—having risked everything in the revolution—felt their struggles had yielded no tangible benefits. The Provisional Government's failure to immediately address these concerns led to growing support for radical alternatives.

- The war continued, with mounting military losses at the front.

- Returning soldiers, many of whom defected, were either imprisoned or forced back into service.
- There was a growing demand to withdraw from the war, which the Provisional Government resisted.
- Food and supply shortages persisted, exacerbating economic hardships.
- Rival political factions actively sought to undermine Kerensky's authority.

These failures disillusioned different segments of the population in distinct ways.

Industrial workers gravitated towards socialist parties, particularly the Bolsheviks, as they saw little improvement in wages or working conditions. Peasants, who had initially welcomed the revolution, were dismayed at the continued war effort and lack of land redistribution, pushing them towards radical alternatives. Returning soldiers, increasingly embittered, became a volatile force—some supported the Bolsheviks, while others simply abandoned political engagement altogether.

Without a clear resolution to these issues, the fragile balance between the Provisional Government and the Petrograd Soviet was destined to collapse.

Lenin and Bolshevik Consolidation

Seizing on the growing disillusionment, Lenin saw an opportunity to realize his Marxist revolution. With German assistance, he returned to Russia, bringing a message that resonated deeply: "Peace, Land, and Bread." The Provisional Government sealed its own fate by doubling down on the war, alienating a public already weary of suffering. Support for the Bolsheviks surged as they positioned themselves as the only major party unconditionally opposed to the war [43]. Their unyielding stance won them increasing influence among soldiers and workers, particularly as other socialist factions hesitated to fully break with the Provisional Government.

In this period of instability, the increasingly powerful Bolsheviks were able to offer significant incentives to urban workers who formally joined their ranks. Those who joined the Red Guard militias were offered immediate protection against counterrevolutionary violence, persecution, or repression by the regime. This immediate security benefit aligns with Humphreys and Weinstein's argument that personal safety or "feeling safer inside" a group is a strong selective incentive for individual participation [48]. In addition to personal security, there were immediate opportunities to occupy leadership roles or positions of authority in local revolutionary committees, Soviets (councils), trade unions, or workers' groups that could incentivize participation. Individuals who participated actively and visibly often gained personal recognition, increased social standing, and direct authority within revolutionary circles.

As unrest mounted, the Bolsheviks demonstrated this organizational strength. Their militias and influence over railroad and telegraph workers allowed them to suppress an attempted coup against the Soviet. Leon Trotsky, a key Bolshevik leader, soon became chairman of the Petrograd Soviet, further consolidating their control [45]. The Bolsheviks' ability to act decisively in moments of crisis increased their credibility, while their continued anti-war messaging solidified their support among soldiers and lower-class Russians.

Other socialist factions hesitated to break with the Provisional Government, favoring national unity over class struggle. In contrast, the Bolsheviks remained uncompromising in their revolutionary stance. This consistency appealed to lower-class Russians, who increasingly saw the Provisional Government as an extension of the old regime. Landless peasants and urban workers, feeling betrayed by a government that had failed to provide relief, turned to the Bolsheviks as the only party advocating immediate and radical change. Once the Bolsheviks

secured control of the Petrograd Soviet, they formally demanded the dissolution of the Provisional Government in favor of Soviet rule [42], [49].

October Revolution

In October 1917, the Bolsheviks launched their final move. The Red Army swiftly seized control of key locations in Petrograd and Moscow with minimal bloodshed. Within days, they had toppled the Provisional Government, marking the beginning of Bolshevik rule and igniting the Russian Civil War [44]. The ease of the takeover reflected the waning legitimacy of the Provisional Government—it had failed to secure the loyalty of the military, the workers, or the peasantry.

For soldiers, the revolution promised an end to the war and a chance to return home. For workers, it offered control over production and improved conditions. For peasants, it held the promise of land redistribution. Although these promises would later prove more complex in implementation, in the moment, they secured widespread support for Bolshevik rule. With the collapse of the Provisional Government, the Bolsheviks positioned themselves as the sole rulers of Russia, setting the stage for the internal struggles and civil war that would follow.

Chapter 5 - Evaluation

After understanding the key events and influences, we analyzed their effects on payoff values and regime strength, and/or the populace's beliefs about those values over time. These changes drive more widespread transitions from one case to another over time. To assist in the structure of the analysis, we will generalize the populace into groups that were particularly affected by many key events in the progression towards widespread revolution. These groups are:

1. Peasant farmers
2. Urban workers
3. Minority groups
4. Intellectuals
5. Armed forces

These groupings are established by a combination of occupational, socioeconomic, legal, ethnic, and/or some other status. An individual may move from one group to another (a peasant farmer being conscripted into the armed forces for example) but the definition and existence of all of these groups does not change over the course of events. There are also other groupings of people that we find useful in analyzing the impact of events on players' outlooks. These are typically ideological or political in nature, i.e. liberals, moderates, socialists, etc. Individuals from a socioeconomic or ethnic group may hold differing political views, and there may be more utility in grouping them by said political or ideological views. We also will refer to formally organized groups like the Petrograd Soviet.

Our analysis will focus on the payoff and regime strength variables defined earlier. *R* refers to the payoff that a player believes that they will receive if they act against the regime and

are successful in producing regime change. X refers to the payoff that a player believes that they will receive if they do not act against the regime, and regime change occurs anyway. The difference between R and X captures the value and/or existence of selective incentives (benefits that are only offered to those who act against the regime). F refers to the payoff that a player believes that they will receive if they act against the regime and are unsuccessful in producing regime change. This captures the punishment that the regime levies against revolutionaries. N refers to the payoff that a player believes that they will receive if they do not act against the regime, and the regime continues to exist. This captures the value of the status quo.

Table 5.1 Individual Payoff Matrix

Payoffs	Regime/status quo ended	Status quo maintained
Act against the regime	R	F
Participate in status quo	X	N

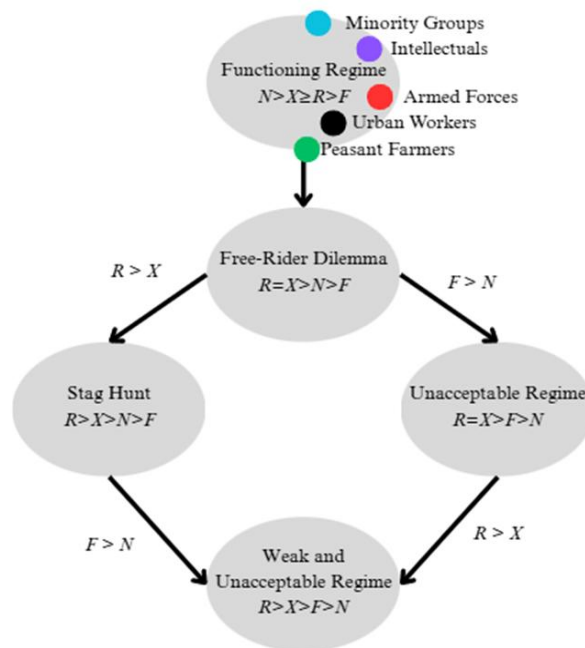


Figure 5.1 Payoff Status 1861

Figure 5.1 summarizes the five cases introduced in Chapter 3. Similar figures will be used to show the status of the key groups at a given time, beginning in 1861.

1861-1891

Peasant Emancipation and the Agrarian Problem (1861–1891)

Change in payoffs for peasant farmers:

- N is relatively high after serf emancipation, because of the perception of upward mobility and increased autonomy afforded to the peasants. During this time period, though, it becomes clear that peasants are still dependent on the landowning class and state, and N decreases due to continued or increasing hardship and a practical lack of mobility.
- R increases, as a successful land reform would improve livelihood.
- F improves, but remains low, as failed revolts lead to harsh punishments, but as subsistence on the part of peasant farmers becomes more difficult, acting against the state or against the rule of law to obtain resources for basic survival becomes more appealing.

- X echoes R , as no selective benefits exist for taking action against the regime.

