Nation-Building, Nationalism, and Wars*

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Abstract. This paper explores how the increase in army size observed in early modern times changed the way states conducted wars. Starting in the late 18th century, states switched from mercenaries to a mass army by conscription. We model the incentives of soldiers to exert effort in war and show that as army size increases paying mercenaries is no longer optimal. In order for the population to accept fighting in and enduring war, government elites began to provide public goods, reduced rent extraction, and adopted policies to homogenize the population. We also explore the variety of ways in which homogenization can be implemented, and study its effects as a function of technological innovation in warfare.

Keywords: Interstate Conflict, Public Good Provision, Nationalism, Military Revolution, Nation-Building.

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1. Introduction

The interplay between war and the fiscal capacity of the state is widely studied.[1] However, guns are not enough to win wars; one also needs motivated soldiers. In modern times, the need for large armies led to bargaining between rulers and their population. Elites had to make concessions to induce citizens to comply with war-related demands. Elites also promoted nationalism to motivate citizens and extract "ever-expanding means of war – money, men, material, and much more – from reluctant subject populations" (Tilly, 1994; see also Levi, 1997).

The "ancient regimes" of Europe fought wars with relatively small armies of mercenaries, sometimes foreigners, paid out from the loots of war. As a consequence of the evolution of warfare, countries changed the conduct of war, switching from mercenaries to mass armies recruited or conscripted almost entirely from the national population. Roberts (1956) explains how warfare underwent a "military revolution" starting between 1560 and 1660 and reaching completion with the "industrialization of war" (McNeill, 1982) that occurred in the 19th century.[2] The source of this revolution was changes in tactics, weapons, and communications and transport technologies which allowed states to put a large army in the field. The electromagnetic telegraph, developed in the 1840s, allowed the deployment and control of the army at a distance. Steamships and railroads moved weapons, men, and supplies on an entirely unprecedented scale (Onorato et al., 2014). In the middle of the 19th century, the adoption of semiautomatic machinery to manufacture rifled muskets made it possible, and relatively affordable, to equip a large number of soldiers (McNeill, 1982, p. 253). As a result, the size of armies increased and, as Clausewitz (1832) put it, "War became the business of the people."[3]

This paper examines nation-building in times of war. Mass warfare favored the transfor-

[1]Among others, see Brewer (1990), Tilly (1990), Besley and Persson (2009), and Dincecco and Prado (2012).

[2]Roberts (1956), Tallett (1992), Rogers (1995), and Parker (1996) study innovations in warfare in the early modern period. For more recent work see McNeill (1982) and Knox and Murray (2001).

[3]According to Finer (1975), the number of French troops called up for campaigns was 65,000 in 1498, 155,000 in 1635, 440,000 in 1691, and 700,000 in 1812. In England and Prussia, which were less populous countries than France, armies were smaller but nevertheless impressive relative to the population size. For instance, in 1812 Prussia sent 300,000 soldiers (equivalent to about 10 percent of the population) to war (Finer, 1975, p. 101). These figures increased dramatically in the 20th century: during WWI, 8 million soldiers were recruited in France (Crepin, 2009, and Crepin and Boulanger, 2002).

mation from ancient regimes (based purely on rent extraction) to modern nation states in two ways. First, the state became a provider of mass public goods in order to buy the support of the population. Second, the state developed policies geared towards increasing national identity and nationalism. The state had to reign in distant provinces to avoid the breakdown of the country, which would have interfered with war effort, and to motivate soldiers and civilians located far away from the core of the country.[4] In addition, nation-building in times of war also included aggressive negative propaganda against the enemy and supremacy theories.

When armies increased in size, elites needed to build tax capacity. This is a well studied point, and we return to it at the end of our argument. We focus here on a different issue: how to spend fiscal revenue to motivate a population to endure war. The composition of spending is relevant. For instance, Aidt et al. (2006) argue that total spending as a fraction of GDP did not increase that much in the 19th century up until WW2. Instead, the composition of the budget changed: in the 19th century and early 20th century, spending on defense and policing shifted in part to spending on public services (transport, communication, construction) and later on provision of public goods (education and health).[5]

We show that when war became a mass enterprise, elites had to reduce their own rents and spend on useful public goods. Levi (1997, p. 204) writes that citizens' voluntary "compliance [with conscription] is a quid pro quo for services provided by the government.[6] Along similar lines, Tilly (1990, p. 120) writes that in order to mobilize resources for war, states had to bargain with their subject population and concede rights, privileges, services, and protective institutions: in Europe at the end of the 19th century, "Central administration, justice, economic intervention and, especially, social services all grew as an outcome of political bargaining over the state's protection of its citizens." In other words, citizens and soldiers have to believe that defeat in war implies a loss of useful national public goods and services provided by their government.

In addition to the provision of public goods, governments also invested in "homogenization". Governments used indoctrination (for instance via education policies) to "homogenize"

[4]Alesina et al. (2017) focus on nation-building to avoid the breakup of the state.

[5]As reported in Table 5 in Aidt et al. (2006), in Europe, defence, judiciary, and police accounted for on average 59.7 per cent of total spending from 1850-1870, and 30.5 per cent from 1920-1938.

[6]See also Scheve and Stasavage (2012, 2016).

a heterogeneous population, instill patriotism, and increase the value of common public goods and a common language.[7] Soldiers from regions without any national identity may not put much effort into fighting or may even break away to join the enemy since their national identity is nil. For instance Weber (1976, p. 101) describes episodes of hostility of French border regions towards the national army during the 1870 war against Prussia. Governments can instill "positive" national sentiment in the sense of emphasizing the benefit of the nation, or "negative" sentiment in terms of aggressive propaganda against the opponent. We analyze different forms of indoctrination. We show that when states have low fiscal capacity or they face an opponent with high level of public goods, elites find it costly to provide mass public goods to increase positive nationalism. In such cases, elites choose negative nationalism to motivate the population, since it does not require the provision of public goods.

Our paper is related to several others. Acemoglu and Robinson (2000) argue that elites gave concessions in response to internal threats of revolution. In this paper we argue that concessions occurred as a response to external threats. Whether the main motivation for elites' concessions were internal or external threats may have varied in different cases and it is worth further investigation. Our theory is also complementary to the work of Lizzeri and Persico (2004), who show that the expansion of voting rights, by increasing the electoral value of policies with diffuse benefits, has determined a shift from pork-barrel politics to public good provision. Alesina et al. (2017) consider nation-building but do not consider wars. They focus on the incentive to "nation-build" as a response to democratization. The interplay between democratization and external threats may exacerbate the need to nation-build and is left for future research.

A number of papers study the relationship between war and the state. Besley and Persson (2009, 2011) show how wars give rulers the incentive to build an effective state that can successfully tax its citizens in order to finance military expenses. Gennaioli and Voth (2015) show that before the military revolution, the probability of winning a war was somewhat independent of fiscal resources. They argue that between 1650 and 1800, the odds of the fiscally stronger power winning a conflict increased dramatically, thus giving strong incentives to build fiscal capacity.[8] The focus of these papers is fiscal capacity rather than nation-

[7]States sometimes homogenize the population through mass killings and forced displacements. This possibility, which is not considered in this paper, is studied in Esteban et al. (2015).

[8]There is empirical evidence (Biddle, 2004) that in more recent times the correlation between military

building. Gennaioli and Voth (2015) model the military revolution as an increase of the sensitivity of the war outcome to fiscal revenues. We model it in a complementary manner, as an increase of the size of the army.

