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Journal

Cliodynamics, 16(1)

Authors

Hoyer, Daniel
Bennett, James S.
Whitehouse, Harvey
et al.

Publication Date

2025

DOI

10.21237/C7clio.38365

Supplemental Material

https://escholarship.org/uc/item/3mw3d3r7#supplemental

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Cliodynamics: The Journal of Quantitative History and Cultural Evolution

CRISES AVERTED

How a Few Past Societies Found Adaptive Reforms in the Face of Structural-Demographic Crises

Daniel Hoyer[1,2], Harvey Whitehouse[3], Pieter Francois[3], Jenny Reddish[1], Donagh Davis[4], Kevin C Feeney[5], Jill Levine[2], Samantha L Holder[2] and Peter Turchin[1]

[1] *Complexity Science Hub*
[2] *Evolution Institute*
[3] *University of Oxford*
[4] *Sciences Po*
[5] *Trinity College Dublin*

Historians and social scientists have long been preoccupied with understanding and documenting periods of crisis. Such emphasis is only growing, and becoming more pressing, as the world continues to face a number of interrelated stressors in the form of irreversible climate change, major ecological shocks and disease outbreaks, eruptions of military violence, economic disruptions and deepening inequalities, political polarization and unrest, the rise of authoritarian and nationalist regimes. Crises in these domains are not new, but have been recurrent features of past societies. Although these periods have typically led to massive loss of life, the failure of critical institutions, and even complete societal collapse, there are instances in the historical record of societies managing to turn the tide of crisis even as violence and social turmoil grow. Here, we focus on four such cases of crises mitigated with structural reforms revealed from our previous historical analyses: early Republican Rome, mid-19th century England and Russia, USA during the the late 20th to early 21st centuries. Utilizing structural demographic theory as a lens to explore these cases, we seek to expose the pressures that built up leading to crisis and the early signs of violent confrontation

Corresponding author's e-mail: dhoyer@evolution-institute.org

Citation: Hoyer, Daniel, Harvey Whitehouse, Pieter Francois, Jenny Reddish, Donagh Davis, Kevin C Feeney, Jill Levine, Samantha L Holdera and Peter Turchin. 2025. CRISES AVERTED. How a Few Past Societies Found Adaptive Reforms in the Face of Structural-Demographic Crises. *Cliodynamics* 16: 1–50.

revealed by these societies, as well as to examine the conditions and key decisions made in the midst of this unrest that allowed these societies to turn the tide and enact significant structural adaptations. Our findings have clear relevance to understanding and navigating similar crises in contemporary societies.

Introduction

Historians and social scientists have long been preoccupied with 'crisis' – what makes societies unstable, susceptible to major revolutions, disruptions in normal political and economic functions, and in extreme cases experience complete societal collapse[1]. Such studies are only becoming more frequent, and relevant, as the world continues a number of interrelated stressors in the form of irreversible climate change, major ecological shocks and disease outbreaks, eruptions of military violence, economic disruptions and deepening inequalities, political polarization and unrest, the rise of authoritarian and nationalist regimes; what some are terming a 'polycrisis'(Homer-Dixon et al. 2022; Tooze 2022; Mark et al. 2023). While the scope and interconnectedness of our current crises are perhaps unprecedented, societal collapse, polarization and fragmentation, eruptions of civil violence, and even environmental catastrophe have been recurrent challenges since humans began to form large-scale societies over 6,000 years ago.

Utilizing the insights of Structural Demographic Theory (SDT), previous work by ourselves and others has revealed how societies both past and present tend to cycle through periods of growth, expansion, and general cohesion alternating with times of instability and violence (Goldstone 1991; Korotayev, Malkov, and Khaltourina 2006; Ortmans et al. 2017; Turchin 2003; 2023a; Turchin and Nefedov 2009; Turchin et al. 2018; Turchin and Korotayev 2020a). In fact, this work led one of us in 2010 to forecast that 2020 would witness a host of crises throughout the Global North; a lamentably accurate assessment (Turchin 2010; Turchin and Korotayev 2020b). These periods of rising social pressure – what could be termed societal crises – are common throughout history. . A recent study (Hoyer et al. 2024) finds, however, that societies experience a diverse set of outcomes from such crises. These range from relatively minor disruptions (an uprising, a palace coup) to the more severe events (major civil war, massive loss of life, political fragmentation, complete societal collapse). This is consistent with other recent research into the impacts of periods of crisis on past societies (Hartley 2024; Knapp and Manning 2016; Parker 2008).

The historical record does, however, offer a few examples of crises resulting in relatively mild outcomes at least in terms of the violence and societal disruptions experienced, along with some where unrest never fully materialized. In these

[1] For a recent overview, see (Hoyer 2023).

cases, societies displayed the early signs of entering into a major crisis, including popular revolts, violent confrontations with protestors and state authorities, and other signs of social turmoil. Yet, in these rare instances these events did not spiral into major violence and disruption of social functioning, as occurred in many crises observed throughout history. Rather, the societies in question managed to enact certain adaptations and implement responses that managed to quell the tide of unrest, sometimes through positive reform that improved the well-being of certain communities in the years following, though sometimes through more unsavory interventions involving management of colonized territories and peoples and violent suppression of dissent. While SDT has proven adept at uncovering, even predicting (or retrodicting) how the stresses that create crisis conditions unfold, the theory was not designed to explain how different societies would respond to these stresses. This leaves several critical questions as yet unanswered: namely, what determines whether a crisis results in more or less severe outcomes? What sort of actions have been taken by rulers and other power-holders in societies facing different challenges? What incentives or barriers exist to implementing effective responses when crises begin to rise? Do these reforms improve the lives of the society's inhabitants (in the short, medium, and/or long term) and how long do they persist?

Here, we focus on four such cases of crises mitigated through structural reforms as revealed byour previous historical analyses (Hoyer et al. 2024): early Republican Rome, England during the early-mid 19th century, mid 19th century Russia under the reign of Tsar Alexander II and his successors, and the USA during the so-called Progressive Era of the late 20th to early 21st centuries. In the following section, we briefly summarize key theoretical considerations introduced by SDT, which we use as a lens to identify the onset of crisis in these cases. SDT provides in effect a 'baseline' for how societal pressures rise and crises unfold in the typical case, to which the examples described here are outliers. We then detail each of these four case studies in turn, employing an analytic narrative style (Bates et al. 2000) to provide structured, comparable insights alongside more qualitative description acknowledging the unique circumstances of each example. We scrutinize these cases both to expose the pressures that built up leading to crisis and the early signs of violent confrontation revealed by these societies, as well as to examine the conditions and key decisions made in the midst of this unrest that allowed these societies to turn the tide and enact significant structural adaptations. We next provide a discussion presenting a comparative analysis of these cases in an attempt to identify the key factors that allowed these societies to escape more dire outcomes, though noting certain aspects where these societies' adaptations remained partial or proved ineffective over the long term. We conclude by pointing to future work can make use of the framework offered here and highlight points of relevance to contemporary societies facing similar crises.

Structural-Demographic Theory and the Shape of Historical Crisis

Developed initially by Goldstone (Goldstone 1986; 1991), SDT seeks to identify the major factors that tend to generate social pressure and lead to societal crises, which in turn often (though not always) generate revolutions, rebellions, and major outbreaks of civil violence. SDT starts with the simplifying assumption that societies contain three essential, though partially overlapping groups: elites (including economic, political, military, and other social leaders), the populace (effectively the other 90-95% of the population, largely engaged in wage labour or primary resource production), and the state itself (namely, the institutionalized fiscal and enforcement mechanisms and those with authority to direct these resources, including many elites). The key insights of SDT relate to how these groups interact and respond to changing conditions. The theory posits that any society develops structures – institutions and practices such as tax policies, public goods programs, administrative hierarchies and regulations, etc – to support their populations, distribute resources both material and social (such as prestigious government positions) among the different groups, and maintain a certain degree of stability and cohesion as needed to perform state functions. These structures may not always lead to equitable distributions of resources or the most adaptive, effective outcomes, but SDT simply seeks to describe what structures have been developed by any given society to manage its resources and inhabitants. As conditions change, for instance as populations rise of fall (the 'demographic' element) or there is a shift in the makeup of institutions (the 'structural' element), this can alter the way that resources are generated and distributed. These shifts can be thought of as generating stress in the social system. This often then leads to dissatisfaction and anger among large groups of people as expectations are not being met in terms of quality of life achieved, ability to secure prestigious positions or gain rewards from efforts such as advanced education, and generally when inter-generational social mobility is perceived to be stalled or even declining. Under such conditions, more and more people will tend to become dissatisfied with status quo systems and seek new, sometimes radical alternatives, or undertake actions to restore or claim the rewards to which they feel entitled. At the same time, the society's institutions can become perceived as malfunctioning, while the officials and other state agents charged with managing them are seen as illegitimate or even hostile to 'proper' governance. This can often feed-back into further stress, as the state losses capacity to perform its core functions or enact interventions aimed at restoring confidence, thus reinforcing the idea that it has lost its way and spiraling into further unrest, and so on.

At its core, SDT seeks to detail how such stresses develop as demographic and structural conditions shift and become misaligned with expectations built from prior experiences, outlining how this causes frustration and unrest to build up

among all segments of a population including elites as well as elite aspirants and puts pressure on the normal functioning of state institutions. This state of high stress and growing frustration, then, can be said to be a typical structural-demographic crisis. It constitutes a crisis because it is a period of escalated risk where state capacity and legitimacy is declining while a growing number of people gain the resolve to restore or reset the way that the society manages its critical resources, even if means through violent means. When this type of crisis arises, more often than not it results in widespread protests, rebellions, and armed revolution and civil war (Goldstone, Grinin, and Korotayev 2022). As mentioned, however, this is not always the case and the onset of a structural-demographic crisis does not indicate any particular set of outcomes.

The 5 Stages of a 'Typical' Structural-Demographic Crisis

We divide the typical dynamics experienced in the run up to, and recovery from, a period of intense crisis as described by SDT. into five archetypal stages. These distinguish the well-being experienced by the three segments of a society articulated by SDT – the general populace, elites, and state structures – as stresses build and combine into a state of high risk. This process is shown in Figure 1. This schematic understanding was developed by referencing prior studies exploring the structural-demographic pressures and crises experienced in a number of historical societies (Baker 2011; Bennett 2016; Goldstone 1991; Korotayev and Zinkina 2011; Muñoz-Rodríguez et al. 2024; Orlandi et al. 2022; Ortmans et al. 2017; Turchin 2003; 2016; Nefedov 2005; Shevsky 2020), though note that this is meant as purely illustrative and does not refer to any specific historical experience.

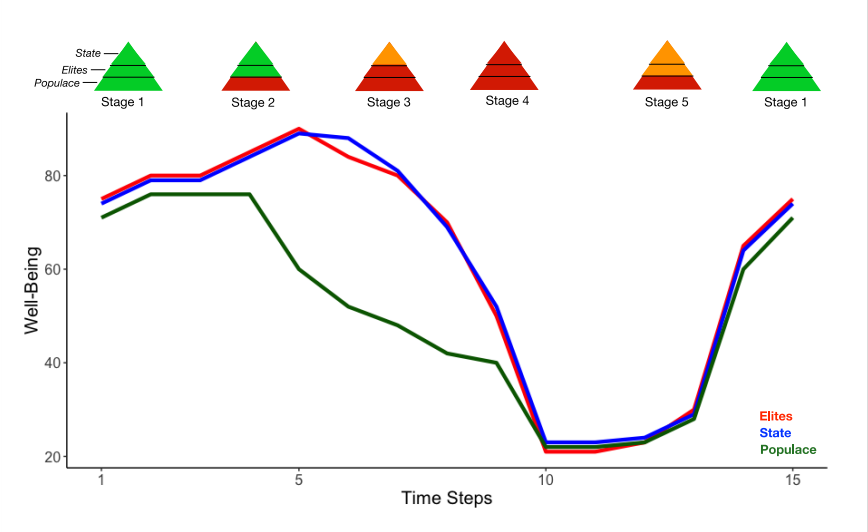

Figure 1. Schematic illustration of how well-being for different sectors of a society fluctuates during a structural-demographic cycle. Triangles represent different stages of a typical cycle (detailed below), coded by shade according to whether each social group is experiencing relatively high (dark), or low (light) levels of well-being and cohesion. The y-axis presents an idealized well-being Index ranging from 1-100.