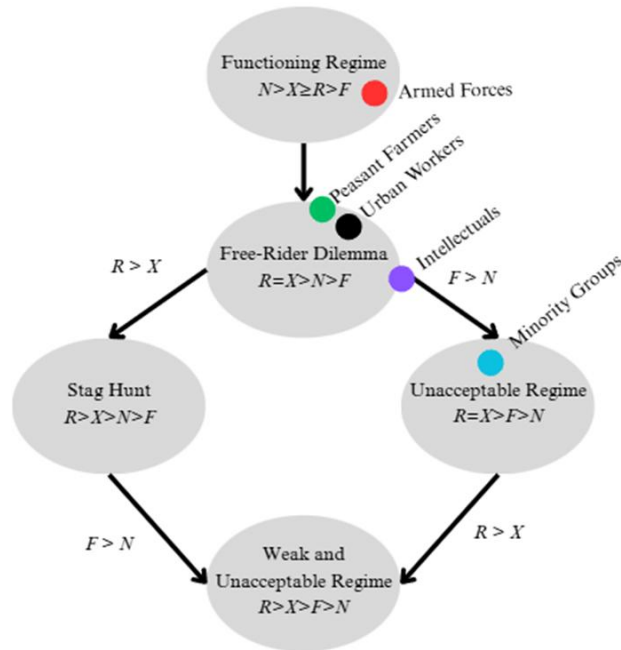


Figure 5.2 Payoff Status 1891

In 1861, the payoffs offered to peasant farmers represent a Functioning Regime case. The perception of increased opportunity and autonomy under the same regime created a more positive outlook on the status quo. In the 30 years to follow, however, R , F , and X increase, and N decreases, which brings the situation closer to less stable cases for the segments of the peasant population who struggle most.

The Labor Problem: Industrialization and Worker Unrest (1861–1905)

Change in Payoffs for Urban Workers:

- N decreases, as quality of life for factory workers deteriorates.
- R increases significantly, as union successes promise improved conditions.
- F remains negative, as unsuccessful strikes lead to firings, imprisonment, or exile.
- X increases, echoing R , as it is impacted by the same factors, and no selective incentives exist.

Inadequate structural and social infrastructure resulted in similar dynamics for urban industrial workers as faced by the peasant population. R and X increase, while N decreases, all for quality of life reasons. F is primarily dictated by the regime's ability to maintain control over dissenters and prevent the subversion of rule of law. These tasks are easier to accomplish (in a physical sense) in urban areas, and therefore F remains low for the urban working population.

The regime's repressive response, and the fact that striking remained illegal, meant that even peaceful demonstrations or strikes were technically subversive in nature. Since there was no legal means to improve the situation, the more intolerable the status quo became, the more palatable F and R became for the urban population.

The Nationality Problem and Russification (1861–1905)

Change in Payoffs Among Minority Groups:

- N declines, as forced cultural assimilation reduces autonomy and opportunities. This decline is compounded due to poor targeting of deportations and suppression, leaving non-actors being punished as if they acted.
- R increases, as successful resistance promises restoration of cultural and political rights.
- F remains highly negative, as failed resistance often results in mass deportations or suppression.
- X remains uncertain, as the benefits of regime change for minorities vary by region, making generalization extremely difficult. There is little to no evidence of selective incentivization for action, implying that X reflects R .

The same dynamics resulting from poorly targeted repression are present in these groups, as with the urban working class. In this case, they are even more widespread, as entire ethnic or national groups are disenfranchised. As evidenced by the famously nationalistic Baltic states, this

sort of repression consistently increases R and F , and decreases N . The severity of these changes seems to be a product of the degree of nationalism and religious devotion present in the group experiencing repression. The Polish Uprising of 1863 exemplifies this. Even in a period of relatively high regime strength, and correspondingly high k'_i , an insurrection swept through Poland, with a wide range of social groups participating in action against the regime [50].

The Educated Class and Intellectual Radicalization (1860s–1905)

Change in Payoffs for Intellectuals:

- N decreases, as repression of free speech and academic restrictions escalate. Harsh crackdowns also result in radicalization, as university closures and bans of student organizations affected academic non-actors as if they were actors.
- R increases, as successful resistance would allow intellectual freedom and political reform.
- F remains highly negative, as failed actions lead to exile, imprisonment, or execution.
- X echoes R , as no selective benefits are available to those acting against the regime.

The radicalization of the educated class is uniquely significant, as their capacity for communicating revolutionary ideas constitutes a powerful ability to influence the perception of payoffs of a much broader segment of society than each individual, extending even outside the academic circle. For example, Bolshevik leadership was formed in this movement and yet were able to mobilize large segments of the urban working class.

The Famine of 1891

Shock Effect on Payoffs for Peasant Farmers:

- N decreases dramatically, as starvation spreads through rural communities. The regime's policies appear to make even basic survival difficult.

- R increases dramatically, as food security could be better guaranteed under a different system.
- F increases, as incurring repression is preferred to starvation.
- X increases, but less than R , as those who do not act against the regime (by stealing or robbing) may not accumulate the desired resources (to avoid starvation).

Famine acts as a shock that pushes the rural working class farther from a Functioning Regime case, and closer to an Unacceptable Regime case. The government's incompetence places them in a position to face starvation, which is an unacceptable status quo. The continued repression of the regime keeps the payoff of F from exceeding N for large enough segments of the population to force them to find any way of survival besides acting against the regime. This keeps any action against the regime from evolving into large-scale revolt.

1891–1905

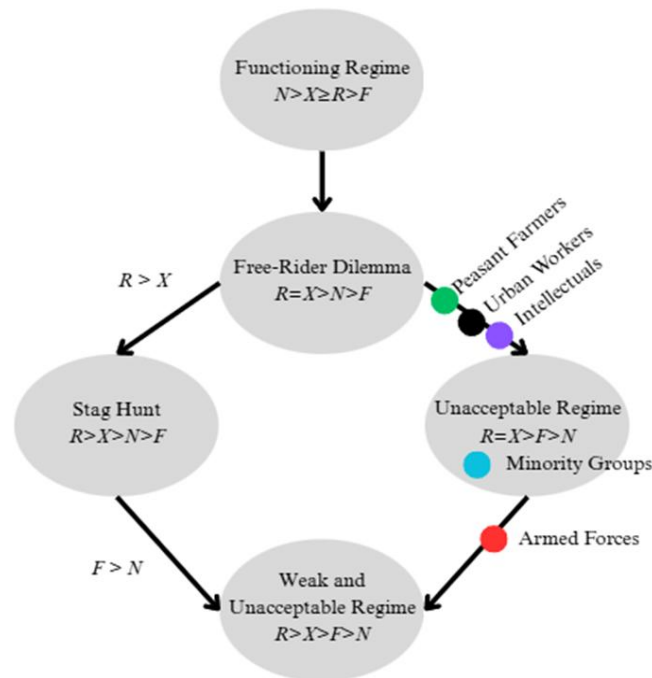


Figure 5.3 Payoff Status Early 1905

Witte's Great Spurt (1891–1905)

Impact on Payoffs for Industrial Workers:

- N decreases, as rapid industrialization leads to urban overcrowding, poor working conditions, and stagnant wages.
- R increases, as labor movements gain traction, demonstrating the potential for successful reforms through strikes and collective bargaining.
- F remains highly negative, as failed strikes often lead to termination, blacklisting, imprisonment, or violent suppression by the state.
- X continues to match R , but the formation of radical labor groups lays the groundwork for selective incentives to be made available.

Minor reforms do little to change the degradation of the status quo. During this period, an increasing number of industrial workers are participating in a Free-Rider dilemma. Given the abysmal working and living conditions, they would benefit from regime change, but the intensity of targeted repression faced by actors and the lack of results produce a situation where regime change is desirable, but action against the regime is not a best response unless they can be assured that $j_i = k_i$ will be achieved.

The Russo-Japanese War (1904–1905)

Impact on Military and Nationalist Payoffs:

- N decreases sharply, as humiliating defeats undermine faith in both the regime's military competence and national prestige.
- R increases, as military dissatisfaction grows, leading to desertions, mutinies, and the spread of revolutionary sentiment among soldiers.

- F becomes uncertain and difficult to generalize. While some soldiers are executed for disobedience, mass desertion and coordination problems make repression less predictable.
- X increases slightly, as regime change could lead to military reform or an end to the unpopular war, incentivizing passive opposition.

For peasant soldiers faced with the prospect of being used as cannon fodder, action against the regime (desertion) is an attractive option, even when faced with the potential consequences of a failed desertion. This means that as the war continues to progress poorly, an increasing number of soldiers move into an Unacceptable Regime case, and they believe that their best response is to act, regardless of the outcome. The desertions and mutinies previously mentioned are the primary product of this evolution.