Aghion et al. (2014) study which regime (democracy or autocracy) invests more in education. They also investigate whether spending on education is related to external threats.[9] Their model is different from ours in several respects. We focus on government spending per se (their focus is education) and we model the mechanism through which spending can increase effort in the conflict. The paper is obviously also related to the literature on conflict. Esteban and Ray (2001, 2011) study conflicts over "public goods" (such as, political power and ideological supremacy) and private goods (e.g., spoils).[10] In their model, there is an exogenous parameter which determines the importance of the public and private components in the conflict. In our model soldiers fight to capture monetary payoffs and/or to defend the national public good. In contrast to Esteban and Ray (2001, 2011), the importance of the two components and the degree of across-group alienation are endogenous and are a choice of the elite.

The paper is organized as follows. Section 2 presents the basic structure of the model and examines peacetime. Section 3 considers the situation of war between the two countries. Section 4 discusses the elite's trade-off between providing public goods and paying the soldiers with monetary transfers. Sections 5 and 6 study various forms of indoctrination, including nationalism and propaganda. Section 7 discusses endogenous taxation, and is followed by our conclusion. All proofs are in the Appendix.

2. Peace

The world consists of two countries, A and B, for the moment at peace and with no prospect of war. Country A is represented by the linear segment $[0, q]$ and country B by the segment $(q, 1]$. We let $C_A \in [0, q]$ and $C_B \in (q, 1]$ denote the location of the "capitals" of the two countries as in Figure 1. In each country, there are two types of individuals: members of the elite and ordinary citizens. The elite has measure s_j in country $j = A, B$. Ordinary citizens

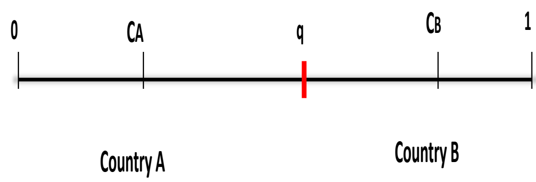
expenditures and military victory has weakened.

[9] For a discussion of education policies as instruments of cultural homogenization, see Weber (1976, ch. 18), Posen (1993), Darden and Mylonas (2016), Alesina et al. (2017), and Bandiera et al. (2017).

[10] On this distinction, see also Spolaore and Wacziarg (2016).

have measure q in country A and $1-q$ in country B. Each individual has a specific "location." All members of the elite are located in the capital, where the public good is provided, while citizens are uniformly distributed over the country. Each country is run by its own elite and the elite is not threatened by internal revolutions. In peacetime the only role of the elite is to decide how to spend the tax revenue: between rent-extraction, public good provision and homogenization. We discuss this further below.

Figure 1: The two countries



In country j all individuals, including the elite, receive a fixed income y_j. Ordinary citizens (but not the elite) pay an exogenously given tax of t_j.[11] We discuss endogenous taxation in Section 7. When A and B are not in conflict, we can deal with them separately and analogously. Here we solve for country A.

The citizens and the elite derive utility from private consumption and from the public good. In country A the utility of an individual located at $i \in [0, q]$ is

$$U_{i,A} = \theta g_A(1 - a\,|i - C_A|) + c_{i,A}, \tag{1}$$

where $g_A \geq 0$ is a scalar that denotes the size of the public good provided in the capital of country A. Consumption of an ordinary citizen in country A is $c_{i,A} = y_A - t_A$, while consumption by a member of the elite is

$$c_{e,A} = y_A + \phi_A, \tag{2}$$

where ϕ_A are the rents.

As in Alesina and Spolaore (2003), we give the public good a geographical and a preference interpretation: it is located in the country's capital and individuals located close to the

[11]This could be easily generalized to elites paying taxes and/or having higher income, with no gain of insights and with more notation.

capital benefit more from the public good. The proximity can be interpreted as geographical or in terms of preferences, culture, or language. The value $|i - C_A|$ is the distance of individual i from the location of the public good. The parameter $\theta > 0$ is the marginal benefit of public spending for an individual at zero distance from it, and $a > 0$ is the marginal cost of distance. A low (respectively high) value for the parameter a captures homogeneity (respectively heterogeneity) of preferences within the country. We posit $a < 1$ so that everybody's utility is increasing in the public good.

We also assume that the government has access to homogenizing technology. The latter makes the public good more attractive to individuals who are far away from it. In other words, "homogenized" citizens feel like members of the nation rather than of their specific village, region, ethnic, or religious groups. States have homogenized populations by creating state-controlled educational systems, promoting national symbols and traditions, celebrating the cultural roots in national museums, using print-based media, teaching a common language (the one spoken by the elite in the capital) and so on. Homogenization can take a variety of odious forms, such as prohibiting local culture and repression.[12] Homogenization can also be achieved in more physical terms such as building roads (or railroads or airports) in order to reduce the costs of distance from the capital.

The variable $\lambda_A \in [0, 1]$ denotes the homogenization policy (or indoctrination, terms which we will use interchangeably) while h is the linear cost of it. Homogenization changes individual preferences by shifting the ideal point of an individual "located" at i and bringing it closer to C_A:

$$(1 - \lambda_A)i + \lambda_A C_A. \tag{3}$$

Thus the higher λ_A is, the more the citizens benefit from the public good provided in the capital. We assume that the citizens do not (or cannot) resist homogenization.

The share of $t_A q$ (the tax revenue) that is appropriated by the elite as political rent is $(1 - \pi_A) \in [0, 1]$ and is chosen by the elite. If $\pi_A > 0$, the tax revenue is used to either provide the public good (financing a positive g_A) or to homogenize (financing a positive λ_A). The budget constraint of the government is given by

$$\pi_A t_A q = g_A + h\lambda_A. \tag{4}$$

[12]In our model we do not consider genocide since the size of the population is constant.

The elite is located in the capital. Each member of the elite has the following utility which is maximized subject to the budget constraint above:

$$U_{e,A} = \theta g_A + y_A + \frac{(1-\pi_A)t_A q}{s_A}. \tag{5}$$

The last term of (5) is ϕ_A, the political rents appropriated by each member of the elite (of measure s_A). The utility of the elite is not affected by λ_A, since the elite is located in the capital (i.e. elites have the public good that they like). Thus, the elite sets $\lambda_A = 0$ since homogenization is costly. Given the linearity of (5) it immediately follows that the elite either invests all tax revenue in the public good or diverts all tax revenue as rent.

Proposition 1: *For all parameters values, $\lambda_A = 0$. When*

$$1 - s_A\theta > 0, \tag{6}$$

the elite chooses zero public good provision and the entire tax revenue is appropriated as rents. When instead (6) does not hold, the elite does not extract rents and chooses maximal spending on the public good.

Condition (6) implies that if the elite's measure s_A is relatively small, and if the benefits of the public good are not extraordinarily large (small θ), then the elite prefers to extract rents rather than deliver public goods that benefit every one, including the elite.[13] This captures the case of ancient regimes: small elites extricating rents with small (or non existent) public sectors. Throughout the rest of the paper we assume that (6) holds. Thus:

Assumption 1: $1 - s_A\theta > 0$.

3. War

3.1. The Determinants of Victory: War Effort

We now study a conflict between country A and B without modelling why a conflict erupts.[14] The elite does not fight and the proportion of ordinary citizens fighting in the war is respec-

[13] If utility were not linear in g_A, public good provision would not be necessarily zero (see Appendix). Linearity is assumed to keep the analysis tractable.