The five typical stages of a crisis dynamic are outlined as follows:

STAGE 1: in the first stage, we imagine a society early in its developmental trajectory. Structures and systems of governance are established to manage the production and distribution of resources among different elements of the society. Imagine a relatively – though far from perfectly – equitable society in which there are disparities between those elite classes and the general populace, though the gap is somewhat narrow and the majority population is generally well-off. The state itself functions well in that it is well-financed, has coherent and functional systems of administration, monitoring of officials, and adherence to rules. The result is a fairly well-functioning and cohesive society. We imagine that society experiences a period of **growth**, perhaps expanding territory, increasing overall productivity, and likely experiencing an increase in population in such favourable conditions

STAGE 2: the growth of Stage 1 starts to wane, particularly as territorial expansion reaches its limits and the economy stabilizes or even stagnates slows. Yet, population continues to expand, putting pressure on the institutions set up to manage the society's resources and distort expectations placed by earlier generations. Population pressure can put downwards pressure on wages, causing a decline in real and relative wages, while those with wealth and power can coopt systems of distribution, pumping wealth and other resources for their own advantage (Turchin 2023a). Typically when this happens, living standards for large segments of the population fall, what we term ***popular immiseration***. Meanwhile, in this Stage the elite populations who own much of the productive land and businesses – who are in effect 'consumers' of this cheap labour – enjoy unprecedented wealth and luxury. These periods are often hailed by future commentators as golden ages

STAGE 3: Stage two sees a growing divide between the wealthy elite and the rest of the population. Sometimes this is referred to as a 'golden age' by these elite populations and historians who focus on grandiose displays of wealth, like the monumental palaces and great works of art that extremely wealthy families commission. However, as wealth and power accumulate at the top, the number of elites and elite aspirants (those who aspire to enter elite ranks) also rises. Further, those with economic wealth often seek to translate their riches into positions of authority and prestige – becoming presidents, senators, leaders of major corporations, etc. – yet the number of these positions tends to be relatively

inelastic. This results in ***elite overproduction,*** as more people aspire to lofty positions than there are positions available. I***ntra-elite competition*** rises in turn as a growing number of elites and elite aspirants engage in increasingly intense contests over the available positions.

STAGE 4: typically, the elites who were living 'golden' lives in Stage 2 are able to institutionalize their advantages in the form of low tax rates and various hereditary privileges. As the competition to maintain or acquire elite intensifies in Stage 3, these efforts often intensify as well. Over time, this leads to ***state fiscal distress***. The state becomes effectively starved of the revenue and authority needed to achieve its aims. This can include measures to combat violent outbursts, or to resolve the underlying tension through spending programs aimed at reducing popular immiseration. Adding to this pressure, as the state looses capacity it can be seen as increasingly ineffective or even corrupt. It then loses legitimacy in the eyes of a growing number of people.

STAGE 5: as all of these pressures build up and the institutions that underpinned growth and relative prosperity in Stage 1 fall under growing strain, societies become increasingly susceptible to a *triggering event* – an assassination, riot, famine or other ecological catastrophe, etc. – that precipitates major unrest. These events can take many forms, and their consequences can be more or less severe depending on a variety of factors (Hoyer et al. 2024). SDT's focus is on the growth of societal pressure as structural conditions are taxed by changing circumstances. As these pressure build, they will come to a boil one way or another; sometimes, the state fragments into civil war or is conquered by an external force (itself generally enjoying the expansion of Stage 1), or the society becomes simply weary of fighting, though this simply pushes back the worst of it for a generation or two. In rare instances, crises are resolved through more resilient and peaceable means, like non-violent (or minimally violent) protest and institutional reform. Ultimately, the pressures recede and/or the state is reconstituted in some form, leading to the end of Stage 5 and, typically, a return to Stage 1 where the cycle begins anew. The three key pressures that arise during stages 2-4 (popular immiseration, elite overproduction and intra-elite competition, and state fiscal distress) can be measured in different ways suited to the particular societies under consideration (Turchin and Hoyer 2023). For instance, real wages (namely, average wages adjusted for inflation or scaled against the types of goods that could be purchased in local economies) have been used to quantity immiseration in the USA (Turchin 2016), but in another historical context where wage labour formed only a minor portion of economic activity, access to agriculturally productive land proved a more useful measure (Orlandi et al. 2022). Combining measures used to track these three pressures can produce a composite score dubbed the Political Stress Indicator (PSI). PSI, then, is a quantitative measure of demographic-structural pressure. SDT predicts that as PSI rises in a given society, a major

outbreak of civil violence, uprising, or other destabilizing crisis becomes increasingly likely, though the theory is silent as to what form exactly that crisis will take or how severe it will be[2].The Gingko-Leaf Model of Crisis Outcomes.

It needs to be stressed again that the above picture of the typical stages of a structural-demographic crisis are only an idealized typology, meant to highlight the core pressures and developments common to the examples explored in previous work. SDT traditionally has not sought to explain the link between the pressures that create this period of high risk with the actual manifestation of that risk in the form of various disasters, instigated by one or more triggering events; from protests to international conflict to major civil wars and even societal collapse. Yet, as we detail further below, a growing number of historical studies show that, as these structural pressures mount, the chance that a society will experience some significant period of turmoil becomes quite high. Indeed, identifying the rare cases where major disruptions are avoided is the key aim of the present article.

Critically, though, this historical work reveals a fundamental difference in how societies enter and then experience and exit from periods of crisis. We call this the gingko-leaf model of crisis dynamics, signalling that there appear to be a fairly consistent set of pressures in the run-up to periods of crisis (the gingko's narrow stem), though the outcomes from these crises follow a diverse set of paths of varying severity and societal disfunction (the gingko's broad leaf) (Figure 2a).

a) b)

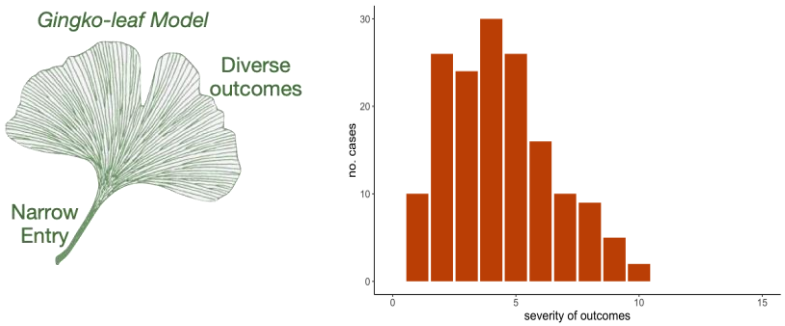

Figure 2. Exploring patterns across past crises: a) Schematic representation of the gingko-leaf model of crisis dynamics; b) Distribution of the severity of outcomes from historical periods of crisis, taken from a sample of 168 cases. Severity of consequences are calculated as a cumulative total of 15 possible outcomes, defined in the SM. Adapted from (Hoyer et al. 2024).

[2] (Turchin and Hoyer 2023) provides a detailed discussion of how SDT can be utilized in historical analysis.

Figure 2b presents the results of a recent study exploring patterns in periods of crises sampled from a diverse set of historical societies (Hoyer et al. 2024). This shows the broad distribution seen in the outcomes of these cases, measured in terms of how many destabilizing and violent events co-occurred during these crises. On the right side of Figure 2b are cases experiencing a number of such events. For instance, Valois France during the French Wars of Religion in the late 16th century witnessed several bouts of civil warfare, the assassination of a King Henry III, a number of violent revolts and uprisings resulting in widespread massacres of religious and other groups, violent confrontation with neighbouring states, and disease outbreaks and famines leading to severe population loss; in all, over 3 million people died from disease, famine, or violence during this period, ultimately leading to the dynasty's collapse (Knecht 2014; Holt 2005). The fall of the Tang in the 10th century, respectively, the breakup of the Sassanid Empire in the 7th, and ancient Rome's transition from Republic to Principate at the turn of the 1st century are other notable examples of crises that resulted in a number of severe outcomes.

The historical record does, however, offer some examples of societies in (or entering) a period of crisis – namely, experiencing mounting structural stress of the type detailed in the 5 Stages above – yet who managed to escape relatively unscathed. These occupy the left side of Figure 2b. The city-states of ancient Phoenicia, for instance, managed to escape relatively unscathed from the Bronze Age collapse that wreaked havoc across numerous other societies in the eastern Mediterranean (Scott 2018), or the succession crisis among the Inka during the late 15th century which saw unrest and conflict among ruling families vying for power, but with minimal disruption to other facets of life (Covey 2020; Rowe 2006). In these less severe cases, violence generally remains relatively minimal or confined to a small group, there is little territorial loss, and most societal structures and institutions remained intact. Some cases exhibit the conditions that led to destabilization in other instances, yet remain unrealized to the point that many historians do not consider those periods crises at all, such as conflicts among different ruling families representing different religious traditions among the Medang Kingdom of Indonesia during the 8th century, which remained largely non-violent despite the potential to spiral into full-blown civil fighting (Hall 1992).

Cases of Crises Averted

Much more work is needed to fully expose the link between the structural, dynamic pressures that SDT identifies with the course that such crises take, particularly to identify the factors that shape how severe, destabilizing, or, alternatively, adaptive and transformative these periods ultimately become. The present article is meant to build towards that goal by spotlighting some of the specific responses taken during periods of high societal risk in cases that not produce the most severe

outcomes seen in many other instances. It is important to stress that we do not attempt here to provide a broader analysis of whether averting crises in this way is 'beneficial' to the populations overall, or may actually prove maladaptive in the long run by suppressing or heading off more transformative structural changes, even those that result from more intense violence. These determinations must be made with reference to the particular context in which any potential interventions are being considered. We return to these crucial points in the Discussion and Conclusion sections below.

Here, we detail four societies who managed to mitigate, or implement effective adaptations to, burgeoning structural-demographic crises: early Republican Rome, Chartist Period England, the Russian Empire's Reform Period, and the Progressive Era in the USA. These four cases are selected because they witnessed growing structural-demographic pressures placing them in a crisis situation and then saw that crisis manifest in the form of violent civil conflict and widespread unrest, yet they were able to avoid the other more destabilizing events that many other societies endured. These cases have received relatively little attention in scholarship to date, which prefers to focus on the more dramatic and severe crises. Yet, these cases hold the promise of providing unique insight into the mechanisms that translate social and other pressures into specific outcomes, precisely because they are outliers from the general pattern. Critically, while SDT has proven effective at documenting the rise of such social, structural pressures, it has not been able to account fully for crises where these pressures were rising yet resulted in only relatively mild consequences.

These are not the only societies that managed to escape or mitigate the impact of a burgeoning structural demographic crisis. Indeed, crises are notoriously difficult to define, let alone to identify cases of crisis that never fully materialized into major disaster (Centeno et al. 2023; Sandberg 2023; Hartley 2024; Hoyer et al. 2024). The four cases selected here are taken from a larger sample of historical crises presented in other work (Hoyer et al. 2024), identified as being rare instances of societies experiencing many of the pressures and exhibiting signs of entering a period of significant turmoil, but ultimately experienced relatively mild outcomes from the crisis period. The four cases discussed below also share a number of key features in common, notably all are examples of large, long-lived, productive, and expansionist states with major imperial holdings and heavily involved with other states, both in the forms of exchange as well as competition and conflict. They also display some critical differences though, including their time periods, the level of technology available, their histories prior to the crisis periods identified here, and their involvement in a global economic system. These similarities as well as differences make them suitable and novel subjects for the comparative analysis we offer here. In what follows, we present a brief historical overview of the period under question for each of our four cases, highlighting the

rise of the three key SDT pressures (popular immiseration, elite competition, and state fiscal distress). We then explore some of the factors that shaped the way the crisis proceeded, noting external factors such as economic or ecological considerations and interactions with neighbouring states, along with internal forces such as the decisions taken by rulers and other power holders and their reactions to initial signs of growing tension. Finally, we summarize the primary features that appear to explain how each of these societies managed to relieve the pressures that were driving crises, mitigate conflict, and enact adaptive reforms. Our goal here is to highlight interesting patterns and generate potential explanatory factors to explain how these societies managed to avoid severe crises, or at least stave off the worst outcomes seen in other cases with similar beginnings.