Impact on Urban and Rural Populations:

- N declines, as military expenditures exacerbate economic hardship, and war-related shortages increase prices.
- R rises significantly, as war defeats reveal the regime's weakness, providing a window for opposition movements.
- F remains high, as failed anti-war protests and draft resistance efforts lead to severe repression.
- X increases slightly, as the war weakens the state's ability to suppress dissent, making inaction potentially beneficial for some.

Pressure on the economy continues to reduce the gap between N and F . This continues to increase the portion of the population participating in the Free-Rider Dilemma case. This

situation is increasingly fragile, since this case where $R=X>N>F$ is only stable if F (the result of acting against the regime) is worse than N (continued participation in the status quo).

Impact on Perceived Regime Strength

The catastrophic defeats suffered during the war weakened public confidence in regime strength significantly. From a game-theoretic perspective, these losses updated citizens' beliefs, reducing their estimation of the threshold k'_i required for successful regime change. This was a limited effect however, since the lack of media, and far-off nature of the war reduced the impact of signaling on k'_i . As the populace revised expectations downward, collective action transitioned from a risky endeavor to an increasingly attractive strategic choice, aligning citizen incentives toward a coordination equilibrium aimed at revolution.

1905–1907

December 25, 1904 – Nicholas II's Initial Concessions

Changes in Perceived Payoffs:

- N : Preference for the status quo still dominates among elites, while disaffected workers and peasants have less faith in the status quo, reducing its perceived desirability.
- R : No meaningful increase occurred because no direct pathway to systemic reform emerged; the absence of a representative legislature signaled that more forceful pressure might be needed, and radicals perceived these partial measures as proof that the Tsar would only respond under duress.
- F : Risk remained high due to the intact tsarist military and police, though immediate punitive measures were lacking and marginally lowered short-term fears; overall, harsh suppression remained a long-term expectation.
- X : X continues to mirror R because of the lack of selective incentives.

Outcome:

Although these concessions did not push Russia out of a Functioning Regime scenario in any widespread sense, they indicated possible vulnerability in the Tsarist order. Many radicals grew convinced that stronger revolutionary action was required for genuine reform.

Bloody Sunday (January 1905)

Effect on Payoffs for Workers and Reformists:

- N collapses, as continued attempts at peaceful reform are shown to be futile and the state is revealed very publicly to be an unyielding autocracy.
- R rises dramatically, as revolutionary participation is now perceived as the only viable path to change.
- F remains negative but becomes less of a deterrent, as the indiscriminate repression suggests that non-participation does not necessarily offer safety.
- X increases significantly, and largely continues to reflect R . The public lacks widespread selective incentives, and therefore we maintain that this is, for most relevant players, an Unacceptable Regime case, and not a Weak and Unacceptable Regime case.

Impact on Broader Revolutionary Movements:

- N decreases across all social classes, as repression radicalizes previously moderate opposition groups, including parts of the middle class.
- R increases almost universally, as even elites begin questioning the regime's stability, making alternative governance structures more attractive.
- F remains a major risk, as the state continues to use force against dissent, but risk perception shifts due to widespread unrest.

- X rises significantly, as regime concessions (e.g., the October Manifesto) become more likely in response to mass pressure.

The most critical outcome of Bloody Sunday is the degradation of the status quo such that N becomes less attractive than F . For any individual for which this is true, action against the regime becomes a dominant strategy, because even a failed attempt at regime change is at least as preferable as continuing to participate in the status quo. When this is true, action against the regime is inevitable. In this case, regime change was unsuccessful, as Tsar Nicholas II remained in power, and we can conclude that $j_i < k_i$. It could be argued that some level of success was attained that is not captured by this model, since reforms technically took place following these events, but these reforms were largely inconsequential in substantively improving the lives of the Russian populace.

These events also had a distinct impact on the perception of regime strength. By violently repressing a peaceful demonstration, the regime openly signaled that it felt threatened by even peaceful dissent. Instead of demonstrating control, the massacre conveyed insecurity and a lack of legitimate authority, therefore reducing k'_i . Game-theoretically, a strong regime can manage dissent with minimal violence because citizens recognize its capability to enforce order. In this case, the regime's severe reaction suggested that it lacked sufficient political capital or confidence to risk negotiation or dialogue, which acknowledged the strength and seriousness of citizen grievances.

June 14, 1905 – The *Potemkin* Mutiny

Changes in Perceived Payoffs for the Sailors of the *Potemkin*:

- N represents the utterly intolerable living conditions experienced by the enlisted sailors.

As conditions degrade, a threshold exists that forces an Unacceptable Regime case.

- R is extremely attractive for the sailors aboard the *Potemkin* because of the prospect of escaping the horrible conditions of Russian naval life.
- F represents the prospect of execution, which was preferable to the quality of life the sailors were currently experiencing.
- X represents a negative selective incentive for non-participants in the mutiny, since they would likely be under threat by those who participated if they engaged in free-riding.

Outcome:

The *Potemkin* serves as a sort of microcosm of the broader Russian Revolution. Faced with intolerable circumstances and an officer corps that could not overcome the combined will of the enlisted sailors, convergence from an Unacceptable Regime to a Weak and Unacceptable Regime case naturally resulted in mutiny aboard the ship, and since $j_i > k_i$, the *Potemkin* was taken by mutineers.

Intuitively, it would appear that the mutiny signaled to the broader population that such a case existed in the armed forces, despite the ship's surrender to Romanian authorities, and lack of widespread uprising among the rest of the navy. Due to the lack of widespread communication and media during this time period, this signaling was largely impeded.

October 1905 – General Strike & Formation of the St. Petersburg Soviet

Changes in Perceived Payoffs:

- N plummets among urban laborers and students, though loyalists demanded harsh measures to restore order.
- R becomes more attractive, as the establishment of soviets provide a more concrete example of an alternative system of governance.

- F remains low, as the continued loyalty (for the most part) of the military to the Tsar maintains the threat of failed action against the regime.
- X varies, as some workers gained concessions without active participation, while moderate liberals chose negotiation over a full-fledged revolution, hoping to secure partial reforms.

Outcome:

The general strike and formation of the St. Petersburg Soviet demonstrated the opposition's organizational capability. This and similar organizations prove to be a crucial difference between the failure of the 1905 Revolution and the 1917 Revolution. The ability of such organizations to offer selective incentives provides a reliable resolution to the free-rider problem, and will prove to be the differentiating factor between the 1905 and 1917 revolutions.

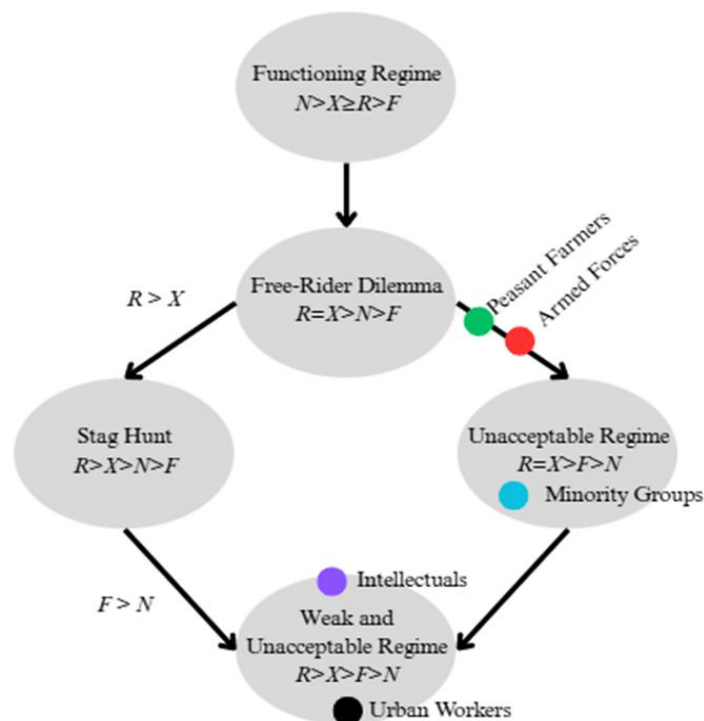


Figure 5.4 Payoff Status Late 1905

October 17, 1905 – The October Manifesto

Changes in Perceived Payoffs:

- N regained appeal among moderates preferring stability, but workers and peasants mistrusted the Tsar's promises, keeping their valuation of N low.
- R decreases for moderates and liberals who saw a potential constitutional path to reform, reducing their revolutionary drive, but socialists remained skeptical of the manifesto as a method of stalling.
- F is reduced as concessions lowered the short-term fear of failure for some, but lingering doubt about the Tsar's sincerity preserved moderate apprehension.
- X decreases, and largely continues to reflect R . The public lacks widespread selective incentives, and therefore we maintain that this is, for most relevant players, an Unacceptable Regime case, and not a Weak and Unacceptable Regime case.