[14] The thrust of our results would not change if a conflict were expected to arise with some probability.

tively $\chi \in [0, 1]$ in both countries.[15] The size of the army in country A and B is χq and $\chi(1-q)$ respectively. We assume that the army fully represents the heterogenous population in the country. That is, the elite cannot selectively send citizens to the front on the basis of their location, and citizens cannot resist the call. The exogenously given parameter χ plays a key role in our analysis; an increase in χ captures the evolution of military technologies that we described in the introduction.

The defeated country forgoes its entire tax revenue to the winner and loses its sovereignty, and its capital becomes the capital of the winning country. If country A wins, the tax revenue raised in country B is shared between A's elite and A's soldiers according to the proportions $1-\gamma_A$ and γ_A, respectively, where γ_A is chosen by the elite. The reverse holds true if B wins.

Each soldier in A exerts effort e_A, derived in Section 3.3. Total effort in country A is therefore $\chi q e_A$. Effort in country B, e_B, is taken as exogenous, and total effort is therefore equal to $\chi(1-q)e_B > 0$. The probability of country A winning is given by:

$$P_A(e_A, e_B) = \frac{\chi q e_A}{\chi q e_A + \chi(1-q)e_B} \tag{7}$$

with the probability that B wins $P_B = 1 - P_A$.

The probability of winning depends on soldiers' effort and motivation. Needless to say, in reality it depends also on the quality and quantity of guns but remember that for the moment we assume a constant tax revenue.[16]

Since war effort in country B is fixed, the relevant timeline is as follows. First, the elite of country A chooses how to allocate taxes among rents, public good provision, and homogenization, as well as how to divide the spoils of war between themselves and soldiers. Thus, the elite chooses policy vector $(g_A, \lambda_A, \gamma_A)$ subject to (4) and given $e_B, t_{B,} g_B > 0$.[17] The elite's rents are determined residually using (4). Second, a conflict arises and war effort

[15] In reality, elites fought wars as highly ranked members of the army. Generalizing this would yield no major insight but would clutter the notation.

[16] More generally, we could have assumed that the military strength of a country is the product of two inputs, soldiers' effort and guns, and that the cost of effort is reduced by having more efficient guns. In this case, soldiers efforts would increase with the quantity and quality of military equipment, so that effort may also be taken more generally as a catchall term for having a more efficient army

[17] To make the problem interesting, g_B should not be too large otherwise individuals in A would like to be invaded by country B. Similarly, e_B cannot be too high in order to give soldiers in A the incentive to exert positive effort. Also the size of the two countries cannot be too different otherwise the larger country would win with almost certainty. We discuss these bounds in the Appendix.

e_A is chosen. Finally, the winner of the conflict is determined, and individuals' payoffs are computed. We will solve the game backward, first computing the war effort in A (Section 3.3) and then solving the elite's problem. It bears stressing that we abstract from commitment problems on the part of the elite: the initially chosen policies determine the soldiers' payoffs when the war ends.

3.2. Citizen and Elite Payoffs

Consider an ordinary citizen $i \in [0, q]$ who is a soldier in country A. His utility in case of victory and defeat is denoted, respectively, by $U^+_{i,A}$ and $U^-_{i,A}$. Using (1) and (3):

$$U^+_{i,A} = \theta g_A - \theta g_A a \left|(1-\lambda_A)i + \lambda_A C_A - C_A\right| + y_A - t_A + \gamma_A \frac{t_B(1-q)}{\chi q}. \quad (8)$$

All but the final term in (8) are the same as in peacetime. The final term is the "pay" that each soldier receives from the spoils of war: in victory, proportion γ_A of the tax revenue of B is distributed among A's private soldiers, whose measure is χq. If country A is defeated, the capital of country A moves to C_B. Citizens continue to pay taxes but the tax revenue goes to country B. Then, citizen i's utility is

$$U^-_{i,A} = \theta g_B - \theta g_B a[C_B - (1-\lambda_A)i - \lambda_A C_A] + y_A - t_A. \quad (9)$$

Citizens in A evaluate the new capital according to their preferences after indoctrination, i.e., for given λ_A. In (9) we have also assumed that the elite in the winning country do not homogenize the losers. We do not model insurrections in this paper; if we did, homogenization could be useful even in peacetime and for a winning foreign country.[18]

The utility of each elite member in country A in case of a success and a defeat is denoted, respectively, by $U^+_{e,A}$ and $U^-_{e,A}$, where

$$U^+_{e,A} = \theta g_A + y_A + (1-\pi_A)\frac{t_A q}{s_A} + (1-\gamma_A)\frac{t_B(1-q)}{s_A}. \quad (10)$$

[18]Alesina et al. (2017) study a model of homogenization with insurrections modelled as independentist movements. An interesting avenue for future research could investigate how the prospects of future insurrections of conquered territories may influence the decision to go to war and the subsequent choice to homogenize after victory.

The last two terms in the above expression are, respectively, the political rents and the share of loots appropriated by the elite. The elite's utility from defeat is

$$U_{e,A}^{-} = \theta g_B - \theta g_B a(C_B - C_A) + y_A. \tag{11}$$

Payoff (11) assumes that the elite continue to not pay taxes in case of defeat, but lose their political rents. Assuming that the elite pays taxes in case of defeat would reinforce our results, because it gives the elite even stronger incentives to win the war.

3.3. Effort Decision

We abstract from the free-riding problem that may arise when individuals choose effort levels in war. The latter would be extremely severe in a model with a continuum of soldiers, given that each soldier would see his contribution to the winning probability as negligible, leading to no effort in equilibrium. Yet, we do observe that soldiers exert a significant amount of effort in many wars. Threat of harsh punishment for cowardice (not modelled here) is certainly a reason, but it is not the only one. In this paper we bypass free-riding problems by assuming that (1) all soldiers in A exert the same effort level e_A, and (2) this common effort level maximizes the average expected payoff of ordinary citizens. Analogous to the concept of rule-utilitarianism by Harsanyi (1980), the idea is that soldiers, regardless of their differences, want to "do their part" by abiding by an effort rule that, when followed by all soldiers, would maximize average utility.[19]

Given the policy vector $(g_A, \lambda_A, \gamma_A)$, effort in war, e_A, maximizes the average expected payoff of all citizens:

$$\max_{e_A} \quad \frac{1}{q}\left(\int_0^q U_{i,A}^{-} di + P_A(e_A, e_B)\int_0^q (U_{i,A}^{+} - U_{i,A}^{-}) di\right) - e_A. \tag{12}$$

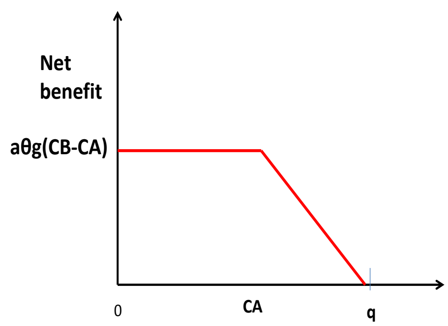
The last term is the cost of effort, which we assume is linear in e_A.

Depending on their location, individuals have different stakes in the conflict. Individuals close to the border have (relatively) low stakes, as moving the capital to C_B in case of a defeat would be less costly for them. People closer to C_A have higher stakes. Figure 2 draws

[19]A similar behavioral assumption is made, for instance, in Aghion et al., (2014), Feddersen and Sandroni (2006), and Coate and Conlin (2004).

the net benefit of winning for citizens in each country for a given set of policies: we select $\gamma_A = 0$, $g_A = g_B$, and assume that citizen q (at the border of the two countries) is equally distant from the two capitals. An increase in the spoils of war received by soldiers, γ_A, will increase the net benefit of winning by the same amount for all citizens, while an increase in the size of the public good provided by country A, g_A, increases the net benefit of winning to a greater extent for individuals closer to the capital.