Early Republican Rome: Conflict of the Orders (494-287 BCE)

Brief Historical Overview

The founding of Rome, seat of what would become one of the largest and well-known ancient empires, is traditionally dated to 754 BCE when Romulus is fabled to have killed his twin brother Remus and founded a new city among the hills along the Tiber river in west-central Italy (the modern province of Lazio). Archaeological evidence, though, signifies that the site had been occupied steadily since the Iron Age, roughly 1000 BCE by a largely agropastoral community (Cornell 1995). In early years, Rome was not the dominant regional power it became. The settlement began as one of the smaller and less prominent in the region, surrounded by advanced Etruscan city-states to the North, fairly populous and well-defended Samnite and Oscan settlements in the Apennine mountain range to the East, and descendants of Greek colonists in the south (Hoyer 2012). From the 8th through 6th centuries, Rome was under the rule of Kings claiming Etruscan descent, termed the Regal period. The last of these so-called Etruscan kings, Lucius Tarquinius Superbus ('the proud/arrogant'), was overthrown in 509 BCE. After Tarquinius' overthrow Rome was transformed into a Republican city-state run by an aristocratic Senate comprised of the region's wealthy and powerful families (Brennan 2004; Cornell 1995; Forsythe 2006; Raaflaub 2006). Over the next two centuries, early Republican Rome grew, in fits and starts, to become the dominant hegemonic power in the peninsula and, after major confrontations with confederations of Gallic tribes and the mighty Carthaginian kingdom, the entire western Mediterranean.

Apart from nearly constant battles with their Italian neighbours, the early Roman Republic experienced significant internal turmoil. This took the expected form of competition among the ruling aristocracy and those seeking entry into their ranks as well as popular unrest and uprising. In 494 BCE, a group of non-patrician Romans (plebs) occupied a hill north of the city to protest the burdens placed on ordinary citizens by the patrician elite, particularly the taxes and rents

owed that tenant farmers owed to wealthy landowners and the military conscriptions they were subjected to. This became known as the first secession of the plebs, which is often seen as the beginning of a long a prolonged period of hostility now known as the Crisis of the Orders (or Conflict of the Orders) (Raaflaub 2005a). The Crisis of the Orders is often presented as a conflict between the two dominant socio-economic classes of the time, the wealthy ruling elite (known in Latin as *patricians*) and the majority of the population (*plebs*), though as the case study presented below illustrates the lines of conflict were not quite that clear-cut. While there were certainly moments of unrest and violence, this crisis did not derail Rome's development during the early Republic or spiral into any major civil war or insurrection. Rather, for the most part the city-state was able to mend the rupture through internal reform and avoid more severe outbursts of violence. Indeed, the early Republic is often noted by historians for its remarkable growth and prosperity (Harris 1985; Keppie 1984; Rosenstein 2012); an "unusually long expansion" phase that stands out in a global history of societal rises and falls (Turchin and Nefedov 2009, 267). The peace lasted for a while; however, similar tensions resurfaced at the end of the Republican period in the late 2nd century BCE, where pressures did erupt into a prolonged and transformative period of civil war. An overview of significant events during this period is provided in Table S1.

Key SDT Factors: Popular Immiseration, Elite Competition, and State Fiscal Distress

This Crisis of the Orders was precipitated by rising territorial and demographic expansion during the last decades of the Regal period. During the fifth and fourth centuries, Rome experienced incredible growth in territory, population, and economic development (Cornell 1995; Hoyer 2012). By 300 BCE, Rome was the undisputable hegemonic power in Italy. Its expanded territory and growing economy could now support much larger populations, leading to further demographic expansion. The sources are unfortunately not able to provide exact numbers, but we are able to estimate that from the beginning of the Republic to the end of the Early Republican period, Rome's territory nearly doubled (from roughly 800 to 1500km^2) while its population more than tripled (30,000 to over 100,000) (Cornell 2000; Scheidel 2006). This suggests a growth in population density from about 37.5 people per km^2 at the beginning of our crisis period to over 65 by the end; considerable shift in the demographic context.

This growth was accompanied by expanded economic productivity, though Rome's newfound prosperity was enjoyed disproportionately by the patrician families, who expanded and consolidated their control over the Republic's growing area of productive farmland. Prestigious political and religious offices in the Republic were also still held exclusively by the patrician elite, a fairly closed hereditary group during this period (Forsythe 2006; Richard 2005); Figure 3. What we see, in other words, is rapid demographic growth along with a slowly expanding

political administration and the entrenchment of aristocratic positions: hallmarks of rising **intra-elite competition**.

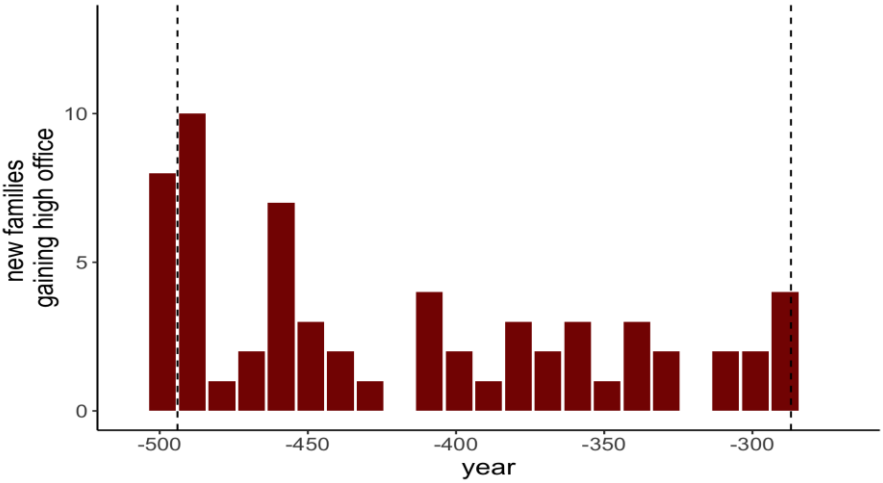

Figure 3. Estimated number of new families gaining high office (after (Forsythe 2006)), 509 – 269 BCE. Vertical dashed lines mark the beginning and end dates of the crisis period

As wealthy and prominent families amassed more of Rome's productive territory, large numbers of relatively poor farmers were left working smaller and more marginal lands. Often, small-holders and tenant farmers had to borrow seed, livestock, and other implements from wealthy patricians to maintain their land while away fighting in military service, which they also owed to the state (Mitchell 2005; Richard 2005; Roselaar 2010). Under certain conditions, creditors could take debtors into bondage. These are strong signals of **popular immiseration** and growing economic and social inequality. Indeed, the first succession of the plebs was largely driven by widespread dissatisfaction over the stranglehold on wealth, power, and opportunity held by Rome's elite families.

Lastly, in the early Republic there was little distinction between the state and the wealthy individuals who made up its administration, so as the patrician class gained wealth, in some ways so too did the state itself. In all, it appears that Rome was not suffering from much **state fiscal distress**, though this must be taken with a grain of salt as we lack clear sources on Rome's finances at the time.

Factors Shaping Crisis Outcomes

Three key features stand out as likely explanations for why Rome managed to avoid a more destabilizing outcome from this extended period of social stress.

First, Rome was almost constantly at war with neighbouring states during this time (Table S2). Though its victories are sometimes presented as an inevitable march towards regional hegemony, these battles were waged against powerful alliances and Rome did experience several losses (Eckstein 2006; Hoyer 2012). This is significant, as even the threat of defeat would have exerted external pressure on Rome's elites to resolve internal disputes and to maintain enough cohesion and participation among the citizenry to continue to wield a viable force[3]. Again, we lack clear contemporary records that could illuminate debates held over any specific policies. Still, Rome was involved in some external warfare in almost every decade between 509 and 287 BCE, sometimes fighting on multiple fronts at once (Table S2).

The second, related factor is that Rome's power-holders in this period were both willing (at least at times) and able to make significant institutional reforms to ameliorate the plight of the plebs and so maintain social cohesion. Nearly every period of unrest was accompanied by a change in the political and/or economic system that directly addressed one of the plebs' major grievances(see Table S1): redistributing farmland, forgiving debts and abolishing debt-bondage, giving political voice through the office of the tribune, and easing the burden of military service. Further, all of these reforms were inaugurated by patricians or non-patrician office-holders. This is not to suggest that the ruling class had completely altruistic motives. But they at least recognized the danger posed by unrest and saw that forgoing some of their wealth and privilege in order to maintain support and engagement by the plebs – who were needed as soldiers and producers of food and other goods –served their own long-term interests.

Despite their ability to push through such major reforms, the patrician class was never quite a united, cohesive group. The execution by fellow elites of Caeso Quinticus in 460 BCE, who had interfered with the duties of the plebeian tribune in protest at the populist policies of that office, illustrates this clearly. However, even the ability for a group of elites to come together and put a well-known fellow patrician to death arguably indicates a level of cohesion in itself. This is significant, as the Roman state at the time was effectively synonymous with the elite agents who held high office. Proposed reforms only became law because a majority or at least an influential block of office-holders were able to push forward the idea of mitigating the plight of the masses (Forsythe 2006; Mitchell 2005; Raaflaub 2005b).

The third key factor is that, as noted, Rome witnessed many successful military victories and expanded its control within Italy throughout this period. Rome's

[3] This follows the logic of cultural evolution, specifically multi-level selection theory; for details on this perspective, see e.g. (Richerson and Christiansen 2013; Turchin 2003; 2015).

policy of establishing colonies in conquered territories aided in establishing hegemony in the region, while also providing new farmland to its citizens and to relieve overpopulation in the capital (Bispham 2006; Hoyer 2012; Raaflaub 2005b; Rich 2008). In practice, however, these colonies were not merely used as outlets for urban crowding. By the mid-third century, the wealthy elite had seized control over a good deal of the territory designated for distribution to citizen-farmers (Roselaar 2010). Still, for a time the ability to redistribute their growing population within an ever-expanding zone of productive farmland likely contributed to Rome's relative stability and prosperity during this period. We return to this point in the Discussion.

Summary: How Did Rome Avert a More Destabilizing Crisis?

The period from late Regal Rome through the early Republic was one of high political stress; an enduring crisis situation. The bookends of this period represent seminal moments in Roman history and illustrate well the range of possible outcomes from disintegrative phases. On the one hand, intra-elite competition spilled over into violent conflict and the overthrow of the ruling family with the expulsion of King Tarquinius Superbus in 509 BCE. This failed to reverse the growing trend of insecurity and sociopolitical stress, however, leading to the outbreak of the Crisis of the Orders only a few decades later. This time, similar tensions were resolved not by a bloody coup or major political reorganization, but by a series of reforms responding to repeated bouts of (largely non-violent) popular protest.

Early Republican Rome essentially alternated between Stages 4 and 5 (unrest – reform) in the idealized structural-demographic cycle (Figure 1). This lasted until the Hortensian law was passed in 287 BCE giving the plebeian assemblies institutionalized legislative authority (Table S1). This did seem to provide the means for peaceable cooperation and compromise, as there was no further major popular disruption for more than a century. The pressures driving crisis seem to have been effectively relieved.

The words of historian Kurt Raaflaub offer a concise conclusion for the impact that this period had on Roman history:

> What is called the Conflict of the Orders … was really a long process of fundamental transformations in several respects. The exclusive aristocratic society of early Rome was replaced by a unified and cohesive citizen body, and although this was still led by an almost equally exclusive aristocracy, all classes were integrated and had their defined rights, obligations, and functions. Solutions were found for most of the problems that had caused a deep economic, social, and political crisis and brought Rome to the brink of civil war soon after the foundation of the Republic and repeatedly thereafter. During this

> period, Rome passed from the prepolitical stage, where there was little political organization, and power was primarily defined and exercised as social power, to the political stage, with defined and differentiated institutions and a well-balanced constitution. (Raaflaub 2005b, 4).

Although this case stands out as an early example of a crisis mitigated, the interventions employed to mollify tensions did not provide anything like a permanent solution. Indeed, nearly identical issues of landlessness, indebtedness, and overextension in military service plagued plebeian populations again (or, perhaps better, still) in the late second century BCE. By this time, however, expansion had slowed and intra-elite competition had intensified significantly. The disagreement between those wealthy Romans who supported institutional reform and those who opposed it resulted in a much more severe outpouring of intra-elite violence than had occurred during the Conflict of the Orders. Beginning with the murder of Tiberius Gracchus, Tribune of the Plebs, in 133 BCE by a gang of enraged Senators, Rome descended into a lengthy period of sporadic war lasting over a century, which was resolved only with the political reorganization from Republic to Empire and ascension of Augustus as its first emperor.

England: Chartist Movement: 1819-1838 CE

Brief Historical Overview

Through the 17th and 18th centuries CE, the Kingdom of Great Britain (later the United Kingdom) grew through conquest and consolidation of overseas territory to become one of the largest imperial polities the world has ever known. While experiencing a string of successes against external foes, internal unrest erupted in a series of bloody civil wars during the 17th century. The result was a curtailing of absolute royal power and the transformation of British rule into a constitutional parliamentary monarchy (Cromartie 2006; T. Royle 2005). Another round of imperial consolidation and economic expansion followed.