Outcome:

Though the October Manifesto temporarily eased revolutionary momentum, skepticism remained. Radical elements doubted Nicholas II would honor meaningful constitutional limitations and expected further conflict.

The regime's willingness to negotiate rather than repress also suggested a decline in its strength. Consequently, citizens anticipated further concessions if sufficient pressure could be maintained, since the regime's newfound willingness to compromise indicated a decline in k_i . Thus, partial reforms not only failed to stabilize the regime but strategically incentivized continued resistance.

December 1905 – Moscow Uprising & Government Crackdown

Changes in Perceived Payoffs:

- R rises as hopes for modest pressure to yield reforms dropped sharply, as the regime showed little willingness to compromise; liberals also worried that earlier concessions could be rolled back.
- F is lowered as the brutal response demonstrates the high cost of failure. Mass arrests and executions reaffirmed the Tsar's readiness to use force.
- X continues to shadow R , as selective incentives are lacking. Hopes for modest pressure to yield reforms dropped sharply, as the regime showed little willingness to compromise; liberals also worried that earlier concessions could be rolled back.
- N degrades as fear of indiscriminate repercussions damages support for the status quo as the regime's legitimacy erodes among those who witnessed the bloodshed.

Outcome:

By crushing the Moscow Uprising, the Tsar solidified control in the near term; however, the harsh methods further delegitimized his regime. The use of brute force and fear postponed large-scale revolution but failed to address the root causes that created the conditions for the uprising to occur. The continued loyalty of the military keeps k_i high, but the Tsar's reliance on repression results in all major population segments continuing to progress from a Free-Rider Dilemma case to an Unacceptable Regime case. The only thing preventing more widespread progression to a Weak and Unacceptable Regime case is the lack of selective benefits. The Tsar's repression was effective in undermining the influence of opposition groups and their ability to offer such benefits to those who might oppose the regime.

April 27, 1906 – The First Duma Convenes

Changes in Perceived Payoffs:

- *R*: Many moderates scaled back revolutionary aims in favor of constitutional avenues, while radicals insisted that the Duma remained fully under royal influence.
- *F*: Liberals found some relief in a legal forum, though radicals still feared the Tsar might dissolve the Duma, maintaining a sense of impending failure.
- *X*: Newly hopeful middle-class actors perceived that limited engagement could yield representation without full rebellion; gradual reforms seemed possible.
- *N*: The monarchy's establishment of the Duma reassured conservatives who believed political stability was being restored, but peasants and workers continued to question whether true reform was forthcoming.

Outcome:

Although the First Duma gave some Russians hope for peaceful change, the Tsar's power to dismiss it at will exemplifies the fragility that more broadly limited these reforms. Optimistic moderates would soon be tested by royal intransigence.

June 3, 1907 – Electoral Coup

Changes in Perceived Payoffs:

- *R*: Reformist hopes crumbled when the Tsar manipulated the electoral system, spurring radicals to conclude that overthrow was the only solution.
- *F*: The reaffirmation of tsarist dominance increased the perceived risks of open rebellion; even those leaning toward revolt recognized the regime's capacity to quash opposition.
- *X*: Passive actors found fewer benefits in free-riding, as partial reforms clearly could be revoked; neutral stances no longer promised any security or advantage.

- N : Confidence in the monarchy grew among conservative elites who benefited from the new electoral rules, while disillusionment spread among the broader populace, fueling long-term revolutionary sentiment.

Outcome:

By obviously undercutting the people's desired constitutional governance, Nicholas II disillusioned moderates who still believed incremental reform to be possible. While this did not trigger immediate revolution, it continued to erode faith in legal avenues. In combination with the increasing influence of workers councils, this set the stage for the large-scale upheavals of 1917.

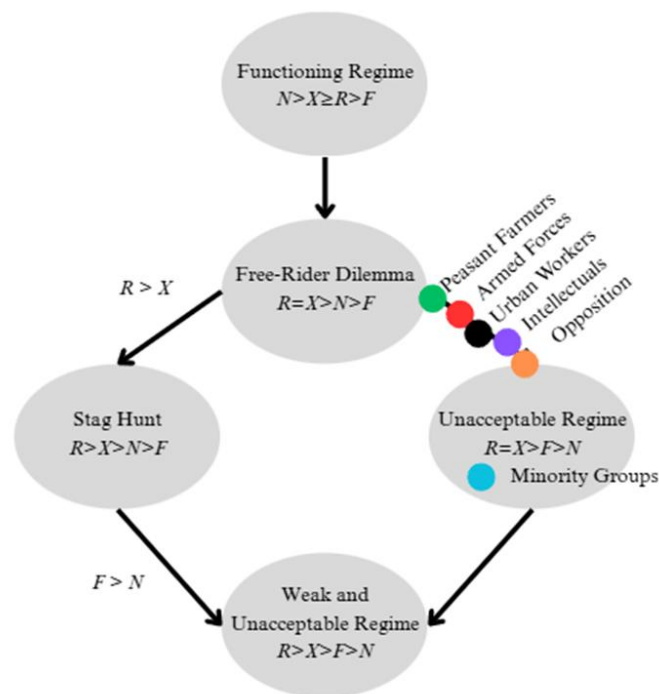


Figure 5.5 Payoff Status 1907

1907–1917

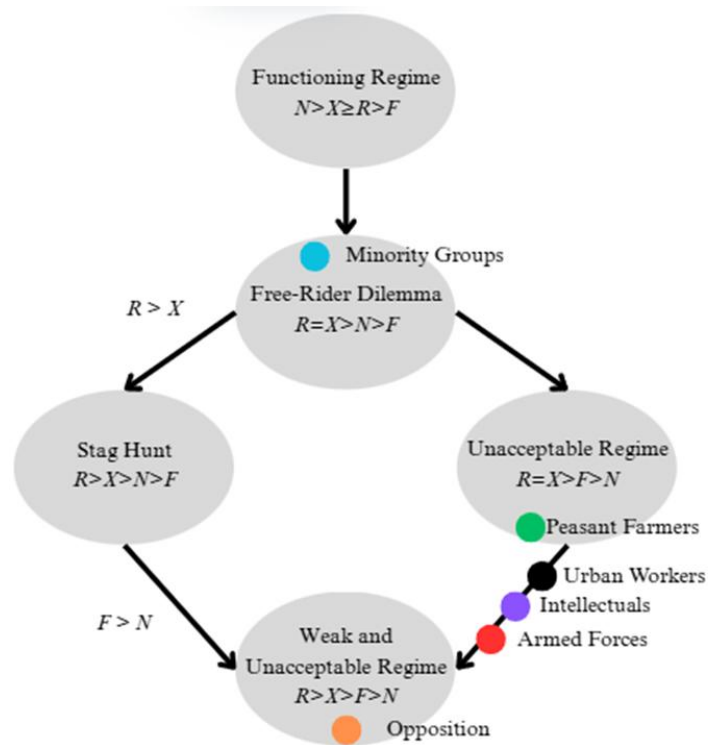


Figure 5.6 Payoff Status 1917

Economic Recovery (1907-1917)

Changes in Perceived Payoffs:

- *R*: For some industrial workers, modest wage increases and expanded employment reduced desires for regime change. However, ongoing rural hardship, minimal land reforms, and worsening urban poverty kept radical elements convinced that real systemic change was still necessary. *R* varied by socioeconomic group but remained high among disillusioned peasants and the more militant working class.
- *F*: The state continued to repress labor strikes. Industrial workers risked losing jobs or being blacklisted for protesting, and peasants feared brutal crackdowns if they rose up. *F* thus remained low.