Figure 2: Net benefit of winning



The average net benefit of winning is the average utility that a soldier receives in case of victory relative to the utility in case of defeat. We let NB_A denote the average net benefit of winning in country A

$$NB_A \equiv \int_0^q \frac{U_{i,A}^{+} - U_{i,A}^{-}}{q} di \tag{13}$$

and define the positive parameter $\Delta \equiv \frac{C_A^2}{q} + \frac{q}{2} - C_A$. Since optimal effort increases in NB_A, policies chosen by the elite raise war effort, e_A, if they increase the soldiers' average net benefit of winning.

Lemma 1: *War effort in A is increasing in the size of government provided in A and in the spoils of war, but is decreasing in the size of the government provided in B:*

$$\frac{\partial NB_A}{\partial g_A} = \theta - a\theta(1-\lambda_A)\Delta > 0 \qquad \frac{\partial NB_A}{\partial \gamma_A} = \frac{t_B(1-q)}{\chi q} > 0$$
$$\frac{\partial NB_A}{\partial g_B} = -\theta + a\theta\left(C_B - \lambda_A C_A - (1-\lambda_A)\frac{q}{2}\right) < 0 \tag{14}$$

War effort in A does not depend on taxation in country A, is increasing in taxation in *country B, and is increasing in homogenization in A if and only if*

$$\frac{\partial NB_A}{\partial \lambda_A} = \theta g_A a\Delta + \theta g_B a(\frac{q}{2} - C_A) > 0. \tag{15}$$

Lemma 1 shows that an increase in public good provision by country A has a positive effect on effort. When the country is relatively homogenous (small a), a given increase in public goods has a stronger effect on citizens' welfare and, consequently, a larger effect on war effort. The promise of a higher share of the spoils of war raises soldiers' effort by a larger amount when χ is small. When country B provides more public goods, effort in A decreases because citizens are less worried by the perspective of being governed by country B. When the capital of country B is more distant (in terms of geography and culture) from the average citizen of country A, the disincentive effect of higher foreign public goods is smaller. Because taxes t_A are paid regardless of the war outcome, the net benefit of winning (hence, war effort) does not depend on t_A. Conversely, an opponent with higher fiscal capacity t_B provides larger spoils of war and raises war effort of soldiers of country A.

The sign of the effect of λ_A on war effort is ambiguous as the first term of (15) is positive but the second term may be negative. To see why indoctrination might reduce incentives to fight, notice that homogenization has the biggest effect on the desired effort of citizens between C_A and the border with country B. Homogenization increases their utility in the case of victory and reduces their utility in the case of defeat. Homogenization results in higher utility from the public goods provided in country A and makes defeat more costly because these citizens find themselves with preferences further away from C_B and so receive lower utility from the public goods provided in country B. For citizens who are to the left of C_A, homogenization reduces their "distance" to C_A but also to C_B, increasing the utility of both victory and defeat. Think, for instance, of roads linking Brittany to Paris which reduce the cost to reach Paris but also Berlin. More generally, eliminating (more or less peacefully) local culture by making people more "cosmopolitan" may make them closer to both "capitals". Obviously this effect would be eliminated if there were a fixed cost of losing sovereignty. We return to these issues below considering alternative forms of homogenization/indoctrination which do not have this feature.

4. Public Good Provision versus Loots

In this section, we show that wars, and especially mass warfare, induce the elite to allocate a larger share of tax revenue to public good provision and lead to a reduction of rent extraction. In order to build intuition, we begin by solving a simplified version of the model without homogenization ($\lambda_A = 0$). The policy vector reduces to (g_A, γ_A): the elite chooses public good provision (which directly determines rent extraction π_A) and how much of the spoils of war go to soldiers. The optimal policy vector that maximizes the elite's expected payoff is given by:

$$(\gamma_A^\star, g_A^\star) = \arg\max_{g_A, \gamma_A} (U_{e,A}^+ - U_{e,A}^-)(\frac{\chi q e_A}{\chi q e_A + \chi(1-q)e_B}) + U_{e,A}^- - e_A. \qquad (16)$$

The last term of (16) is the linear cost of effort; the underlying assumption is that the elite internalizes the effort cost exerted by ordinary citizens in the war.[20] Note that policies have a direct effect on the elite's payoff and an indirect effect via soldiers' effort. When country A faces an external threat, the elite must make some concession. If both g_A and γ_A were equal to zero, soldiers' net benefit of winning would be negative and there would be no war effort, leading to a sure defeat. In choosing the size of the public good, g_A, and the spoils of war accrued by soldiers, γ_A, the elite compares the costs (in terms of its utility) with the benefits (in terms of providing incentives) of both instruments. When equilibrium policies do not hit their upper constraint (i.e., $\gamma_A^\star < 1$ and $g_A^\star < t_A q$), only the most efficient instrument is used. In the Appendix we address the case in which the policies can also hit their upper constraint and show that the thrust of our results would not change. From this point onwards our results present the case where equilibrium policies do not hit their upper constraints.

Proposition 2: *When army size is small so that $\chi < \overline{\chi}$, where*

$$\overline{\chi} \equiv \frac{1 - \theta s_A}{q\theta(1 - a\Delta)}, \qquad (17)$$

we have $\gamma_A^\star > 0$ and $g_A^\star = 0$. When instead $\chi \geq \overline{\chi}$, we have $g_A^\star > 0$ and $\gamma_A^\star = 0$.

[20] This assumption is completely inessential. If the elite disregarded soldiers' effort, the results would be qualitatively unchanged.

Proposition 2 states that there is a cutoff in army size below which the elite provides incentives to fight by paying its soldiers with the loots of war, but without delivering public goods. For larger army sizes, the elite gives citizens incentives to fight by providing public goods but no monetary transfers (that is, soldiers are not paid with the loots of war). This proposition captures the evolution of wars and nation-building. When armies were small, the elite motivated professional soldiers (mercenaries) by paying them with loots of war. The advent of mass armies made the problem of dilution of the loots severe: loots were not sufficient, or, to put it differently, elites had to give up too much of the loots to create good incentives soldiers. The provision of public goods, which are (at least partially) non-rival, is a better "technology" than private goods to motivate a large army. Elites began to provide public goods. Soldiers, who were recruited mainly by conscription, fought in order to keep their own sovereignty and public goods.[21] The assumption that a defeat entails the loss of the national public goods paradoxically makes citizens better off. If the national public goods are not at stake in a war, citizens will not fight for them. As a result, the elite will not have the incentive to provide them in the first place.

Figure 3

Spoils promised to soldiers

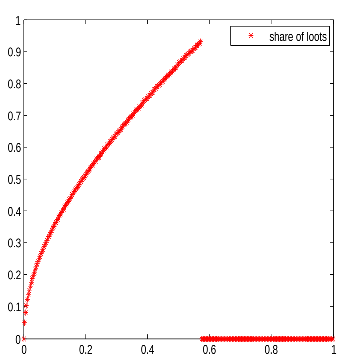
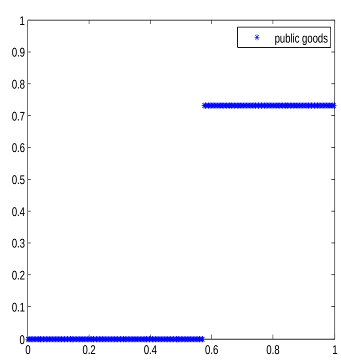


Figure 4

Public goods



Figures 3 and 4 show the equilibrium levels of γ_A and g_A as a function of χ. As army size increases, the elite must concede to soldiers a growing share of the spoils of war. This is why in Figure 3, γ_A is initially increasing in χ. When army size reaches the threshold $\overline{\chi}$,

[21]To simplify the notation we assumed that the public good is completely non-rival. Qualitatively our results would obviously apply to a model where public goods are only partly non-rival. Also, we assumed away the effect that certain public goods (e.g., roads) may have on the technology of war.

spending jumps up and soldiers are not paid anymore. Note that this discontinuity arises because we assume linearity of individuals' utility. In the Appendix we solve a model with quasi-linear utility in consumption and show that results are qualitatively the same (public spending increases continuously in army size, and loots are not distributed for large values of χ).