Even after the loss of the American territories after the American Revolution in 1783 CE and the end of the fist imperial phase, Britain still ruled over a vast Empire stretching over 22 million km^2 supporting a large and diverse population. Population had been rapidly accelerating beginning in the late 18th century, reaching over 10 million subjects in England alone during our period (Figure S1). Bolstered by a rapidly industrializing economy and access to resources, labour, and markets, Britain continued to grow and prosper during this second imperial phase through the 19th century as well (Broadberry et al. 2015; Van Zanden 2009). In 1837 CE, Queen Victoria ascended to the throne, beginning a long reign of relative peace and productivity lasting beyond her death in 1901. The Victorian era is noted (alternately) for its booming economic output, repressive social *mores*, political

liberalization and the development of welfare-state policies, and harsh colonial management.

Through the first half of the 19th century, England (along with Scotland and Ireland) experienced a period of unrest driven by the unrest among the majority populations who felt slighted and left out of the Empire's overall prosperity. This included the rural poor, but was driven especially by the increasing number of labourers who had been flocking to England's industrial cities to work low-paying, unregulated, and sometimes unsafe jobs and live often in crowded, unsanitary conditions (Komlos 1998; Vögele 1998). We date the start of this crisis period to the Peterloo riot in 1819, a massive popular protest demanding full male suffrage and improvement in working conditions, which was met with violent suppression and resulted in a number of deaths. The crisis lasted until 1838, the passing of the People's Charter, a formal document of protestation calling for a series of reforms. These reforms were largely undertaken, culminating in the 1867 extention of the franchise to all male citizens. In between these key dates, several more riots and protests occurred while a series of labour laws and other reforms aimed at improving the living conditions for the urban working poor were passed. Fortunately, the data available from the Chartist period are much more extensive than for early Republican Rome. An overview of significant events during this period is provided in Table S3.

Key SDT Factors: Popular Immiseration, Elite Competition, and State Fiscal Distress

Following the Civil War (1642-51), the United Kingdom saw steady demographic growth with the pace quickening considerably towards 1800 (Davis and Feeney 2017; Goldstone 1991; Turchin and Nefedov 2009; Wrigley et al. 1997). This was matched to a degree by territorial gains as Britain's overseas empire expanded during the same period (Davis and Feeney 2017; Goldstone 1991). England itself experienced a clear population boom, driven both from high birth rates as well as by mass migration within the Empire, especially to major industrial centres like London and Manchester. Most workers flocking to these sites, however, saw few of the spoils of Britain's imperial prosperity. Cities became overcrowded hubs rife with disease and malnutrition, while labourers worked long hours for low wages with few safety measures in place (Komlos 1998; Vögele 1998).

As SDT predicts, this population expansion and urban crowding led to an overall decline in average stature among England's residents over the course of the 19th century, though with some gains small revealed in the early decades of the 1800s (Komlos 1998; Vögele 1998); Figure 4a. This can be an enlightening indicator of general well-being and the distribution of material wealth within a society. Consistent with this picture, we find that workers' wages had also been declining since 1750, though saw significant increases through the Chartist period itself, largely due to the reforms described below (Shaw 2001; Davis and Feeney

2017; Goldstone 1991); Figure 4b. **Popular immiseration** was thus growing during the early nineteenth century.

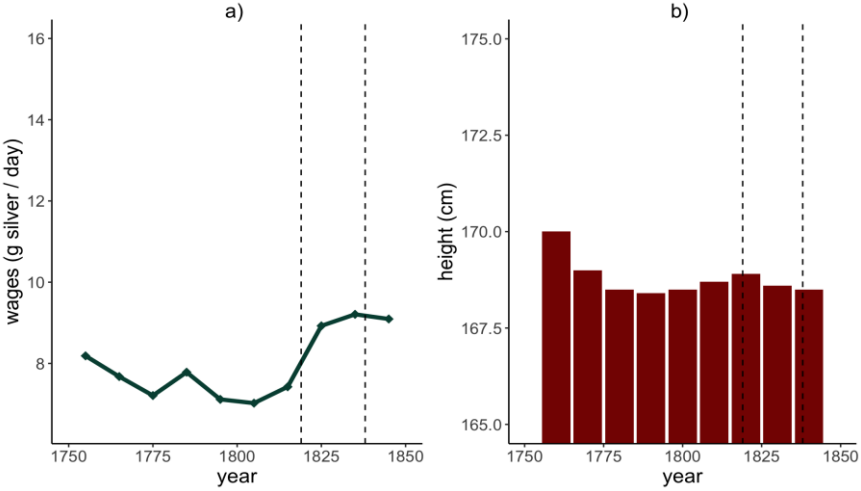

Figure 4. Trends in popular immiseration in England, 1750 – 1850: a) estimated nominal daily wages for labourers in grams of silver (after (Allen 2001)); b) estimated average height of soldiers (after (Komlos 1993)). Vertical dashed lines mark the beginning and end dates of the crisis period

Though the Chartist movement is often presented as one of class struggle – the urban poor and working class struggling against a complacent aristocracy for recognition of their plight – growing unrest within and competition among the elite was just as important. As Goldstone demonstrated, the immiseration of even a large and vocal majority of the population is typically not enough to foment revolution "unless elites unleash the high mass mobilization potential of aggrieved workers through their own attacks on the state," and elites "played a leading role on both sides in all of the nineteenth-century revolutions" (Goldstone 1991, 294; 286). The Chartist movement, a revolution that never fully materialized, is no exception. Fierce debates broke out within elite groups about how to address the unrest, signalling growing **intra-elite competition** (E. Royle 2000).

We also find evidence for **elite over-production**, demonstrated most clearly by university enrollments (Figure 5). Rising university enrollments are an important early warning sign that a society is producing a surplus of wealthy, highly educated and ambitious people; when frustrated, these ambitions can foment factionalism and unrest. After falling in the rebuilding phase after the Civil War, enrollments began to climb sharply after 1750, peaking in the mid-nineteenth century, precisely as would be expected of a period of high political stress (Stone 1974; Turchin and Nefedov 2009).

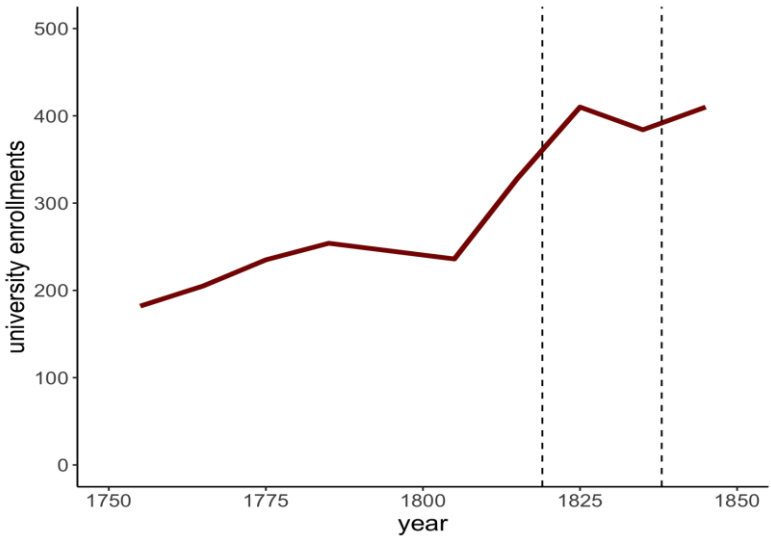

Figure 5. Estimated number of freshmen enrollments in English Universities, 1750-1850 (after (Goldstone 1991; Turchin and Nefedov 2009)). Vertical dashed lines mark the beginning and end dates of the crisis period

Despite the loss of the American colonies, the Empire as a whole remained large and highly productive, and the state was bringing in substantial revenues in this period, in marked contrast to the turbulent period preceding the Civil War (Brewer 1990; Davis and Feeney 2017; E. Royle 2000; Turchin and Nefedov 2009). However, state revenues did fall relative to spending by the middle years of the century (Keep and Brien 2018; E. Royle 2000), in part due to the increased spending programs initiated during the Chartist reforms. The critical point is that state capacity and institutions remained largely intact and functional during this period of high stress, notwithstanding growing intra-elite competition. This leads to the conclusion that **state fiscal distress** was a relatively minor factor in the Chartist period (Figure 6).

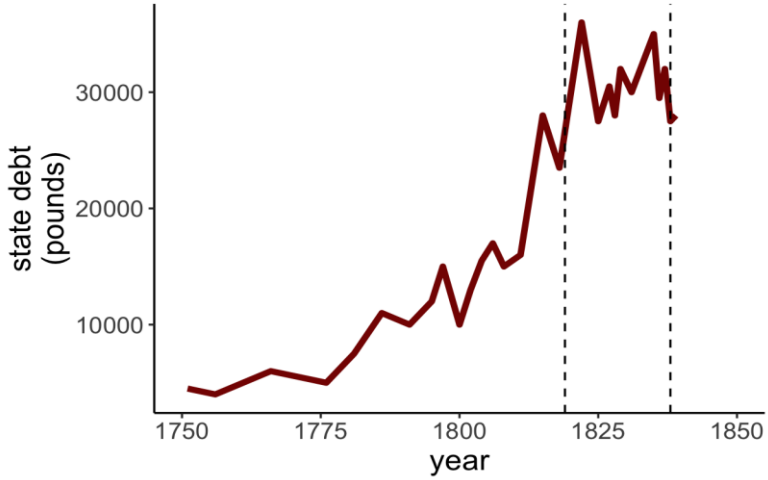

Figure 6. Estimated state debt of the UK, 1750-1850 (after (Davis and Feeney 2017; Tilly 2015)). Vertical dashed lines mark the beginning and end dates of the crisis period

Overall, driven largely by growing popular immiseration and tensions among elites, social stress climbed through the latter half of the 18th and beginning of the 19th centuries. Using similar evidence as discussed here, Goldstone (1991) constructed two separate PSI trends, aggregating information on the growing pressure England faced during this period (Figure S1). Goldstone's calculations show that social stress wanned after the violence of the Civil War, but emerge at a fairly high level by the early 19th century, suggesting a sharp rise at the end of the 18th. According to Goldstone, PSI then fluctuated until 1850. Critically, during this period of high but fluctuating PSI in the 1820s, 1830s, and early 1840s, we see also a spike in social unrest, indicated by a rising number of instability events (Table S3 and S4), including some significant events such as country-wide factory strikes in 1842 and riots that spread throughout the UK in 1848. The Chartist reforms were certainly born in a period of growing, though sporadic, social pressure and civil turmoil. The level of violence during the Chartist period, however, remained substantially lower than it had been as tensions were mounting in the late eighteenth century, and was nothing compared to the Civil War and Glorious Revolution during the seventeenth century.

Factors Shaping Crisis Outcomes

As with Rome's Conflict of the Orders, England benefited from the resources afforded by her extensive empire, including the opportunities to leave. Millions of

people emigrated from England in this period, primarily to other British territories including Canada and Australia as well as the (now independent) USA (Davis and Feeney 2017; Hatton and Williamson 1998). This was driven partly by the demographic and economic pressures facing the non-elite population as documented above. The state also facilitated this movement by lifting emigration restrictions starting in the 1820s and subsidizing travel to areas seeking population growth, notably Australia and New Zealand (Davis and Feeney 2017). This also provided outlets for England's elite aspirants frustrated with the saturation of prestigious and powerful positions at home. Emigration then likely carried a two-fold impact: on one hand, it would have relieved some of the demographic and social stressors within England itself; on the other, it had significant effects on institutional and social structures in the overseas territories, catastrophic for indigenous populations.

The impact of this mass emigration on England's domestic stability and resilience in the nineteenth century, however, should not be overstated. Indeed, while many left England's shores, this was not enough to offset population growth, as noted above. Ireland for instance experienced higher rates of emigration (scaled to population) than England, yet saw greater unrest and political violence during the late nineteenth century (Hatton and Williamson 2005; Mokyr 2006). Emigration, then, can tell only part of the story.