- *X*: The economic upswing slightly improved conditions for portions of the urban proletariat, which made the status quo more attractive for these individuals. Middle-class professionals, newly employed in expanding industries, also had reason to maintain neutrality, though inflation and poor conditions prevented wholesale improvement.
- *N*: Despite partial economic recovery, structural issues—like inadequate land redistribution and urban overcrowding—reinforced dissatisfaction for the majority. Among business owners and officials, however, *N* rose as they profited from state investments in heavy industry. This split approach left peasants and low-wage workers increasingly skeptical of the status quo, while some bourgeois and managerial classes found it more acceptable.

Outcome:

Economic recovery offered limited, uneven benefits that did not address Russia's deeper socioeconomic fractures. While some segments of the population tolerated or even endorsed the status quo, worsening inequality and inflation fueled underlying discontent.

Russia Enters World War I

Changes in perceived payoffs:

- *R*: At first, patriotic fervor and talk of defending Slavic lands reduced demands for radical change, lowering *R*. Yet as wartime realities set in (heavy casualties, supply shortages) doubts resurfaced, causing *R* to increase among workers and peasants who bore the brunt of conscription and economic hardship.
- *F*: Embarrassing military losses revived fear of government crackdowns on anti-war sentiment. The army's improved logistics post-1905 also suggested the state still retained

a potent repressive capacity. Consequently, the cost of failure remained large for any overt anti-war demonstrations.

- *X*: The war does not provide a selective incentive, so *X* remains unchanged by these specific circumstances.
- *N*: Early in the war, *N* gained momentum among nationalists and moderates who wanted to unify behind the Tsar. Like the Russo-Japanese war, prolonged battles and casualties undermined morale, eroding trust in imperial leadership. This was especially true for those faced with conscription into Russia's meat-grinder approach to the war. Still, conservative elements and parts of the urban middle class maintained some level of hope that military triumph would solidify Russia's global standing.

Outcome:

Russia's initial war euphoria briefly renewed loyalty to the throne, but successive defeats and rampant hardships increased dissatisfaction. Initial enthusiasm was higher than for the Russo-Japanese war but quickly had similarly adverse (for the regime) effects on the payoff dynamics.

Military Failures

Changes in Perceived Payoffs:

- *R*: Every major loss, particularly Tannenberg and the 1915 retreats, signaled to common soldiers and civilians alike that the regime was both inept and unwilling to fix systematic problems. Nicholas II's personal command of the army turned him into a lightning rod for blame, increasing *R* among conscripts, workers, and intellectuals who viewed him as a personification of the incompetence that threatened their personal wellbeing.

- *F*: Despite widespread disillusionment, the Tsar's continued control over military and police forces meant direct confrontation was still fraught with danger. Desertions indicated cracks in discipline, but large-scale revolts risked brutal crackdowns. In effect, *F* remained low for the populace at large.
- *X*: Mutinies and desertions opened the possibility of letting others do the fighting—literal or metaphorical—while waiting to see if the war might end or if new concessions would arise.
- *N*: For many soldiers, the disastrous war effort made the status quo intolerable. Continued defeats also reduced optimism for future life on the home front under the regime.

Outcome:

The Tsar's attempt to personally steer the war effort magnified public frustration with autocracy. The surge of desertions indicates the increasing number of soldiers faced with an Unacceptable Regime case. Even though *F* remained low due to the threat of punishment (frequently in the form of execution), this punishment was seen as preferable to staying on, or being sent to, the front lines.

These repeated failures severely undermined public perception of the regime's strength. These failures systematically reduced k_i . This reduced the friction for players in an Unacceptable Regime or Free-Rider Dilemma case to be convinced that action against the regime represents their best response.

Political Conflict Between the Tsar, Duma, and Bureaucracy

Changes in Perceived Payoffs:

- *R*: Increased for politicians and societal groups that saw the Tsar's obstruction of the Duma as proof that genuine reform was impossible under the current system. Even some moderates concluded that removing Nicholas II might be the only path to preserving order.
- *F*: Continued friction between the monarchy and the Duma undermined governmental cohesion, but the Tsar still commanded loyalty from key military and administrative sectors. Revolutionary failure remained a real threat as civil institutions were partially co-opted by the state, though the war industries committees gave workers a platform to organize and possibly reduce the cost of failed action against the regime.
- *X*: Selective incentives were largely unaffected by these conflicts.
- *N*: While some conservatives clung to hopes that the Tsar would reassert strong leadership, many Duma members and bureaucrats started losing faith in autocracy's viability. *N* declined further as repeated power struggles made governance increasingly dysfunctional, driving more observers toward the conclusion that a major political shift was inevitable.

Outcome:

The Tsar's constant clashes with the Duma compounded administrative chaos and continued to impede effective economic governance and wartime leadership. It made the already incompetent Tsarist government even less effective, and in areas that were clear to observers, like wartime logistics and economic policy.

Economic Crisis and Hardship

Changes in Perceived Payoffs:

- *R*: Rising inflation, food shortages, and failing transportation infrastructure made daily life increasingly difficult. Strikes and protests became more common as workers tried to secure necessities. Among soldiers, concerns about their families' well-being at home contributed to declining support for the Tsar, increasing *R* in both military and civilian contexts.
- *F*: Authorities continued to suppress protests. While *F* remained a deterrent, worsening conditions made inaction seem less viable. Action against the regime, or just action outside of the rule of law, with the goal of obtaining resources becomes increasingly appealing to a desperate populace.
- *X*: As wages failed to keep pace with prices and essential goods became harder to obtain, the option of waiting for conditions to improve became less attractive. The benefits of avoiding direct involvement declined as basic resources became more uncertain.
- *N*: The worsening of basic aspects of daily life continues to degrade the status quo in the eyes of the populace.

Outcome:

Economic instability and declining living standards continued to weaken public support for the regime. Inflation, shortages, and administrative challenges contributed to a shift in attitudes, increasing willingness to consider alternatives and setting the stage for political change in early 1917. For an increasing number of Russians, the perceived risks of resisting were comparable to the risks of doing nothing. Convergence to the Weak Regime case continued.

Conclusion (1907-1917)

From the brief economic recovery's failure to address structural inequities to the catastrophic impact of World War I on every aspect of Russian life, the years 1914–1917 saw a

rapid erosion of the Tsarist regime's legitimacy. In essence, a large segment of the population had begun this period in a state approximating a Functioning Regime case and moved almost immediately into a Free-Rider Dilemma case when it became clear that the current regime was not going to improve the people's quality of life. During the following 10 years, the Free-Rider case eroded into an Unacceptable Regime case, as the status quo became intolerable, and eventually became worse than even the consequences of a failed attempt at regime change.

This is a generalization that, while failing to capture the nuances of payoff evolution for specific groups, serves as an approximation of the "general will" of the Russian people. We acknowledge that this is a flawed characterization, but in this case, it is a useful one, as it describes the key evolutionary dynamics resulting from exogenous effects, including Marxist ideas, economics, and Tsar Nicholas II's frequent blunders.

1917

February Revolution

- *R*: By toppling the monarchy, protestors and rebellious soldiers stood to gain sweeping political reforms and relief from oppressive conditions. The convergence of women, students, and industrial workers rapidly undermined the Tsar's grip on power, illustrating that overthrowing the old order could yield tangible, immediate benefits for the masses.
- *F*: Failing to overthrow the regime still carried the threat of violent reprisals, imprisonment, or exile. Although many troops defected or refused orders to fire on civilians, pockets of loyalists could still impose heavy costs on unsuccessful revolutionaries.
- *X*: Hoping that others would secure reforms without personal risk offered fewer advantages once large sections of the army defected. As public demonstrations exploded

in size, passivity risked missing out on potential gains or future representation in whatever new structures emerged.

- *N*: Remaining loyal to the monarchy lost the rest of its lingering appeal when Nicholas II prorogued the Duma and ignored the crisis on the streets. Those clinging to the old order risked being sidelined or targeted by an increasingly unified opposition. The failing status quo offered fewer prospects for stability or prosperity.

Outcome:

The Tsar's abdication and the emergence of a Provisional Government alongside the Petrograd Soviet created a precarious dual power situation. Revolutionaries saw heightened chances of profound change, but the underlying challenges—continuing war, food shortages, and land reform—remained unresolved, creating the environment for further conflict.