From (17), note that the cutoff $\overline{\chi}$ is decreasing in the marginal benefit of public goods. A higher value of public goods relative to the value of the spoils of war will tip the elite to incentivize soldiers with public goods at an earlier point. Similarly, a more homogeneous country switches "earlier" (i.e., has a lower threshold on army size) to providing public goods since public goods are more valued on average in a more homogeneous country. In contrast, more heterogeneous societies disagree to a greater extent about what public goods should be provided, and so direct payments to soldiers can be more effective.[22] The cutoff, $\overline{\chi}$, is decreasing in the size of the elite and is higher when C_A is located at either border (either at 0 or q). Finally, the effect of q, is ambiguous. A larger population makes the problem of dilution of the loots of war more severe, thus favoring public good provision. But a larger q also increases heterogeneity, which increases disagreement over which public goods should be provided.

In Figure 5, we show individual effort in war, e_A (solid line), and total effort, χe_A (dashed line), as a function of army size. Individual effort, which is computed according to (12), is strictly decreasing in χ as long as $\chi < \overline{\chi}$. This is because the share of spoils of war promised to soldiers increases less than army size. However, total effort is increasing in χ, thus capturing the fact that the increase in army size did indeed make wars more disruptive.

[22] Consistent with this, Levi (1997, p. 124) argues that countries with class, social, ethnic, and religious cleavages mainly relied on professional soldiers and were least able to mobilize their population to support conscription. For instance, universal male conscription in Canada and Britain was strongly opposed, respectively, by the Francophone and Irish population. On the history of military conscription, see Mjøset and Van Holde (2002).

Figure 5

Effort

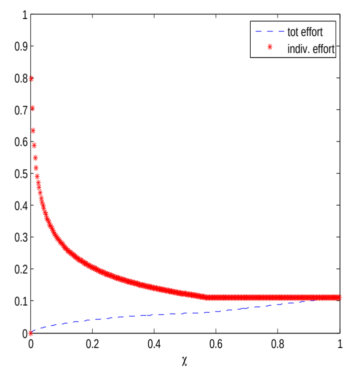
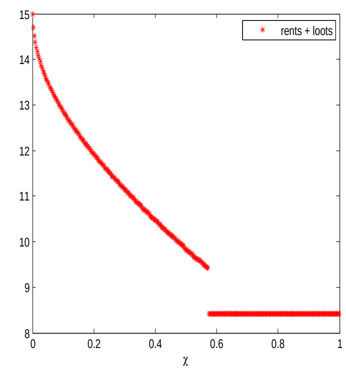


Figure 6

Resources captured by the elite



While public spending jumps up at $\overline{\chi}$, the resources captured by the elite (namely, the sum of rents and loots of war) drop at the cutoff (see Figure 6). At $\overline{\chi}$ the elite is indifferent between distributing loots and providing spending. Since public goods are also valued by the elite, indifference is possible only if monetary transfers to the elite drop. Figure 6 shows that increases in army size make the elite worse off by requiring an expansion of concessions to the population.

To determine the level of public good provision, g_A, and the proportion of spoils that go to soldiers, γ_A, that are chosen by the elite, we solve the first order conditions. For concision, we present the first order condition for g_A only. Let $NB_{e,A} \equiv U^+_{e,A} - U^-_{e,A}$, obtained from (10) and (11), denote the net benefit from winning for the elite. If the solution for g_A is interior to the interval $[0, t_A q]$, the first order condition is

$$\underbrace{\frac{\frac{\partial P(e_A,e_B)}{\partial g_A}}{P(e_A, e_B)}}_{effort\ effect} \underbrace{(NB_{e,A} - NB_A)}_{disagreement} = \underbrace{\frac{1 - \theta s_A}{s_A}}_{elite's\ mc}. \tag{18}$$

The right-hand side of (18) is the elite's marginal cost of providing more public good and the left-hand side is the marginal benefit. The first term on the left hand side is larger when the probability of winning is more sensitive to increasing public good provision, that is, when soldier effort is more sensitive to public good provision. The second term measures the difference between the net benefit of winning to the elite and the average net benefit of winning to citizens. This term captures the extent of disagreement between the two groups regarding the right amount of effort that should be exerted in war. When effort responds strongly to public good provision, and when the elite has a much bigger stake in the conflict relative to citizens, the elite's incentives to deliver more public goods increases.

From (18) we can show that if the other country has a higher public spending, the elite increases public spending in A towards the foreign level of public spending. That is, there is a "spending contagion" from B to A. Foreign public spending makes losing the war less costly for domestic citizens and so the elite has to respond by increasing domestic public spending in order to motivate citizens to fight.

Proposition 3: *Suppose $C_A \leq \frac{q}{2}$. When $\chi \geq \overline{\chi}$, the size of government in country A, g_A, is increasing in the size of government in country B, g_B.*

Finally, we comment on the effect of preference heterogeneity on public good provision. As discussed earlier, more homogenous countries switch "earlier" to public good provision. However, if we compare two countries that both provide public goods to incentivize war, from the first order condition (18) it is ambiguous whether the more homogenous country will choose higher provision. A more homogenous population (lower a) raises the first term on the left-hand side of (18), and makes public spending a more effective instrument at raising effort. However, a more homogenous population lowers the second term on the left-hand side of (18), reducing disagreement between the elite and citizens (as the elite and most citizens equally enjoy the national public good).[23]

5. Indoctrination and Public Goods

We now consider the case where the elite can also choose homogenization, i.e., the elite chooses $(g_A, \gamma_A, \lambda_A)$. To avoid considering multiple cases, we derive these results under the assumption that the capital of A is in the middle of the country.

Assumption 2: $C_A = q/2$.

Unlike public good spending, which is also enjoyed by the elite, homogenization policies do not directly affect the elite's payoff. The elite pursues homogenization only if it is effective

[23] In the literature (e.g., Alesina et al., 1999), the effect of homogeneity on public good provision is usually unambiguously positive.

in raising war effort.[24] As we noted above, homogenization has the biggest effect on citizens who are close to the border of the rival country. Citizens located on the other side of the capital of country A, far from the rival country, are not much affected by indoctrination. In some cases, indoctrination decreases their net benefit of winning because it reduces the distance not only to C_A but also to C_B, increasing the utilities of both victory and defeat. Assumption 2 guarantees that the overall effect of homogenization is unambiguously positive and does not depend on g_B.

Finally, from (15) notice that the cross partial derivative of NB_A with respect to spending and indoctrination is $\theta a\Delta > 0$. There is a complementarity: a larger government in A makes indoctrination policy more effective. Lemma 2 shows that since public spending and homogenization are complements, they are generally provided jointly. As before, we suppose that equilibrium policies (including homogenization) do not hit their upper constraint.