Arguably more significant to this story are the institutional reforms of the period. As noted, riots and demonstrations, sometimes violent, had been occurring sporadically since the late eighteenth century, spearheaded by landless farmers and labourers suffering under the harsh conditions of early industrial cities. Further outrage emerged in the 1820s against the Corn Laws, a series of tariffs on the import of grains that benefited large landowners and at times inflated the price of staple food in domestic markets. In response, a sizeable faction of England's political elite passed several critical reforms. Notably, in 1832 the franchise was extended to smaller landowners and some urban residents, and in 1834 the country's Poor Laws were amended in an attempt to increase state support for infirm and out-of-work labourers. When this new Poor Law failed to meet its stated aims, a new wave of riots and protests erupted, giving rise to the People's Charter. In response, a number of additional reforms were made through the 1860s (Table S3).

This is not to suggest that there was an outpouring of unity between elites and labourers. The concessions of English Parliamentarians came only after sustained public protest and rebellion, and elites themselves were divided on how to deal with this unrest. Nevertheless, the ruling elites sought to meet, at least partly, the demands of the immiserated majority through institutional reform. Their implementation also required large outlays of public spending to support the new welfare programs. As one historian put it, "From the 1820s onwards the British

elite showed a remarkable ability to reform its institutions and move from a fiscal-military state to an administrative state capable of meeting the needs of an increasingly complex commercial and industrial society" (E. Royle 2000, 171).

Summary: How Did Avert a More Destabilizing Crisis?

Britain experienced a fairly typical Stage 2 structural-demographic crisis: popular immiseration grew over a prolonged period and there were many signs of growing elite overproduction. Scholars of the period generally agree "that these decades [in England] possessed a revolutionary potential and … that the country came as close as it had ever been to revolution since the seventeenth century" (Archer 2000, 89). Fractious elite competition and the fiscal distress often seen in Stages 3 and 4 were, however, mostly absent. Perhaps for these reasons, no major civil war or outright rebellion materialized.

As with Rome, England's ruling powers managed to achieve sufficient cooperation to push through several significant reforms. These aimed to extend representation and political inclusion to a wider segment of the population and alleviate the most dire poverty through housing, healthcare, and alimentary schemes. For whatever reasons, a sizeable group of elites sought to address (or at least be seen to address) the underlying issues through reform rather than double down on their own privileges or focus only on suppressing the unrest. State resources were also adequate to follow up on these reforms, which continued over decades.

As with the Roman Republican case, it should be acknowledged that England continued to prosper during this period in part due to the British Empire's colonial possessions – and the extreme violence committed in their management. Still, as noted above, these factors fail to fully account for England's resilience and stability during this period, especially relative to the contemporary experience of other large, wealthy, colonial societies like France and Spain, who each experienced a major revolutionary event at this time (Davis and Feeney 2017; Goldstone 1991). This suggests that while economic expansion and colonial migration may have played a role, England's experience through the mid-nineteenth century would likely have been dramatically different if a large coalition of elites had not been willing to push through institutional reforms targeting some of the major root causes of popular immiseration.

Russia: Reform Period: 1855-1881 CE

Brief Historical Overview

At the conclusion of the Great Northern War against the Swedish Empire in 1721 CE, Russia found herself in possession of a massive swath of territory from the Bering to the Baltic, Siberia to Mongolia. Declaring itself an Empire with the reign of Peter I 'The Great', Russia continued to face off against the major powers of

Europe and Asia, annexing lands throughout the 18th century from Persia, Poland, the Ottomans, and others, as well as establishing settlements across the Baring Straight into Alaska. At the start of the 19th century, Russia had swollen to a massive imperial power stretching over 23 million km^2 across three continents.
While Russia was experiencing a string of military successes and territorial expansion, internal unrest was on the rise as well. Dramatic population growth butted up against an agricultural economy that struggled to keep pace with soaring demand, resulting in periods of high inflation and several bouts of severe famine. Exposure to the same progressive and liberal ideals sweeping the rest of Europe fomented unrest in Russia as well, particularly among the large class of agricultural serfs who railed at their lack of freedoms along with a growing sub-elite artist and intellectual subculture seeking widespread reforms. Add to this growing tension between the elite class, or gentry, struggling to maintain their privileges and positions against both this popular unrest and the imperial authorities, who were engaged in their own long-term program of centralization, and 19th century Russia was one of very high tension.

When Russia's period of expansion came to a halt with the stalemate of the Crimean War, Emperor Alexander II (r. 1855-1881) turned his attention towards the internal unrest; we date this crisis period to his reign. Under Alexander II, several major economic and social reforms were passed aimed at alleviating the poverty of Russia's large population of enserfed labourers. A notable feature of this case is that these reforms, as important as they were for mitigating unrest at the time, stopped short of reversing many of the underlying trends that had fomented the tensions to begin with. Elite in-fighting remained high, especially between the social and economic elites and the imperial authorities, while the state coffers and, perhaps, political will were insufficient to expand or capitalize on the reforms. Alexander II was assassinated in 1881 by a small, disaffected segment of the elite intelligentsia.

Russia's amelioration of unrest is the shortest-lived of those explored here. While the crisis does seem to have been averted or at least supressed temporarily, only a few generations later the same tensions rose again and led to a much more dramatic and disruptive – and more violent – outcome, namely the Socialist Revolution that brought an end to Russia's imperial period in 1917. An overview of significant events during this period is provided in Table S5.

Key SDT Factors: Popular Immiseration, Elite Competition, and State Fiscal Distress

Alexander II's accession followed a period of territorial expansion accompanied by significant population growth (Figure S2). Coupled with relatively low agricultural productivity, at least during the early nineteenth century, this resulted in quickly rising prices and falling or stagnating real wages (B. N. Mironov 1999; Turchin and Nefedov 2009). This is a common dynamic during the transition from Stage 1 to 2.

Further, a sizeable portion of Russia's agrarian population were enserfed, a common practice across medieval Europe in which farming families were 'tied' to a particular plot of land.

Enserfed Russians owed fairly high rents (quitrents) and taxes to both landlords and the state, along with other labour duties (Gatrell 1994; Turchin and Nefedov 2009). Unfavourable climatic conditions, low productivity, and these heavy burdens resulted in devastating famines during the 1720s and another in 1787 (Boris Mironov 2012; Nefedov 2005). Overall, the "eighteenth century is notable for the decline in the living standard of the majority of the Russian population" (Boris Mironov 2012, 148). We have, thus, a clear picture of rising **popular immiseration** during the time leading up to this crisis period (Figure 7).

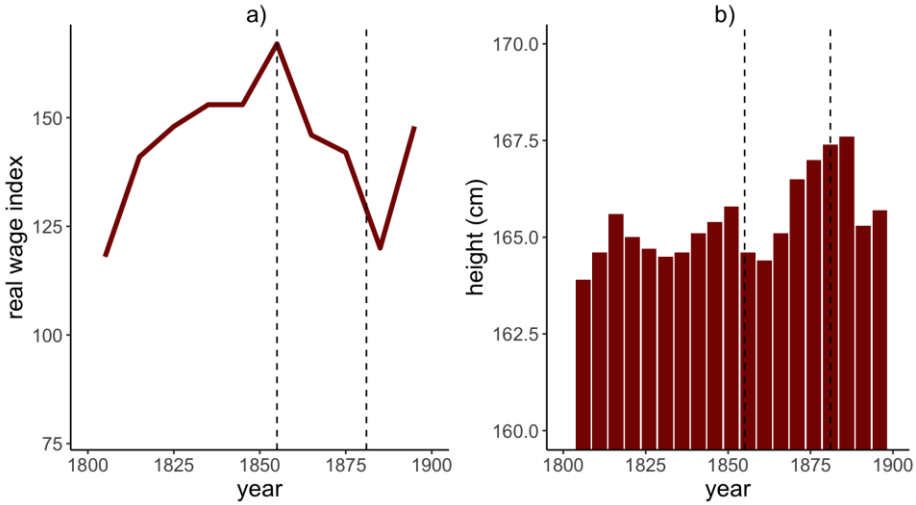

Figure 7. Trends in popular immiseration in Russia, 1899 – 1900: a) estimated real wages of labourers, showing index values (1716 = 100) (after (BN Mironov 2004; Turchin and Nefedov 2009)); b) average heights of army recruits (after (BN Mironov 2004; Komlos 1993)). Vertical dashed lines mark the beginning and end dates of the crisis period

As well-being for a large segment of the population was falling, the lion's share of Russia's surplus wealth fell into the hands of elites through rents and obligations owed by enserfed labourers, with the state's share falling (Figure 3). The so-called Gentry Revolution of 1762 and Empress Catherine II's (r. 1762-1796) favourable attitude towards the nobility further entrenched elite privilege, reinforcing the heavy demands on peasants (Jones Robert 1973). "As the proportion of the peasant surplus going to the state decreased, it was not the peasant who profited but the lord" (Turchin and Nefedov 2009, 232). All the conditions, thus, were in place to generate **elite overproduction**. Through the mid-19th century, elite numbers

overall were rising as the wealth and privileges captured by this class also persisted or expanded, even though as a proportion of the overall population they remained fairly steady (Boris Mironov 2012).

Interestingly, **intra-elite competition** also presents a varied picture. Competition among noble families seems to have remained relatively low in this period, a contrast to Rome during the Crisis of the Orders and Chartist England, though there are some signs of tension. From the reign of Paul I (r. 1796-1801), the imperial state sought to increase the scope and centralization of the imperial bureaucracy and to increase state revenues vis-à-vis the nobility. Steps to curtail the privileges and power of the growing elite class and re-establish elite service obligations were met with hostility, leading to Paul I's assassination (Moon 2001; Rieber 1994). Rather than competition within elite ranks, tensions largely emerged between this noble class and the ruling elites and administrators. This tension manifest in several successful and attempted coups in the late eighteenth and early nineteenth centuries (Table S5). On the whole, though, the landowning class remained a fairly cohesive group in this period, enjoying wealth and privileges even as the state centralized political and military authority through the nineteenth century.

State finances were also on a relatively firm footing by 1800, or at least were showing signs of improvement. The state's fiscal security was undermined in subsequent decades, though, by the high costs of the rapidly expanding bureaucracy and of near constant warfare (Saunders 2014) the Empire engaged in during this time. Through the first half of the nineteenth century Russia was largely successful in these conflicts and added much productive territory in the Balkan and Caucasus regions. This land, though, came with additional populations, creating further management costs and demographic pressures. The tide of victories also turned with the Crimean War, which Russia conceded in 1856 and which put great strain on state finances (Saunders 2014; Soroka and Ruud 2016).

In this case, we see clear signs of popular immiseration along with some elements of elite overproduction and growing fiscal distress as our crisis period unfolded. Yet, the latter two components in particular present a more complex picture than SDT generally assumes. Russia was unquestionably facing rising social unrest as the 19th century wore on, driven largely by the heavy burdens placed on Russia's large peasant classes, though notably this spike in unrest is considerably shorter than the unrest surrounding the 1914 Revolution (see Table S5). Yet, unlike most cases explored under the SDT lens, here we see the state attempting to respond to the issues facing the peasantry, antagonizing a still fairly cohesive and united nobility. The spike of unrest in the 1850s and 1860s, then, quickly subsided, yet the underlying social tensions were not completely resolved; indeed, tensions seem to actually have been enflamed by the state's reforms, which not only failed

to address all of the concerns held by peasants (more on that in the following section), but exacerbated conflicts between state and non-state elites. The cost of these reforms along with Russia's continued engagement in foreign wars drove up expenses, weakening the state's capacity to respond to or supress the next wave of unrest, which built up again fairly rapidly in the latter decades of the 19th century. The complex dynamics seen in this case underscore both the advantages and limits of SDT; using the theory to explore the period helps to expose the different pressures that were – or were not – present in this case, yet it does not provide a clear path to explain the somewhat peculiar patterns and outcomes observed. The Russia reform period is, thus, an excellent example to compare with other cases where SDT has been more straightforwardly applied. We delve into these interesting, and fairly unusual, dynamics below.

Factors Shaping Crisis Outcomes

When Alexander II took the throne, he inherited a lost cause in the Crimean War, runaway state debt, a disgruntled nobility, and immiserated populace. He inaugurated a series of reforms in response. In 1859, military service requirements were reduced, then in 1862 serfdom was, in principle, abolished. This one reform amounted to a major overhaul of Russia's political, social, and economic systems. Further reforms through the 1860s increased funding for and access to education, abolished tax farming, and overhauled the judicial reforms. As with the other cases explored here, the true intentions behind these reforms – whether concern for the plight of the enserfed, a desire to restore state coffers after costly warfare, or many motives at once – is impossible to recover. What matters for this investigation is simply that a series of reforms targeting popular immiseration were indeed enacted, though with much effort and against the wishes of many nobles.