The regime's inability to maintain military loyalty dramatically eroded the populace's perception of its strength. Game-theoretically, this collapse of perceived regime power significantly increased the perceived utility of F , enhancing the attractiveness of immediate revolutionary action. It also significantly lowered the mobilization threshold for successful regime change (k_i). The following convergence to collective revolt illustrates how perceived regime strength impacts equilibrium selection.

Lenin and Bolshevik Consolidation

- *R*: By insisting on an immediate end to the war and radical societal change, Lenin's party offered a clear pathway to substantial benefits for soldiers, workers, and peasants alike.

The efficacy of the Bolsheviks as an organization increased the confidence of the populace that they would be better served with such a group representing their interests in government as compared to other socialist factions or the Provisional Government.

- *F*: Opposing the Provisional Government still meant risking direct confrontation, arrests, or internal strife among socialist factions. Yet, the limited Provisional Government authority lowered the perceived cost of revolutionary failure. The more discontent spread, the less fear of defeat deterred action.
- *X*: For urban workers, the organization of the now Bolshevik-dominated Petrograd Soviet, combined with increasing revolutionary sentiment and the social sanctions that come from acting contrary to such leanings, resulted in the reduced appeal of free-riding, meaning that *X* was increasing less than *R*.
- *N*: Upholding the Provisional Government's version of the status quo grew unappealing as Kerensky failed to alleviate food shortages or end the conflict. Peasants waited for real land redistribution; workers demanded improved wages and living conditions. Maintaining loyalty to an ineffective system seemed costly, accelerating the shift toward radical solutions.

Outcome:

Lenin channeled growing public frustration into a coherent revolutionary program. By acting boldly in crises and capturing the Petrograd Soviet, the Bolsheviks earned legitimacy among workers and soldiers. Their calls for immediate change resonated more powerfully than hesitant reforms, paving the way for a decisive seizure of power in October.

The Bolsheviks generated widespread support by influencing the perceptions of payoffs among various groups, without necessarily moving all participants into a Weak and Unacceptable Regime case. Hardcore Bolsheviks, including Lenin and Trotsky, inherently viewed the regime as Weak and Unacceptable and were fully committed to revolution. The broader Bolshevik membership, mainly urban workers, were incentivized into active

participation through targeted selective benefits such as security, social cohesion, and penalties for non-participation, thus significantly raising their revolutionary payoff (R). Non-affiliated urban workers remained in an Unacceptable Regime scenario but began supporting the Bolsheviks due to changing perceptions of regime strength and the Bolsheviks' organizational capability. These workers observed explicit signals, including Bolshevik effectiveness during crises and credible promises of immediate policy improvements, which made collective action seem more achievable and less risky. Consequently, for this group, supporting the Bolsheviks became a rational best response. This strategic coordination across groups enabled the Bolsheviks to secure mass support and ultimately seize power.

October Revolution

- R : Seizing control of Petrograd and Moscow with minimal resistance showed that ousting the Provisional Government could bring immediate access to power and the opportunity to implement sweeping reforms. For the rank and file—be they soldiers or factory laborers—successful revolution offered a direct route to ending the war and addressing economic needs.
- F : As the Provisional Government had lost much of its military support, the likelihood of a violent backlash against revolutionary forces dropped sharply. The Bolsheviks faced fewer risks of outright defeat, making the potential cost of failing to topple the government comparatively low.
- X : Waiting on the sidelines no longer promised security or leverage. Groups that failed to align with the Bolsheviks risked missing out on favorable policies or facing suspicion under the new regime.

- *N*: Upholding a broken status quo provided almost no tangible benefits. War fatigue, economic misery, and leadership failures all destroyed public faith in moderate governance. With disenchanted peasants, workers, and soldiers turning away from the Provisional Government, defending the old system offered little reward and considerable risk.

Outcome:

The Bolsheviks' decisive takeover sealed the Provisional Government's fate. By aligning themselves with mass discontent, especially concerning war, property rights, and economic issues, they consolidated enough backing to assume full control. Though they soon confronted the realities of civil war and governing a vast empire, their October triumph fundamentally altered Russia's political landscape. The convergence to action as a dominant strategy or best response for a sufficiently large portion of the populace was finally reached, resulting in a regime change in the most literal sense.

Chapter 6 - Discussion

This study applied a game-theoretic framework to examine regime change, highlighting the strategic interactions among citizens under conditions of uncertainty and limited information. Through both theoretical modeling and the historical analysis of the Russian Revolutions of 1905 and 1917, the research identified how individual perceptions of payoff dynamics and regime strength critically influence collective mobilization decisions. The empirical validation demonstrated that shifts in perceived regime vulnerabilities, triggered by events such as military defeats and state repression, significantly lowered the threshold for coordinated action against the status quo. The discussion will now synthesize these findings, addressing their implications for understanding revolutionary dynamics and offering insights into potential strategies for actors engaged in regime change contexts.

Initial Research Questions

To structure this discussion, we return to the central research questions that guided the study. The following analysis then addresses these questions by drawing connections between the model's theoretical predictions and the empirical patterns observed in the Russian Revolutions.

1. What policies or heuristics can we glean that could be applied by stakeholders, particularly regimes and entrepreneurs, to better reach their strategic goals in games of regime change?
2. Can historical case studies offer an advantageous method of validating game-theoretic insights into political games?

Describing Convergence

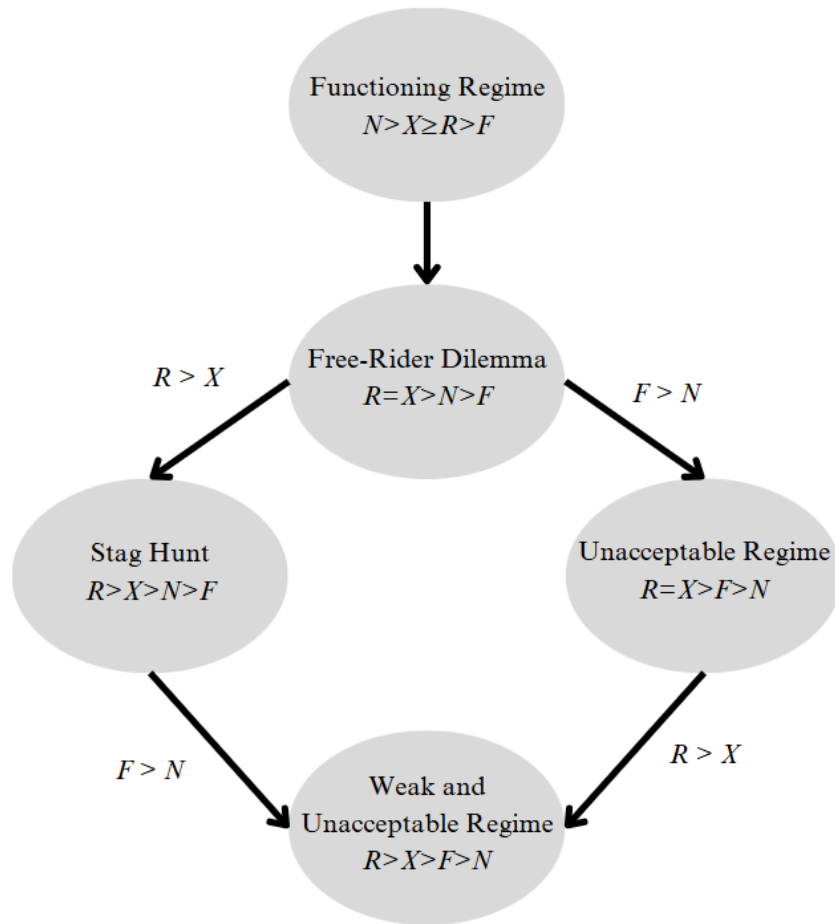


Figure 6.1 Progression of Regime Change Cases

Using our case observations as a framework, two distinct paths lead from the most stable condition (Functioning Regime) to the least stable (Weak and Unacceptable Regime).

Practically, the game of regime change begins when any segment of the population moves out of the Functioning Regime state into a Free-Rider Dilemma, perceiving an alternative regime as superior to the status quo ($R > N$). To progress from a Free-Rider Dilemma to a Weak and Unacceptable Regime, two critical shifts must occur. First, the status quo must degrade to the point where the anticipated outcome of a failed regime change is preferable ($F > N$), achieved either by increasing F or reducing N . Second, the Free-Rider Dilemma must be resolved,

ensuring that selective incentives for action outweigh the benefits of non-action ($R > X$). Thus, regime destabilization and the introduction of effective selective incentives must both be addressed, with the sequence of these events determining whether the intermediate state is characterized as a Stag Hunt or an Unacceptable Regime.