Lemma 2: *In equilibrium, homogenization, λ_A^*, and public spending, g_A^*, are positively related. If $g_A^* = 0$ then homogenization is zero. If $g_A^* > 0$ then homogenization is either zero or*

$$\lambda_A^* = \frac{1-\theta s_A}{h} g_A^* - \frac{1-a\Delta}{a\Delta}. \tag{19}$$

While one can observe public good provision without homogenization, expression (19) shows that the converse is not possible: if country A does not provide any public goods (or if g_A is sufficiently small), it is worthless to reduce citizens' distance to the capital. Despite the high degree of heterogeneity of most pre-modern states, nationalism became a key force in politics only in the last two centuries. When soldiers were exclusively motivated by monetary payoffs, preference heterogeneity within the country and the distance of preferences from the opponent country had no impact on soldiers' effort.

Homogenization differentiates national public goods from foreign ones. It therefore makes the public good a more effective instrument to boost war effort and so lowers the size of the army at which the public good starts being provided. This is stated in Proposition 4

[24] Some homogenization policies (e.g., teaching a common language to the soldiers) may also directly affect the efficiency of the army by facilitating communication.

Proposition 4: *Compared to the case where homogenization is restricted to zero, when positive homogenization is feasible, the threshold size of the army above which public goods are provided weakly decreases:* $\widehat{\chi} \leq \overline{\chi}$.

Conditional on being above the cutoff, the effect of homogenization on spending levels is however ambiguous. On the one hand, since nation-building is costly, the adoption of nation-building policies crowds out public good spending. On the other hand, since indoctrination and public good are complements, spending is more effective in raising soldiers' effort, which pushes spending levels up. The effect on citizens' expected welfare is also not straightforward. If defeated in war, homogenization lowers (respectively increases) the utility of citizens located to the right (respectively left) of the capital. If victorious, homogenization improves the welfare of all citizens.

6. Nationalism and Propaganda

We now consider two different forms of indoctrination and compare them to that described in Section 2.1, which we denote as "benchmark" homogenization.

To facilitate the comparison, we assume that all three forms of indoctrination have a unitary cost h. First, we consider a form of indoctrination called "enemy-neutral" which does not affect citizens' utility in case country B wins the war; it only raises the value of the public good provided in A. The utility if A wins is

$$\widetilde{U}^{+}_{i,A} = \theta g_A \left[1 - a(1-\lambda_1)\left|i - C_A\right|\right] + y_A - t_A + \gamma_A \frac{t_B(1-q)}{\chi q} \tag{20}$$

where $\lambda_1 \in [0,1]$. In case of defeat, the utility of A's citizens is unchanged and equal to

$$\widetilde{U}^{-}_{i,A} = \theta g_B \left[1 - a\left|i - C_B\right|\right] + y_A - t_A. \tag{21}$$

Language policies might be considered in this type of homogenization. It is reasonable to suppose that making, say, Bretons learn French improves their ability to feel "French" and enjoy the public goods provided in Paris, but should have little or no consequence on the way they would enjoy the German public good in case of a defeat in a Franco-German war. There are two ways of considering the effect of this alternative form of homogenization on war effort. On one hand, relative to the benchmark, citizens located to the left of C_A, far from the border with country B, have stronger incentives to fight. On the other hand, there is a negative effect on the desired war effort of citizens located to the right of C_A, because it is not the case anymore that homogenization worsens the utility of these citizens in defeat. It can be shown that when Assumption 2 holds, the two effects exactly balance out. Choices made by the elite and choice of effort by soldiers are the same under either form of indoctrination. This equivalence result hinges crucially on the assumption that the capital is in the middle. If the capital of country A were close to "zero," the benchmark form of homogenization would be more effective, because bringing the population closer to the capital of A would also bring most of the citizens further away from B's capital. Conversely, if the capital were close to the border with country B, enemy-neutral indoctrination would be more effective.

Next, we consider a third form of indoctrination, labeled "anti-foreign nationalism." This does not increase the value of the home public good, but instead increases citizen dislike for the public good provided by B.[25] If country A is defeated and the capital moves to C_B, we assume that citizen i's utility is

$$\widehat{U}_{i,A}^{-} = (1-\lambda_2)\theta g_B \left[1 - a\left|i - C_B\right|\right] + y_A - t_A + \gamma_A \frac{t_B(1-q)}{\chi q}, \tag{22}$$

where $\lambda_2 \in [0,1]$. A higher λ_2 lowers the value of the foreign public good. Conversely, if country A wins, preferences towards the public good in A are unchanged:

$$\widehat{U}_{i,A}^{+} = \theta g_A \left[1 - a\left|i - C_A\right|\right] + y_A - t_A. \tag{23}$$

In considering this form of indoctrination, we assume that the elite itself is not affected by its own propaganda: propaganda against the enemy affects ordinary citizens' utility only. This form of indoctrination is totally inefficient from a welfare point of view, as it worsens agents' utility in case of defeat and does not improve utility in case of victory. Many country leaders have resorted to this form of indoctrination on several occasions.[26]

[25] Tilly (1994) stresses that homogenization benefits from the existence of a well-defined other. For example, he writes, "Anti-German sentiment reinforced the desirability of becoming very French, as anti-French, anti-Polish, or anti-Russian feeling reinforced the desirability of becoming very German." As shown by Voigtländer and Voth (2015), these forms of propaganda have long-lasting effects. Guiso et al. (2009) find that countries with a history of wars tend to trust each other less.

[26] For example, Kallis (2005, p. 65) argues that in the final years of WW2, when beliefs in National Socialism started to crumble, German propaganda switched from positive and self-congratulatory discourse to more negative content, stressing anti-Bolshevism, anti-Semitism, and anti-plutocratic themes. The goal

Before stating the next proposition, we define the following cutoff

$$\widetilde{\chi} \equiv \frac{h}{q\theta g_B(1 - a(C_B - \frac{q}{2}))} \tag{24}$$

and the parameter

$$\varphi \equiv \frac{1 - a\Delta}{1 - \theta s_A} - \frac{g_B(1 - a(C_B - \frac{q}{2}))}{h}. \tag{25}$$

We continue to assume that equilibrium levels of λ_2, γ_A, and g_A are bounded away from their maximal levels, $\lambda_2^\star < 1$, $\gamma_A^\star < 1$, and $g_A^\star + h\lambda_2^* < t_A q$. Proposition 5 states the policy choices of the elite when the elite has access to anti-foreign propaganda as the only form of indoctrination.

Proposition 5: *When army size is small, $\chi < \min\{\overline{\chi}, \widetilde{\chi}\}$, the elite gives monetary transfers to its soldiers without providing public goods and without undertaking anti-foreign propaganda.*

When army size is large, $\chi \geq \min\{\overline{\chi}, \widetilde{\chi}\}$, the elite stops paying its soldiers and provides either public goods (when $\varphi \geq 0$) or anti-foreign propaganda (when $\varphi < 0$), but not both.

Public good provision and anti-foreign propaganda are substitutes and no longer complements. Therefore, we could observe anti-foreign propaganda (hence, strong nationalistic feelings) without any provision of national public goods. This result is consistent with the evidence of several countries with high levels of nationalism and national pride but limited ability to provide public goods and implement good policies.[27] Instead, when indoctrination takes the other (more positive) forms, it is observed together with public-good provision.

Assume that the elite can pursue any and only one of the three forms of indoctrination. Given that all forms of indoctrination analyzed so far have no direct effect on the elite's utility, the elite chooses the type of indoctrination that increases the effort of citizens at the lowest cost. The following proposition provides a sufficient condition that guarantees that anti-foreign propaganda dominates other forms of indoctrination.

was to bolster war effort by convincing the population that resistance was a lesser evil than losing the war. Similarly, Padro-i-Miquel (2007) suggests citizens support kleptocratic rulers because they fear falling under an equally venal ruler who would favor other groups.