Alexander faced significant resistance in these reforms from Russia's social and economic elites, who still maintained considerable authority at court. Further, elite uprisings like the assassination of Paul I, the Decembrist uprising, and November uprising had occurred only a generation or two earlier. The Tzar was thus forced to make several concessions to elite interests in order to get sufficient support for his reform program, notably requiring emancipated serfs to pay redemption payments to former serf-holders[4].

These reforms partly succeeded in reducing the burdens on peasants and redistributing resources from the gentry to the state. The pressures arising from high polarization and elite tensions with the imperial state, however, were not addressed to the same degree. As Turchin and Nefedov note, "The emancipation of enserfed labourers caused serious dislocations for the landowners who specialized in producing grain for the market, especially those who relied on corvée labor.

[4] The state did provide some aid in financing these payments, though interest was charged. See (Saunders 2014).

Many were unable to adapt to the new conditions and failed. Between 1862 and 1877, the number of gentry-owned estates contracted by 11,000, or 8.4 percent of the total" (Turchin and Nefedov 2009, 240).

Many peasants were also unhappy with the reforms. Some enserfed believed incorrectly that "once freed from the nobles, they would be left completely alone to govern themselves and would no longer be obliged to pay taxes or supply recruits to the army" (Moon 2001, 88). Indeed, though the bulk of their obligations shifted from landowners to the state, the overall size of payments had not changed dramatically, and many had access to less or poorer-quality land than before. Peasant uprisings continued to appear for a time in the early 1860s even after the reforms (Table S5), and a populist movement comprising sub-elite intellectuals, artisans and impoverished nobles assassinated Alexander II in 1881.

Summary: How Did Russia Avert a More Destabilizing Crisis?

Russia's institutional reforms managed to curtail the very worrisome signs of unrest and political violence in the mid-nineteenth century. However, their lasting impact in improving the lives of the majority population and in maintaining social stability should not be overstated. The advances made from this reform period were more social and ideological than material.

The compromises reached with the gentry defanged the reforms in many ways. In contrast to our other cases, the Russian state also lacked the fiscal power or administrative force – or simply the desire – to reinforce these institutional changes with costly public programs such as land redistribution, employment guarantees, or subsidized necessities (Gatrell 1994; Saunders 2014). As Saunders concludes, "from the point of view of the peasants, it could be said that the world which the emancipation brought into being barely improved on the world that it brought to an end" (Saunders 2014, 264). The reforms had also deprived the nobility of the means and status their positions had traditionally conferred, without any clear demonstration that it had aided 'the greater good'.

Instability remained ostensibly low during subsequent decades, though this masked the lingering tensions of a still immiserated population and increasingly discontented elite. Just a generation later, these same issues re-emerged with greater force, this time resulting in a violent civil conflict that led to the fall of the Romanov dynasty and a complete reorganization of the state as a socialist republic. Indeed, this is arguably less a case of mitigating or averting a crisis, as one where its full impact was merely delayed. We return to this in the Discussion.

USA: Progressive Era: 1914-1939 CE

Brief Historical Overview

With the assassination of President Abraham Lincoln and ratification of the 13th Constitutional Amendment banning slavery in 1865 CE, the American Civil War

came to a close. Fighting had been particularly intense and bloody, marking a watershed moment for the young country. The reconstruction era that followed, however, did not restore cohesion or fully address many of the underlying tensions. In fact, instability continued to rise after the fighting had formally ceased, while well-being for a large segment of the population continued to fall. Issues of systemic racism, dislocations caused by a changing economic system, the ills of a rapidly industrializing urban landscape, and the challenges of a federal government trying to (re)establish its central authority – all major factors leading to war in the 1860s – remained in force and, in many cases, became more pronounced as the 19th century wore on.

From the end of the Civil War to the onset of World War I, the US saw rapid economic growth and territorial expansion, including the assertion of hegemony in many former Spanish holdings in the Caribbean and Pacific Islands areas. The country's enormous wealth of natural resources furnished a major push towards industrialization, facilitated by growing populations and the building of a large network of railroads to move goods to the major urban centres and ports for transport to important European markets. At the same time, the large number of citizens providing labour in these factories and on the railroads were forced to work long hours, often in unsafe conditions, and had almost no legal recourse to seek protection – a very similar story as seen in the lead up to England's Chartist movement.

The late 19th century, then, was a period of high political instability as runaway inequality, poverty among agricultural workers, and the poor conditions faced by factory and railroad workers led to a number of uprisings and protests, many of which met a violent response by authorities. Typically the Progressive Era, named for the number of reforms passed during this time, is dated 1890–1914. This period is not usually described as a 'crisis', largely because, as we will see, many of the factors driving unrest through the nineteenth century had largely dissipated by this time. We consider this period a crisis due to the signs of rising social tension along with the turmoil and violence that preceded reforms in the 1920s and 1930s, detailed below.

In spite of the major shocks experienced in the first half of the century – the two World Wars along with the Great Depression – there are several indications that these reforms were indeed largely successful in mitigating the major drivers of structural-demographic instability, reversed only with the liberalization regimes beginning in the 1970s. An overview of significant events during this period is provided in Table S6.

Key SDT Factors: Popular Immiseration, Elite Competition, and State Fiscal Distress

After gaining independence in the late eighteenth century, the USA grew rapidly in territory and population (Carter 2004; Turchin 2016). The government promoted

westward expansion by violently removing and depopulating indigenous nations and incentivizing settlement by white farmers. Territorial expansion slowed after the Mexican-American War ended in 1848, but population continued to expand for the rest of the 1800s, despite the massive loss of life during the Civil War. In large part this was driven by migration (both domestic and foreign) into the burgeoning industrial cities in the midwestern and eastern states. The country's rural population remained large, but the urbanization rate climbed from roughly 5% in 1790 to over 35% one century later (Turchin 2016).

Unskilled labourers, particularly in factory and transport work, benefited from America's expanding industrial economy, seeing real and relative wages increase overall from the late eighteenth through the mid-twentieth century, though this includes a period of decline at the end of the nineteenth century (Figure 8a). Critically, however, wealthy industrialists captured an even greater share of the growth, resulting in rising economic inequality through the 1800s and first decades of the 1900s (Johnston and Williamson 2021; Turchin 2016). As in the major industrial centres of England, urban US workers in the nineteenth century suffered harsh conditions, long hours and often unsafe and unregulated environments. Additionally, there were few legal protections for workers, driving fairly high unemployment rates during the period (Figure 8b). Increasingly crowded cities and poor sanitation led to a sharp decline in many key indicators of well-being during the late nineteenth century, including average stature (Figure S4) (Turchin 2016). **Popular immiseration** was thus on the rise not only leading up to the Civil War, but even in its aftermath.

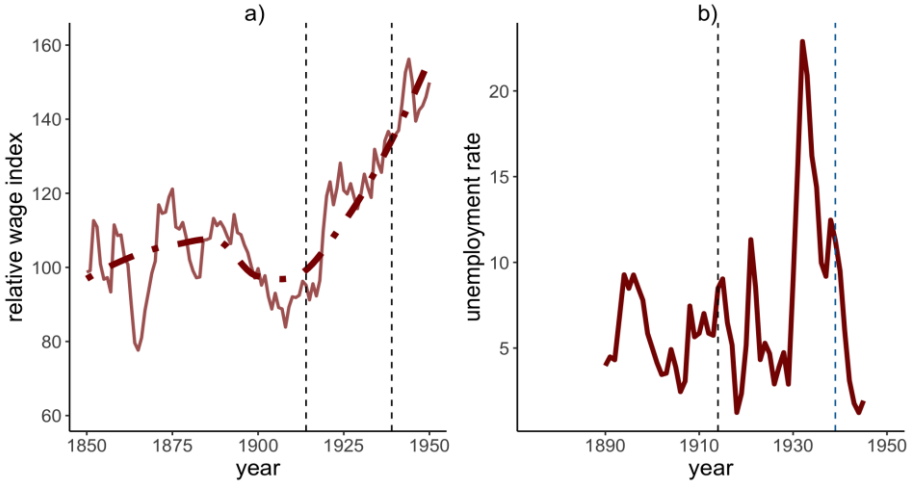

Figure 8. Trends in popular immiseration in the USA, 1850-1950. a) estimated relative wages for labourers (calculated as real wages / GDP) (after (Turchin 2016; Turchin and Korotayev 2020a)). Solid light red line shows the index values,

dark red dashed line shows the loess trend line; b) Unemployment rate as percentage of total population (after (Turchin 2016)). Vertical dashed lines mark the beginning and end dates of the crisis period.

Elite overproduction is likewise apparent in the US case, as wealthy factory owners, merchants, rail barons, and other industrialists profited from the same conditions explored above that worked to drive down popular well-being. The economic gains made by this group produced a growing number of elites and elite aspirants. Enrollments in post-secondary education soared in the second half of the nineteenth century, while the number of millionaires and the size of fortunes likewise rose steadily (Turchin 2016)(Figure 9).

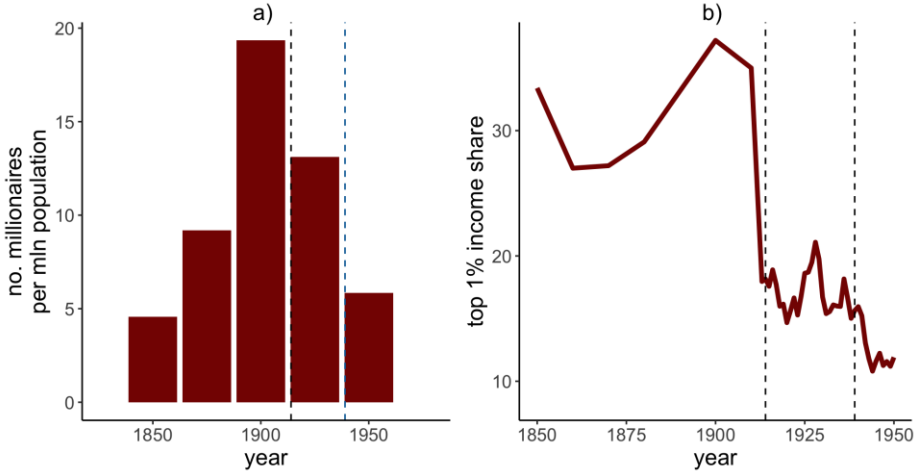

Figure 9. Trends in elite wealth in the USA, 1850-1950. a) estimated number of millionaires (using constant 1900 USD) per every 1,000,000 of total population (after (Turchin 2016)); b) estimated share of national income held by the wealthiest 1% of the population (after (Turchin 2016; Turchin and Korotayev 2020a)). Vertical dashed lines mark the beginning and end dates of the crisis period.

As elite fortunes and numbers grew, so did **intra-elite competition**. The most dramatic and significant illustration of this is, of course, the US Civil War. This outpouring of intra-elite competition was an extreme, violent manifestation of the tension that had been rising decades earlier and resolved some of the institutionalized manifestations of structural inequality, notably with the abolition of chattel slavery. The major underlying drivers, however – including growing immiseration among labourers in the industrial economy, rising elite numbers and fortunes, and a relatively weak, underfunded state – remained after fighting ceased. Though this war was bloody and decisive in many respects, it failed to fully allay tension between elites with very different visions for the country's economic

future. Elite overproduction and popular immiseration continued even after the fighting ended in 1865. This was exacerbated in the Reconstruction era as many northern industrialists gathered an increasingly large share of the country's growing wealth. As SDT predicts, we also see signs of rising intra-elite competition and tension. Figure 10 shows polarization rates in both the House of Representatives and Senate during this period, tracking voting records to calculate how 'distant' party votes were to each other (and how close internally). Unlike in imperial Russia, social and economic elites in America often sought to translate their status into political authority. Competition over these relatively limited positions led to political polarization through the end of the twentieth century and into the first decades of the twenty-first (McCarty, Poole, and Rosenthal 2016; Turchin 2016).