Conclusion 1: The destabilization of the game occurs when attractive alternatives to the current regime are available, the status quo becomes worse than failed rebellion, and selective incentives overcome the Free-Rider Dilemma.

We will operationally define the progression from Free-Rider to Stag Hunt to Weak and Unacceptable Regime as “Path 1,” and the progression from Free-Rider to Unacceptable Regime to Weak and Unacceptable Regime as “Path 2.”

1905 Revolution

The descent into widespread action against the regime in the 1905 revolution can most aptly be characterized by Path 2. For many people, the status quo became extremely unpleasant, which created a situation where, in many cases, action “against the regime” was a pursuit of necessities, like stealing food. Also, Samson’s choice as described by Lichbach is operating here, where the desire to harm an opponent (in this case the regime) is valued more highly than the net benefits obtained by the individual [51]. In some cases, seemingly including the 1905 revolution, this can make the payoff of F sufficiently attractive to exceed N .

The other dynamic at play here is the accuracy of repression. Well-targeted repression raises the perceived cost of failed action against the regime and reduces F as a result. Poorly targeted or heavy-handed repression damages the populace’s outlook on the status quo, and reduces the gap between F and N . “If I am going to be punished as though I acted, I might as

well act.” If the quality of life of the populace becomes sufficiently poor, it only takes a very small incentive to induce action.

We argue that the 1905 revolution did not reach widespread convergence to the Weak and Unacceptable Regime case, for two reasons.

1. First, when the populace in general was most widely experiencing the Unacceptable Regime, or Weak and Unacceptable Regime case and acting against the regime (after Bloody Sunday), the Tsar enacted reforms that gave the people a perceived constitutional path to a more livable status quo. This, in combination with the fact that the military largely stayed loyal to the Tsar, left F as a very costly outcome, meaning that it only took this smallest of hopes for future reforms to secure the $N > F$ relationship for a sufficiently large portion of the population, and return the game to a Free-Rider Dilemma case, if for a short time.
2. The second key reason was the lack of selective incentives. Aside from the aforementioned looting and petty theft, there was little material incentive to act against the regime in a more committed or extreme manner to increase the odds of success of such action. Our model does not capture this nuance: due to the binary action space, we do not explicitly capture the variety of actions available to players. For example, the model treats a worker strike as having the same payoffs and impact as an act of political assassination, but obviously the payoffs and impact vary in reality. The regime had successfully undermined the power of formal opposition organizations, which are the most common vehicle for offering selective incentives.

1917 Revolution

The 1917 revolution had a different result, because each of the factors that undermined widespread mobilization (players either playing dominant strategy or a best response strategy of action) were resolved in a way that favored the revolutionaries. It quickly became clear that the Tsar's reforms were incredible, and the populace's view of the utility of possible choices and outcomes adapted accordingly. As the quality of life stayed poor or became worse due to World War I and further economic mismanagement, N degraded once again. The establishment of the Soviets in the wake of the first revolution and the return of their leadership from exile meant that the people (particularly the urban working class) had a clearer alternative regime: one that offered explicit incentives in the form of "Peace, Land, and Bread." This ensured that $R > N$ for a large segment of this population.

Those who joined the Petrograd Soviet (particularly as members of Red Guard militias) were offered selective incentives in the form of security, access to resources, and increased social standing in the working community. Taylor contends that the strength of Russian communities was such that social sanctions also provided substantial negative selective incentive [52]. These factors combined to sufficiently increase R such that $R > X$.

Finally, when support for the Tsar waned in the armed forces, the regime was unable to maintain $F < N$ when civil unrest increased. The poorly targeted repression continued, and in combination with quality-of-life issues, created a situation where $F > N$. This created an environment where those joining the Petrograd Soviet were experiencing a Weak and Unacceptable Regime case where action constitutes a dominant strategy. The number of urban workers who joined the "Reds" was then large enough to take actions that would signal to the larger populace that their best response was to mobilize against the regime as well. This resulted

in widespread action against the regime, both by players playing a dominant strategy, and those playing a best response strategy.

Predicting Convergence

Utility of Equilibrium Analysis

For many game-theoretic analyses, Nash equilibria are used as the primary indicator or predictor of an outcome. This holds in the regime change game, but with n players experiencing several different payoff cases, the equilibrium analysis becomes much more complex. What we can glean from the Nash equilibrium manner of thinking is that when the impact of a single player's action becomes smaller as the number of players increases, it becomes difficult for players to move from a risk-dominant equilibrium to a payoff-dominant one, due to coordination challenges.

Consider a Nash equilibrium outcome in which the decision to act against the regime is a dominant strategy for a subset of the players, while the decision not to act is a best response for another subset. This echoes previous works that reference a necessary "critical mass" for widespread action against the regime to take place. We contend that there is another "mass" of the population that will respond to the actions of the critical mass. We will call this group the "reactive mass."

Conclusion 2: The influence of the critical mass, and size of the corresponding reactive mass, are the best predictors of widespread action against the regime.

The size of the reactive mass is mathematically significant because it contributes heavily to j_i . Maximizing j_i depends not only on the size of the critical mass but more importantly on three factors: the number of individuals experiencing an intermediate payoff scenario (Stag Hunt or Unacceptable Regime), their susceptibility to external influence, and the critical mass's ability

to exert that influence. For example, an individual in an Unacceptable Regime scenario just slightly worse than a Free-Rider scenario is harder to move toward rebellion than someone whose scenario is only marginally better than a Weak and Unacceptable Regime. These factors determine whether the reactive mass will adopt a strategy of action.

Qualitative Observation

The odds of revolutionary success are irrelevant to players for which action against the regime constitutes a dominant strategy. If such conditions are allowed to exist, for any size of group, or even for an individual, action against the regime is inevitable. In both Russian revolutions – and many other historical examples – action against the regime was believed to be a dominant strategy (described here as the Weak and Unacceptable Regime case) for a substantial portion of the populace, and when combined with the reactive mass, $j_i > k_i$, resulting in regime change.

Conclusion 3: Desperate players will act.

We contend that this is the single best predictor of widespread action against the regime. Due to the massive advantage held by the regime in any contest with the populace, coordination challenges, monopoly on force, and many other factors, it is in the populace's best interest to find any way to improve their situation besides acting against the regime. However, in a case where players are faced with an alternative of starvation, inevitable and severe persecution, likely death in combat, forced violation of religious beliefs, or some other intolerable circumstance, they will almost certainly act against the regime.

Conclusion 4: Post-action signaling is a crucial opportunity for regimes and entrepreneurs.

Action against the regime, whether in the form of protest, sedition, looting, rioting, or even self-martyrdom, can be highly destabilizing. It often serves as a form of signaling that a dominant strategy exists for the participant(s), and this signaling has the potential to activate the reactive mass. If a group demonstrating a dominant strategy is sufficiently large, they make the prospects of action against the regime far more attractive for those experiencing a (far more common) Stag Hunt, or Unacceptable Regime case, who will play a best response strategy since they have more trust that others will act.

The Petrograd Soviet took maximum advantage of this signaling by preventing a coup after securing influence in Petrograd prior to the October Revolution. They were able to signal their level of commitment by mobilizing resources to maintain security for the civilian populace. This signaled to the Petrograd populace that the Soviets were both committed to and capable of offering security. This increased the value of R for the urban working class, bringing their perceived best response strategy in support of the Soviet cause.

Actionable Insights (Heuristic Prescriptions)

Revolutionary Entrepreneurs

A Revolutionary Entrepreneur is defined in this work as an individual acting to influence the outcome of the regime change game beyond their own choice of strategies such that the regime is overthrown.

Revolutionary Entrepreneurs have three questions to consider in establishing their best course(s) of action.

1. Would regime change be beneficial? Is there an alternative preferable to the status quo? ($R > N$)

If regime change is attractive for the entrepreneur, but not for other members of the populace, the entrepreneur must first address this problem. This could be done in any number of ways (which is not the focus of this paper) but will often entail anti-regime propaganda efforts, creation or emphasis of non-state identities (ethnic, religious, etc.), or communication of “higher-order” ideals like self-determination and justice. Such a shift is necessary to move people from a Functioning Regime case to a Free-Rider Dilemma case.