[27] On this, see Ahlerup and Hansson (2011).

Proposition 6: *When fiscal capacity is sufficiently low so that*

$$t_A < \frac{g_B(\frac{1}{a} - (C_B - \frac{q}{2}))}{\Delta q}, \tag{26}$$

the elite's preferred form of indoctrination is anti-foreign propaganda.

Proposition 6 states that countries with low fiscal capacity that face an enemy with high levels of public goods will prefer to pursue negative propaganda. This result is intuitive: countries that cannot match the level of public goods in the foreign country are discouraged from providing public good. These countries prefer negative propaganda over other (more positive) forms of indoctrination because the former does not require effective public good provision in the home country. Another implication of Proposition 6 is that in countries with a low level of heterogeneity (low a), citizens already have preferences closer to the national public good so that the marginal benefit of positive homogenization is quite small. Therefore, homogenous countries will be more likely to satisfy sufficient condition (26).

7. Endogenous Taxation

The intuition of how endogenous taxation (or fiscal capacity) would affect our model is quite straightforward, although a formal treatment is complex and would probably not be solvable in closed form. Let us begin with the case of no external threat; the elite raises taxes only to influence rent extraction. The choice of "fiscal capacity" would be shaped by the trade-off between the benefits of extracting higher rents and the cost of raising fiscal capacity. When facing an external threat, the elite has reasons to collect more taxes (building fiscal capacity) but also to collect lower taxes. Elites need tax revenue to buy guns and military equipment. In our model, one could add another public good, military spending: a larger amount (holding constant the other country's behavior) would increase the probability of winning. In a more general model, if the enemy responds to military spending of the "home" country with more spending, the two opponents can enter a "spending" race. In addition, in order to motivate soldiers the elite has the incentive to raise taxes to spend more on "peaceful" public goods and on homogenization. Yet, there are also reasons for a country to invest less in fiscal capacity when facing an external threat. As pointed out by Gennaioli and Voth (2015), war discourages investment in fiscal capacity because with some probability the opponent country will grab additional fiscal revenues. Moreover, higher taxes might lower soldiers' utility and thus their effort; the latter effect would depend on the tax rate in the home country relative to the tax rate in the foreign country. Finally, higher fiscal revenue could increase the incentive for the enemy to conquer, increasing the enemy's effort and thus lowering the probability of victory of the home country. A set of first order conditions would equalize all these margins, and it is likely that the former forces give us a solution in which external threats lead to an increase in tax revenues as argued in the literature. In other words, when wars become more expensive the need for guns may predominate all the other effects and require higher taxes than in peacetime. Nevertheless (and this is where the contribution of our paper lies), in addition to raising state capacity to buy military equipment, elites also face the question of how to allocate state revenues and the question that more domestic public goods are attractive to potential foreign enemies. To end where we started, one needs not only guns but also a motivated population.

8. Conclusions

In this paper, we have explored several issues related to the question of how wars make states. The literature on this point has mostly focused on how wars induce states to raise their fiscal capacity to buy military equipment. Instead, this paper focuses on complementary issues, namely how to motivate the population (soldiers in particular) to endure war. We show that motivating soldiers for war induces the building of nations. Besides promising monetary payoffs, elites have two means to increase war effort. One is to provide public goods and services in the home country that directly benefit citizens, so that soldiers lose a lot if the war is lost. Second, elites may homogenize or indoctrinate citizens to value domestic public goods and to dislike living under foreign occupation. We explore a variety of types of indoctrination and show which situations can lead to anti-foreign nationalism. The key conclusion of our analysis is that as warfare technologies led to a military revolution with larger armies, elites had to change the way they motivated soldiers: they moved from motivating with loots of war for relatively small armies of mercenaries, to providing mass public good provision and nationalism to motivate large conscripted armies.

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Appendix

Proof of Proposition 1: The elite chooses $\lambda_A = 0$ because the elite does not gain from costly homogenization. Plugging $\lambda_A = 0$ into (4), the government budget constraint becomes $\pi_A t_A q = g_A$. This allows us to write the elite's problem as

$$\max_{\pi_A} \theta \pi_A t_A q + y_A + (1 - \pi_A)\frac{t_A q}{s_A} \tag{A.1}$$

This expression is linear in π_A and is increasing when $\theta > \frac{1}{s_A}$. Then, public good provision is maximal when $1 - s_A\theta \leq 0$ and zero otherwise. □

Proof of Lemma 1: We proceed by steps.

Step 1. We show that effort is increasing in NB_A.

Optimal effort solves the following problem:

$$\max_{e_A \geq 0} \frac{1}{q}\left(\int_0^q U_{i,A}^- di + P_A(e_A, e_B)\int_0^q (U_{i,A}^+ - U_{i,A}^-)di\right) - e_A \tag{A.2}$$

Using (7) and (13) we obtain

$$\max_{e_A}\left(\int_0^q \frac{U_{i,A}^-}{q} di + \frac{qe_A}{qe_A + (1-q)e_B} NB_A\right) - e_A \tag{A.3}$$

If the solution is interior, the first order condition is:

$$NB_A \frac{q[qe_A + (1-q)e_B] - q^2 e_A}{[qe_A + (1-q)e_B]^2} = 1 \tag{A.4}$$

After taking the square root

$$[q(1-q)e_B NB_A]^{1/2} = [qe_A + (1-q)e_B] \tag{A.5}$$

This leads to the optimal effort in country A:

$$e_A^* = max\left\{\frac{[q(1-q)e_B NB_A]^{1/2}}{q} - \frac{(1-q)e_B}{q},\ 0\right\} \tag{A.6}$$

From (A.6) it is immediate that optimal effort is increasing in NB_A. Note that for an interior solution one needs that

$$e_B < \frac{q}{(1-q)} NB_A. \tag{A.7}$$

Step 2. We compute NB_A

First, from (8) we have:

$$\begin{aligned}
& \frac{1}{q}\int_0^q U^+_{i,A}di \\
= & -\frac{1}{q}\theta g_A a(1-\lambda_A)[\int_0^{C_A}(C_A-i)di+\int_{C_A}^q(i-C_A)di]+\theta g_A+y_A-t_A+\gamma_A\frac{t_B(1-q)}{\chi q} \\
= & -\frac{1}{q}\theta g_A a(1-\lambda_A)(C_A^2-\frac{C_A^2}{2}+\frac{q^2}{2}-C_A q-\frac{C_A^2}{2}+C_A^2)+\theta g_A+y_A-t_A+\gamma_A\frac{t_B(1-q)}{\chi q} \\
= & -\theta g_A a(1-\lambda_A)(\frac{C_A^2}{q}+\frac{q}{2}-C_A)+\theta g_A+y_A-t_A+\gamma_A\frac{t_B(1-q)}{\chi q}
\end{aligned}$$

Similarly, from (9)

$$\begin{aligned}
\frac{1}{q}\int_0^q U^-_{i,A}di &= -\frac{1}{q}\theta g_B a\int_0^q[(C_B-\lambda_A C_A)-(1-\lambda_A)i]di+\frac{1}{q}\left[\theta g_B-t_A+y_A\right]q \\
&= -\frac{1}{q}\theta g_B a[(C_B-\lambda_A C_A)q-(1-\lambda_A)\frac{q^2}{2}]+\theta g_B-t_A+y_A \\
&= -\theta g_B a[C_B-\lambda_A C_A-(1-\lambda_A)\frac{q}{2}]+\theta g_B-t_A+y_A
\end{aligned}$$