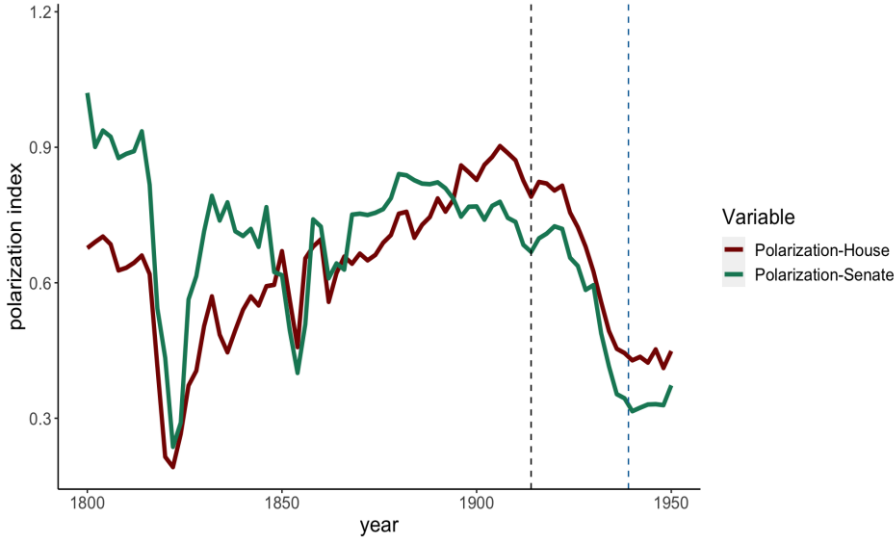

Figure 10. Polarization index in the USA, 1790-1950 (after (McCarty, Poole, and Rosenthal 2016)). Vertical dashed lines mark the beginning and end dates of the crisis period.

Indicators of **state fiscal distress** during this period are equivocal (Figure 11). The government was able to spend large sums on infrastructure projects, such as railroads, and waged several conflicts in the late 1890s, including the Spanish-American War. On the other hand, the state's fiscal apparatus was relatively underdeveloped. Most federal revenue came through tariff dues and excise taxes – income taxes were not introduced until just before World War I – and state and municipal revenues generally exceeded federal funds before the twentieth century (McCarty, Poole, and Rosenthal 2016). The US government did not engage in many major federal programs besides certain key projects, particularly railroad building.

On balance, the state deficit was relatively low from the Civil War until the World Wars. However, this balance masked a precarious situation: spending and therefore public debt was low, but so was revenue, leaving the government poorly positioned to respond to new issues.

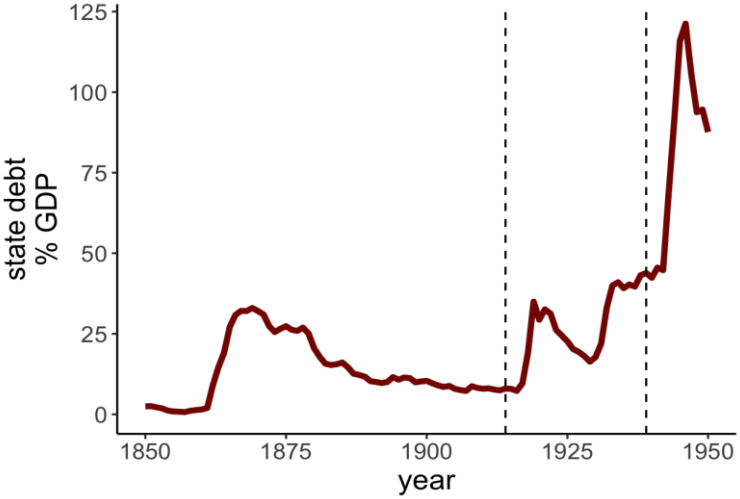

Figure 11. estimated state debt as % of total GDP in the USA, 1850-1950 (after (Turchin 2016)). Vertical dashed lines mark the beginning and end dates of the crisis period.

Much in line with what an SDT analysis would predict given these trends, the 1870s, 1880s, and 1890s witnessed significant protests, labour disruptions, and riots throughout the US, mostly involving factory and railroad workers, while the 1910s saw major bouts of industrial violence including bombings and 'war' between coal miners and state governments in Colorado (Table S6). The beginning of our crisis period is timed to catch this turmoil spike. Yet, rather than continuing to grow or having the unrest spiral into even deeper violent conflict, unrest declines sharply in the post-WWI period and remains low for several decades afterwards, until the 'trend reversal' of the 1970s and 1980s identified by Turchin and others (Turchin 2016; Turchin and Korotayev 2020a; Turchin 2023b).

Factors Shaping Crisis Outcomes

We have, thus, all the conditions for a classic structural-demographic crisis and for another major disruptive, violent event in the early twentieth century. Several protests did turn violent as police or state militia were called in to disperse crowds and supress dissent (Calavita 2020; Domhoff and Webber 2011). Yet, there was no second Civil War, or major revolution as was seen under similar conditions in

eighteenth-century France or early twentieth-century Russia. In fact, by many indicators this 'crisis' actually produced a lengthy era of generally high well-being in the following decades (Turchin 2016).

Partly, this is explained by a constellation of external factors. The start of World War I, which had very little to do with the US at its start, came at a period of high political stress domestically. The US became embroiled in the conflict in 1917, which diverted a lot of the state and populace's attention towards the war effort. The War may indeed have interrupted what would have become a significant civil disruption were these domestic dynamics left to their own devices. The Civil War itself may also have been a significant factor, even though it did little to resolve many of the underlying societal tensions, simply because it was recent enough for people to remember how horrifying the fighting had been. Such an aversion has been noted in many historical cases, lingering for a few generations after a major outbreak of violence that limited the chances of starting a new one (Turchin 2005). The country's willingness to enter the field in World War I, however, undermines this interpretation.

More significantly, the impact of World War I in curtailing this crisis period does not fit the timeline well. After the assassination of President McKinley in 1901, Theodore Roosevelt took office and began to shift some of the government's stance towards workers. In 1902, the federal government successfully mediated a labour dispute involving unionized coal miners in Pennsylvania, signalling at least a willingness to engage in compromise and recognize the concerns of labour, though the government was careful to avoid being seen as explicitly acknowledging worker's right to collective bargaining. A few years later, during Roosevelt's last year in office in 1908, the Federal Employer's Liability Act was passed, which provided a means for railroad workers injured on the job to seek compensation from employers. In 1910, unionized railroad workers won a work-day limited to no more than 10 hours and pre-defined wage scales. We thus see relative wages begin to trend upwards, with elite wealth concomitantly falling, in the first years of the 20th century before the US involvement in the war (see above, Figures 8a and 9). Although several major instances of popular uprising and violent protest occurred in the 1910s, union membership continued to grow and the government slowly but surely loosened its stance against labour collectivization and action. A number of reforms were passed over the following years, accelerating in response to the Great Depression, each building on each other to provide a more robust suite of labour protections; these culminated in the 1933 passing of the National Labour Relations Act (Table S6 provides details on these major violent events and significant reforms).

Another major factor that often goes overlooked by commentators on this period is the important role played by a small but powerful group of the country's economic elites. Indeed, by the early twentieth century many of the industrialists

who had benefited from the lax rules regarding treatment of employees came to support many of the reforms workers were seeking. JP Morgan, for instance, had been a key ally and advisor to Theodore Roosevelt encouraging the compromise between ownership and workers in the President's efforts to mediate the Pennsylvania coal strike in 1902. John Rockefeller Jr, who had been one of the owners of the coal mines involved in the bloody Colorado Coalfield War in 1913 and 1914, had a change of heart after that violent standoff and began to promote informal collective bargaining with his employees through elected worker representatives (Domhoff and Webber 2011; Turchin 2016). The most notable 'populist industrialist' of this period, though, is Henry Ford, who introduced significant wage increases[5] and reduced work hours in his factories in 1926, though he remained vehemently anti-union throughout his life (Watts 2005). Over time, a number of major corporate owners had implemented higher wages and shorter work-weeks for employees, in spite of there being no formal, institutional mandate to do so (Smiley 2002).

Other reforms and cultural shifts played a role as well. The government sought to limit the influx of wage workers into the economy by restricting immigration, such as with the Immigration Act of 1924. This and similar legislation curtailed demographic growth, removing some of the downward pressure on wages and reducing the high unemployment rates seen in the late nineteenth century. Several of the country's premiere Universities also imposed much stricter admissions standards in the 1920s (Calavita 2020; Domhoff and Webber 2011; Karabel 2005; Turchin 2016). Largely, these were driven on class and ethnic grounds, though the result was a similar curtailing of elite overproduction.

The last points should not be taken too far or viewed out of context. It is important to stress that, although immigration restrictions in the 1920s did slow down demographic expansion, population continued to rise in the early twentieth century. Unemployment was relatively low in this period, but this trend had begun before the immigration restrictions were put in place (Figure 8b).

Summary: How Did the USA Avert a More Destabilizing Crisis?

Intra-elite competition both helped spur the growing instability seen in the US during this period, but also seems to have helped ease tensions through the early 20th century. Amid widescale popular unrest, rising polarization, and a number of violent outbreaks, several wealthy and politically powerful corporate leaders changed course and began to support many of the reforms being advocated by the working population. Clearly, this was not a universally held attitude, as violent suppression of labour action and anti-union rulings continued through the end of the first World War. Further, not all sides were satisfied by the era's compromises,

[5] Namely, doubling the pay of automobile factory workers in 1914.

attested by the numerous acts of violence taken by aggrieved workers and anarchist groups in 1910s and 1920s (Table S6).

Nevertheless, the institutional reforms and, perhaps more significantly, foresight by many economic elites and government leaders to head off immiseration before unrest grew insurmountable clearly had an impact in resolving this crisis with relatively minimal violence and social disruption. This resolution was aided by the ability of the state to assert increasing central authority in the early twentieth century. The imposition of an income tax in 1914 allowed the government to dramatically increase fiscal security, while also helping to curb elite overproduction with high top marginal rates. The country's entry into World War I then provided an impetus to raise tax rates further and engage in major spending programs to aid in the war effort.

Interestingly, the Great Depression itself actually served to reinforce and boost these trends, despite its (deserved) reputation as a period of massive loss. This is not to say that there was not real suffering during the depression, but as the above discussion indicates, longer-term trends in relative wages and overall popular well-being continued to rise throughout the 1930s (Turchin 2016). Even political polarization (Figure S10) and instability events were lower during the Depression than they had been in the 1890s and early 1900s. Further, the spike in unemployment (Figure 8b), massive capital loss, and widespread business failure of the early 1930s compelled the Roosevelt government to establish a number of additional reforms – including the establishment of major public works programs, legalizing the right of workers to unionize and bargain collectively, old-age pensions and unemployment insurance – echoing many of the efforts that the first Roosevelt and the progressive industrialists noted above had begun decades earlier. These reforms effectively raised popular well-being and reduced instability, at least on a broad scale. It needs to be acknowledged, however, that these general trends obscure that many communities continued to face high levels of immiseration throughout this period and to the present day, particularly marginalized groups and communities of colour.

Indeed, several scholars have pointed out that the Depression era in the US saw as many advances in life quality and societal stability as disruptions, especially compared with the experience of other affected nations such as France, Italy, and Germany (Bernanke 2000; Smiley 2002; Terkel 2011). This trend of higher overall popular well-being, a strong and coordinated state, and relatively prosocial elite class helped fuel the rise of American prosperity and hegemony, until the next trend reversal set in with the banking and finance reforms of the 1970s and 1980s (Turchin 2016).

Discussion: Can We Flatten Curves or Break Cycles of Crisis?

There are two very different conclusions to be drawn from the cases of crisis explored here. The more pessimistic interpretation stresses the role of external factors in minimizing the severity of outcome. In all four cases, the decades preceding crisis saw the societies expand their territory through conquest. This provided additional resources which the states could draw on in establishing reforms and suppressing unrest, often violently. Further, the expansion of territory and loss of life associated with warfare slowed down the pace of demographic expansion and thus flattened the curve of rising social stress. Rome and England also benefited from increased territory by 'exporting' large numbers of citizens abroad, relieving some of the downward pressure exerted by labour oversupply. Recurrent warfare not only fueled expansion, but the near constant threat from external foes also exerted pressure on power holders to maintain a cohesive, engaged, and (relatively) healthy populace that could be called on to contribute to war efforts. Without intense inter-state conflict, there may not have been adequate support for reform among the elites, which in turn may have led these crises to spiral into more violent and disruptive outcomes.

The more hopeful take is to focus on the success of major institutional reforms in restoring popular well-being and alleviating tension in all four cases. The expansion of representative government and redistribution of resources in Republican Rome and Chartist England, labour legislation in the industrializing economies of mid-nineteenth century England and the early twentieth-century USA, and the emancipation of enserfed labourers in Russia under Alexander II all fit neatly within this category. These reforms led to meaningful improvements in well-being for large segments of the populace (though not all), reducing popular immiseration. They also dampened intra-elite competition by providing new venues for elite aspirants to seek prominence, e.g. by administering the new committees set up to reduce poverty and unsafe working conditions. However, the impact of such administrative positions for upwardly mobile elite aspirants is difficult to assess.