2. Does the individual benefit from acting against the regime? ($R > X$)

For an entrepreneur trying to resolve the free-rider dilemma (either in a Free-Rider Dilemma case, or in an Unacceptable Regime case), some selective incentive must exist to incentivize individual action. This can be in the form of material benefits as a positive selective incentive, violence or social sanctions as a negative selective incentive, or some other incentive that is not contingent upon the outcome of the revolutionary effort.

3. What is the relationship with failed action against the regime? Do people still benefit? Do they benefit relative to the status quo because N is so intolerable as to make F preferable? ($F > N$)

Making failure a more palatable proposition by protecting participants in action against the regime can signal players outside of the group that action will not be quickly abandoned, and therefore the proposition of failure is tolerable. This makes $F > N$ easier to achieve for a potential reactive mass. Additionally, research on the repeated stag hunt game in clinical settings shows that games are more likely to converge to a payoff-dominant equilibrium of unanimous action if the players are more willing to tolerate failure (sub-optimal payoffs).

An entrepreneur can also directly incentivize participation by providing material benefits, such as access to resources or opportunities for looting, ensuring participants receive tangible rewards even if the regime is not immediately overthrown.

Regimes

These levers exist in reverse for regimes, which forces the regime to adopt a defensive posture:

1. Prevent opposition organizations from forming, which makes selective benefits difficult to offer for opposing the regime.

This involves repression to some extent. Offering ways for the voice of the population to be heard is also an effective method, as the populace is unlikely to organize in opposition to the regime if they can enact change while operating within its structure, which is far safer.

2. Make the status quo as pleasant as possible to compete with whatever alternative is perceived to be available. If this is not possible, make the populace believe that there is a path to improving their status quo that does not involve regime change.

Ideally, this involves competent governance across all spheres that affect the lives of the populace. What constitutes “governing well” is outside the scope of this paper, but it seems clear that creating a situation where the population can live a tolerable existence would constitute a minimum quality of governance.

3. Use repression carefully.

To uphold the rule of law, and prevent and oppose opposition groups, some level of punishment and/or repression is necessary. The way this power is wielded is extremely important. If punishment or repression falls on those who are acting against the regime, this can provide highly effective signaling that the regime is strong and can prevent regime change

attempts, and payoff F is highly unattractive. This takes advantage of the post-action signaling that we noted earlier and prevents the reactive mass from observing an opportunity to act in alignment with revolutionaries. If repression falls on those who have not acted against the regime, this erodes the value of payoff N for the population at large, as the regime is signaling that they are at risk despite their inaction.

By cracking down on all methods of opposition, including writing, striking, and peaceful protests, Tsar Nicholas II removed the ability of the individual to influence meaningful change without opposing the regime directly. In *The Art of War*, Sun Tzu instructs that “when you surround an army, leave an outlet free. Do not press a desperate foe too hard,” [53]. Tsar Nicholas failed to leave an outlet – both politically and economically – and he paid for it with his life. While in the Functioning Regime, Free-Rider Dilemma, or Stag Hunt cases, offering an outlet or path to improvement of the status quo prevents further movement into destabilizing cases.

Conclusion 5: The accurate targeting of repression is key for increasing stability. Poorly targeted or heavy-handed repression is a major factor in decreasing stability.

Heuristic Implementation

To understand the regime change problem, one must look at the populace as a collection of individuals. There is no such thing as general will, and we have only generalized the will of the populace to the extent necessary to study and communicate about the will of the individuals. At any given time, the populace is almost certainly going to exist in multiple cases of relative payoffs. Oligarchs may experience an Acceptable Regime case while peasants experience an Unacceptable Regime case. This is a simple example, and it is more likely that there will be members of the populace experiencing each of the five cases at any given time. It is also

extremely likely that members of the same group will experience different cases at a given time, which makes differentiating between cases in real time extremely difficult. By extension, it is extremely difficult to predict what will happen – or what could be made to happen – when studying a situation at arm’s length.

Conclusion 6: The populace is a collection of individuals. Understanding and empathizing with those individuals is necessary for evaluating and/or influencing the state of the regime change game.

By understanding the clamor of the working class for basic dignities and the end of Russian involvement in WWI, Lenin, Trotsky, and the Soviets (revolutionary entrepreneurs) were able to secure their support.

Case Studies and Limitations

The regime change model presented in this study contains inherent limitations. First, the assumption of a binary action space simplifies the complexity of real-world scenarios, where degrees of participation or passive resistance frequently occur. This binary simplification restricts the model’s ability to reflect nuanced individual and collective behaviors observed during regime transitions. Moreover, the model treats groups of individuals as relatively homogeneous entities based on geographic, socioeconomic, or ethnic divisions, which may ignore potential variation within these groups that could significantly influence individual decisions.

Case studies, while valuable for evaluating model validity against historical events, also introduce limitations. Primarily, the generalizability of insights derived from case studies is constrained by the specific historical, cultural, and contextual factors unique to each scenario.

Case studies inherently carry the risk of using exceptional or outlier events to draw broader conclusions.

An integrated approach—combining mathematical modeling with historical case studies—does provide valuable insights that purely theoretical or purely empirical studies often miss. Compared to purely mathematical models, this approach grounds theory in practical, observable events, enhancing the empirical relevance of model predictions. Compared to purely empirical research, it offers clear and structured frameworks for understanding complex interactions during regime changes. However, caution is required when extrapolating these retrospective insights to prospective predictions due to the inherent uncertainties and unique circumstances present in each regime change scenario.

Conclusion 7: Validating mathematical modeling with historical case studies balances empirical grounding with theoretical structure. This helps to mitigate the practical limitations of purely mathematical approaches and the analytical limitations of purely empirical methods.

Chapter 7 - Conclusion

This thesis presents a formal game-theoretic framework for analyzing regime change as an n -player coordination and incentive problem under strategic uncertainty. By modeling individual decisions as binary choices between maintaining the status quo or acting against a regime, and by varying perceived payoffs and informational constraints, the model captures a wide range of strategic contexts encountered during political revolutions. Unlike many prior models, this framework integrates bounded rationality, limited and incorrect information, and belief heterogeneity, allowing for multiple equilibrium conditions to coexist within the same population at a given time. This structure reflects the reality that individuals and social subgroups experience regime strength and incentives differently, and that their strategic environments evolve over time.

The model identifies five representative cases—Functioning Regime, Free-Rider Dilemma, Unacceptable Regime, Stag Hunt, and Weak and Unacceptable Regime—which describe the distinct combinations of incentives, risks, and coordination dynamics faced by individuals. The extension of the model to an n -player population allows for mixed payoff conditions across subgroups, revealing how different segments of society respond to repression, concessions, or shocks based on their local payoff environments.

Empirical validation through retrospective case study analysis of the Russian Revolutions of 1905 and 1917 demonstrates the model's explanatory utility. By tracing changes in perceived payoffs over time, the analysis shows how exogenous shocks such as war, famine, and economic decline transformed the population's strategic landscape. As the perceived value of maintaining the status quo declined and the relative benefits of successful regime change rose, segments of the populace transitioned from cases of inaction to those characterized by dominant or best-

response incentives for revolutionary participation. Organizational capability and selective incentives—particularly as offered by the Bolsheviks in 1917—played a pivotal role in converting latent dissatisfaction into coordinated action, enabling the transition from an Unacceptable Regime case to a Weak and Unacceptable Regime case for a critical mass of participants.

This thesis contributes to the literature by (1) unifying the dynamics of coordination games and collective action problems into a single framework, (2) incorporating bounded rationality and informational asymmetry without losing analytical digestibility, and (3) validating the model against historical outcomes. The analysis clarifies how regimes fail when a sufficient number of individuals revise their beliefs about regime strength and expected outcomes, and when a credible alternative—capable of offering selective benefits and lowering perceived risks—emerges.

Future work should explore the role of time-dependent strategies, reputation dynamics, and inter-group signaling in more detail. In particular, the threshold conditions required for a committed party to induce action from less committed actors warrant further investigation, especially as they relate to real-time applications in political forecasting and conflict prevention.

By treating regime change as a repeated, adaptive, and information-sensitive coordination problem, this model provides a foundation for both theoretical development and practical analysis of political instability, with potential applications in political science, international development, and systems engineering approaches to socio-political risk.

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