It may be the case that these cases simply faced lower overall social pressure than instances where crisis resulted in more severe outcomes, or that the peculiar mixture of pressures from the key SDT factors lent themselves towards relatively mild experiences. It is beyond the scope of the present study to construct full PSI time-series for each of the cases explored here, let along compare these to not only each other but to a large number of other cases offering the full range of outcomes; indeed, sufficiently detailed information is lacking or difficult to access for many historical cases (see Hoyer et al. 2024 for further discussion of these issues). We return to this below when discussing priority areas for future research. More pertinent for the present study is that PSI dynamics on their own are insufficient to provide a complete picture of any society's experience with crisis. The detailed

exploration of the four cases presented here demonstrates unequivocally that each society was experiencing growing social pressure from the three major sources highlighted by SDT in the run up to, and in some cases during and after, the crisis periods defined here, along with clear spikes in violent protests and uprisings; these were, in other words, true 'crises' in the sense of rising unrest, frustration, dissatisfaction, and resulting instability. Our SDT lens helps to expose these patterns and spotlight areas where expected stress may have been lacking. Yet, as the above analyses and discussions reveal, the decline in these stresses (which would be reflected in a PSI dynamic) are not the reason for the relatively mild outcomes experienced in these case, rather it is the from the specific responses taken as these crises were becoming manifest that the pressures were relieved.
Below, we spotlight a few critical insights, and open questions requiring further investigation, stemming from these analyses.

The Importance of Future Thinking

We also want to highlight an often underemphasized trait: early recognition or 'future thinking'. As noted above, the ability of certain elites to foresee an imminent crisis, or at least recognize that the society was unstable and not adequately providing for the well-being of all members, stands out as critical. Each of the cases explored here show signs of entering into Stage 3 or 4 of the typical SDT crisis cycle. Often in such circumstances, instead of supporting inequality-reducing reforms, elites seek to maintain or even expand their entrenched positions and privileges in the hope of short-term gain. These actions more often than not end up exacerbating the underlying drivers of unrest and leading to a spiral of increasing tension and, eventually, a major violent eruption. Indeed, the Civil Wars in the USA and England which preceded the periods under study here, or the violent revolutions in the later Roman Republican period and early 20th century in Russia which follow our periods, offer clear instances of this more common historical tendency. While we do not have space to delve into the details of these more disruptive crises, we posit that reactions by power-holders as pressures mounted, trying to maintain the status-quo and hold on to their own power while not supporting, or actively opposing, reforms explains much of the difference between these cases and the averted crises discussed in this article.

In the four examples described above, a substantial proportion of those in power supported stabilizing reforms, even at the cost of forgoing some of their wealth and advantages. This elite 'buy-in' seems to be necessary particularly early on, during Stage 2 or the onset of Stage 3. This is when the signs of growing inequality between social groups and rising popular immiseration become manifest. At this point, there will be in most cases enough resources available to the state and – at least potentially – the cohesion among elite groups needed to generate and reinforce the sort of major reforms that address the underlying

issues: precisely the sort of reforms we see in the cases documented here. Yet, this is also the point when these same elite groups are seeing the largest gains to their own material and social wealth. This reveals a tragic irony of history: at the very point where reform is most needed, those with the greatest power to enact it are least inclined to do so.

When the chance for early reform is missed, typically crises spiral towards ever larger, more destructive resolutions. Reforms made after the problems of elite overproduction and state fiscal distress have set in are likely to be less effective and long-lasting. The case of Russia offers an informative illustration; Alexander II enacted reforms in spite of opposition from most of the landowning elite, which may explain the short-lived effects of crisis mitigation.

The Role of the State and Scope of Interventions

The role of the state in these reforms must not be overlooked either. In each case discussed here, the state asserted its authority by passing legislation and initiating major spending programs, as with the English and US examples, or working to redistribute wealth and resources, as with the Roman and Russian cases. Interestingly, in the Russian and US cases, these reforms required that the state first undergo a significant expansion of the bureaucratic apparatus, reorganizing regional and municipal governance, and passing fiscal reforms to capture an increasing share of the country's wealth. A further commonality in these cases is the scope of the reforms undertaken. Rather than 'stop-gap' measures aimed at addressing only one grievance at a time as seen in other instances[6], in these examples major reforms significantly altered the political, economic, social, and military structures of the society, touching on a number of complaints and sources of social stress at once.

In the cases of Russia and Rome, the reforms inaugurated certainly reset political stress, but many of the gains were not fully institutionalized or enforced by the state in subsequent decades, in part the result of subsequent leaders and elites undoing the reforms undertaken during these earlier crises. As a result, both societies experienced major violent events not much after the reform period: a century-long period of civil violence began about a century after the end of the Crisis of the Orders; for Russia, tensions re-emerged a few generations after the reform period, leading to the various socialist revolutions of the early twentieth century. In contrast, in England and the USA, the trends of reduced popular

[6] For example, efforts to reduce grain prices during shortages in France during the Bourbon Kingdom (Goldstone 1991) or increasing the number of people who could pass a civil service exam without also increasing the number of openings available in the civil administration, as the Qing Dynasty did in the run-up to the Taiping rebellion (Orlandi et al. 2022).

immiseration, polarization, and unrest initiated at the height of political stress were reinforced by later legislation working along similar lines as the initial reforms. This provided the reforms the time and support needed to make meaningful impacts, helping to complete the process of mitigating crisis or even reversing socio-political tension.

Resilience Can Be a Double-Edged Sword

There also is a dark side to the resilience that these societies displayed through periods of crisis. Namely, the reforms enacted and gains made in alleviating popular immiseration in all four cases were relatively incremental. The appeasement of popular unrest while maintaining many of the structures that supported the accumulation of wealth and privilege among elites may be seen as a missed opportunity for more dramatic systemic change. For instance, more transformative revolutions resulted from much more violent and socially disruptive crises experienced by several European powers during the so-called Age of Revolutions (1789–1919), notably the French Revolution (Goldstone 1991; Hobsbawm 2010). Future work is needed to track how different groups fare in cases of crisis over the long-run to assess the trade-offs between incremental gains with minimal disruption and major systemic reform that comes on the tails of significant violence (Scheidel 2017; Hoyer 2018; Ainsworth and Hoyer Forthcoming).

Crises Unfold Along Multiple Scales

This raises a final point of discussion, namely the need to clarify the timescales involved in analyses of crisis and recovery. Just as providing a clear and reliable definition of crisis has proven elusive, so too establishing clear temporal bounds for crisis periods is fraught (Hoyer et al. 2024). Over the very long term – two or three centuries – nearly all societies experience some form of crisis, outbreak of violence, and/or major institutional reform (Turchin 2005; Turchin and Nefedov 2009). This raises a number of thorny conceptual question. Does the Russian reform era not count as a crisis mitigated, for instance, since the country experienced a major, violent revolution only half a century later? What about Rome, which went over 100 years between the end of the Crisis of the Orders and the extended civil war period that brought an end to Republican government; are these two independent and unrelated events, was the later crisis instigated by the mitigation efforts during the former, or should we instead think of them as a single, long crisis period with different phases? Do Chartist England and the Progressive Era US count as averted crises, since these countries have gone decades without experiencing any further bouts of major civil warfare since, excluding of course the violence and dislocations of the World Wars, Great Depression, and the many conflicts over the independence of both countries' colonial holdings?

These and similar questions confront any study looking to trace the dynamics of crises, from the forces that give them rise to the long-term implications for different communities. Here, we focus on the relatively immediate aftermath of periods of crisis – one or two generations – though other studies may take different approaches. Ultimately, it will be fruitful to look at crises from multiple perspectives and with different time-scales, looking to expose how forces operating at different scales and tempos conspire to produce the outcomes we observe in the historical record.

Conclusion and Areas for Future Work

The focus of this article is to scrutinize a handful of historical cases, circumscribed in time and selected deliberately to illustrate how the most devastating outcomes of crisis seen in many instances in the past were ostensibly averted. The shared features observed in these four cases, as well as the unique details of each, offer a few clues about how societies might be able to mitigate the impacts of a structural-demographic crisis as it grows. Scrutiny of these cases spotlights growing inequality in particular as a major underlying driver of crisis. It also points to the crucial role of elites and state agents in recognizing the signs of unrest and then achieving sustained cooperation to address the issues through iterative reforms.

We take SDT as a framing device for the investigations. SDT has proven adept at illuminating some of the major drivers that lead to societal unrest and foment instability. There are limits to the theory's explanatory power, however, which the above discussion helps to expose. Notably, SDT at its core seeks to explain why societal crises *arise*; it was not developed to explain why these crises take the shape they do, although several previous studies have used it in this way especially when exploring cases of major civil warfare or societal collapse (e.g. (Korotayev and Zinkina 2011; Orlandi et al. 2022)). The present study takes as a starting point instances where SDT is partially explanatory: tracking the three primary factors considered by SDT – popular immiseration, elite overproduction and conflict, and state fiscal distress – helps us understand why these four cases experienced periods of societal crisis and at least momentary spikes in violent unrest; yet, SDT alone does not explain why these cases, unlike most societies in the past that experienced such socio-political stress, were able to avoid or at least delay more catastrophic consequences. For this, we need to dive into deeper into the structures and particularly the responses of power-holders as these stresses rose and began to manifest.

A broader assessment of a large number of systematically sampled historical cases is needed before general conclusions can be reached. In particular, developing long time-series data to construct PSI trends for a large number of societies is needed to unpack whether the PSI level, and perhaps peculiar mixture of the elements comprising it, in different periods may account for the variety of

outcomes observed in the historical record, both the more destabilizing as well as the relatively mild cases discussed here. Such a detailed, data-driven, large sample size study is well beyond the scope of the present work, but may help to uncover some of the key forces driving these outcomes and contribute to the further refinement of SDT. Caution, however, is warranted; the likelihood that such PSI time-series could explain the empirical record on their own is highly unlikely given what the present study has revealed, namely that the responses and actions taken by especially power-holders as social pressure mounts and crisis unfolds seem to play a major role in shaping the crisis' trajectory. Neither SDT on its own, nor detailed analysis of variation in PSI trends, are adept at uncovering such responses. SDT thus offers a critical and invaluable lens to understand the nature of societal unrest, but must be supplemented with additional detail and context to draw a more complete picture of the dynamics of crisis. The present study seeks to provide just such a complementary analyses, combining the insights from SDT along with analytic narratives that delve into the particular actions and interventions taken – or attempted – in the midst of growing unrest. These analyses provide intriguing insights that we hope will seed further investigations seeking to uncover the key factors that can determine whether a crisis ends up more or less devastating, destabilizing, and violent (Hoyer et al. 2024). Pertinent questions for future study include: which factors prolong periods of stability and/or minimize the violence and disruption of rising social pressure, reduce structural and material inequalities, and raise well-being outcomes for all? Can we identify key responses or leverage points that would help societies course-correct and flatten the curve of rising tension? Or better yet, is it possible to genuinely 'break the cycle' of spiraling unrest and violence that the typical structural-demographic crisis generate and avert a crisis before it sets in at all?

The cases explored here suggest some possible answers. It appears incumbent on those with the greatest access to power, wealth, and authority to 'future think' and recognize the signs of unrest early on. Crucially, elites must be willing to give up some private gains for the public good, for example through supporting welfare programs or promoting redistribution of wealth and labour autonomy to the working classes. Giving up some privileges in the short term seems to pay-off in the longer term, as the greater stability and high general well-being achieved in societies that can effectively curb unrest will provide greater overall returns compared to societies that dissolve in the face of popular unrest and civil war (Levi 1988). Further work to diagnose the plight of societies entering into, exiting from, or even avoiding crises altogether can help test these hypotheses and, we believe, point the way to policy-relevant insights to help navigate the slate of crises currently facing nations around the world today.

A deeper understanding of the incentives, barriers, and interests that led particularly leaders and other power-holders to respond to growing crises in the

way they did, both the transformative reforms undertaken as well as the maladaptive reactions we see in many cases. By scrutinizing a large and varied range of cases, it may be possible to uncover the key factors shaping the outcomes of crisis, using these insights to fuel real-world policy interventions that can help contemporary societies navigate the many dangers that we collectively face today. Translating this understanding of the past into specific policy-recommendations or interventions for any modern country will require significant work, the result of dialogues bridging insights from academics, government officials, advocate groups, community representatives, and other key stakeholders. We firmly believe that the insights gained by the sort of historical analysis offered in this paper offers a critical, currently underutilized perspective in fueling these important conversations.

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