Then

$$\begin{aligned}
NB_A &= \frac{1}{q}\int_0^q(U^+_{i,A}-U^-_{i,A})di \\
&= -\theta g_A a(1-\lambda_A)(\frac{C_A^2}{q}+\frac{q}{2}-C_A)+\theta g_A+y_A-t_A+\gamma_A\frac{t_B(1-q)}{\chi q} \\
&\quad +\theta g_B a[C_B-\lambda_A C_A-(1-\lambda_A)\frac{q}{2}]-\theta g_B+t_A-y_A \\
&= \theta[g_A-g_B-g_A a(1-\lambda_A)(\frac{C_A^2}{q}+\frac{q}{2}-C_A)] \\
&\quad +\theta g_B a[C_B-\lambda C_A-(1-\lambda_A)\frac{q}{2}]+\gamma_A\frac{t_B(1-q)}{\chi q} \qquad \text{(A.8)}
\end{aligned}$$

The derivatives in Lemma 1 can be computed from the above expression. Throughout we will focus our analysis on parameters for which there exist values of g_A and γ_A, where $g_A \geq 0$, $\gamma_A \geq 0$, $g_A \leq t_A q$, and $\gamma_A \leq 1$, and such that (A.7) holds. In words: there exists some feasible policy (g_A, γ_A) such that the elite can motivate positive war effort on the part of citizens.

Proof of Proposition 2: Assume $\lambda_A = 0$. Define

$$EU_e = NB_{e,A}(\frac{\chi q e_A}{\chi q e_A + \chi(1-q)e_B}) + U^-_{e,A} - e_A \tag{A.9}$$

The elite chooses $g_A \in [0, t_A q]$ and $\gamma_A \in [0,1]$ to maximize EU_e. We denote by $\gamma^\star_A$ and $g^\star_A$ the optimal solutions. Using (10) and (11) we compute the net benefit of winning for the elite

$$NB_{e,A} = \theta g_A + (1 - \frac{g_A}{t_A q})\frac{t_A q}{s_A} + \frac{(1-\gamma_A)t_B(1-q)}{s_A} - \theta g_B(1 - a(C_B - C_A)) \tag{A.10}$$

Step 1. We show that it is not optimal to set $\gamma^\star_A = g^\star_A = 0$.

From above, we restrict our analysis to parameters for which there exists a value of g_A and γ_A, where $g_A \geq 0$, $\gamma_A \geq 0$, $g_A \leq t_A q$, and $\gamma_A \leq 1$, and such that (A.7) holds. We also assume $NB_{e,A} > NB_A$. Effort is strictly positive only if $g_A > 0$ or $\gamma_A > 0$ or both. It remains to observe that a policy that induces positive effort is strictly preferred by the elite to a policy $\gamma_A = g_A = 0$. If a policy (g_A, γ_A) results in citizens choosing $e_A > 0$ then, from (A.3), it must be that $\frac{q e_A}{q e_A + (1-q)e_B} NB_A - e_A > 0$, but since $NB_{e,A} > NB_A$ we know from (A.9) that the elite must strictly prefer this policy to one that induces zero effort.

Step 2. We prove that it cannot be that the solution is interior for both public good and transfers. That is, it cannot be $g^\star_A \in (0, t_A q)$ *and* $\gamma^\star_A \in (0,1)$.

We show that if $\chi < \frac{1-\theta s_A}{q\theta(1-a\Delta)}$, *then either* $\gamma^\star_A \in (0,1)$ *and* $g^\star_A = 0$, *or* $g^\star_A > 0$ *and* $\gamma^\star_A = 1$. *If* $\chi \geq \frac{1-\theta s_A}{q\theta(1-a\Delta)}$, *then either* $g^\star_A \in (0, t_A q)$ *and* $\gamma^\star_A = 0$, *or* $\gamma^\star_A > 0$ *and* $g^\star_A = t_A q$.

The Lagrangian of the problem is

$$\begin{aligned} L(g_A, \gamma_A; \psi, \omega) &= (U^+_{e,A} - U^-_{e,A})(\frac{\chi q e_A}{\chi q e_A + \chi(1-q)e_B}) + U^-_{e,A} - e_A \\ &\quad + \psi g_A + \omega \gamma_A + \widehat{\psi}(t_A q - g_A) + \widehat{\omega}(1 - \gamma_A) \end{aligned} \tag{A.11}$$

where ψ, ω, $\widehat{\psi}$, and $\widehat{\omega}$ are the multipliers of the constraints $g_A \geq 0$, $\gamma_A \geq 0$, $g_A \leq t_A q$, and $\gamma_A \leq 1$.

Taking the first-order conditions with respect to γ_A and g_A :

$$\frac{\partial L(g_A, \gamma_A; \psi, \omega)}{\partial \gamma_A} = \frac{\partial NB_{e,A}}{\partial \gamma_A} P(e_A, e_B) + NB_{e,A} \frac{\partial P(e_A, e_B)}{\partial e_A} \frac{\partial e_A}{\partial NB_A} \frac{\partial NB_A}{\partial \gamma_A} - \frac{\partial e_A}{\partial NB_A} \frac{\partial NB_A}{\partial \gamma_A} + \omega - \hat{\omega} = 0 \tag{A.12}$$

$$\frac{\partial L(g_A,\gamma_A;\psi,\omega)}{\partial g_A}=\frac{\partial NB_{e,A}}{\partial g_A}P(e_A,e_B)+NB_{e,A}\frac{\partial P(e_A,e_B)}{\partial e_A}\frac{\partial e_A}{\partial NB_A}\frac{\partial NB_A}{\partial g_A}-\frac{\partial e_A}{\partial NB_A}\frac{\partial NB_A}{\partial g_A}+\psi-\hat{\psi}=0 \tag{A.13}$$

Using the interior condition on effort e_A,

$$\frac{\partial P(e_A,e_B)}{\partial e_A}NB_A=1, \tag{A.14}$$

rearranging terms, we can write:

$$\frac{\partial P(e_A,e_B)}{\partial e_A}\frac{NB_{e,A}-NB_A}{P(e_A,e_B)}\frac{\partial e_A}{\partial NB_A}=\frac{\frac{t_B(1-q)}{s_A}}{\frac{t_B(1-q)}{\chi q}}-\omega'+\widehat{\omega}' \tag{A.15}$$

where $\omega'=\frac{\omega}{P(e_A,e_B)}$ and $\widehat{\omega}'=\frac{\widehat{\omega}}{P(e_A,e_B)}$, and

$$\frac{\partial P(e_A,e_B)}{\partial e_A}\frac{NB_{e,A}-NB_A}{P(e_A,e_B)}\frac{\partial e_A}{\partial NB_A}=\frac{(\frac{1}{s_A}-\theta)}{\theta(1-a\Delta)}-\psi'+\widehat{\psi}' \tag{A.16}$$

where $\psi'=\frac{\psi}{P(e_A,e_B)}$ and $\widehat{\psi}'=\frac{\widehat{\psi}}{P(e_A,e_B)}$.

Suppose $g_A^\star\in(0,t_Aq)$. Then, $\psi'=\widehat{\psi}'=0$ and we have

$$\frac{\partial P(e_A,e_B)}{\partial e_A}\frac{NB_{e,A}-NB_A}{P(e_A,e_B)}\frac{\partial e_A}{\partial NB_A}=\frac{(\frac{1}{s_A}-\theta)}{\theta(1-a\Delta)} \tag{A.17}$$

If

$$\frac{\frac{t_B(1-q)}{s_A}}{\frac{t_B(1-q)}{\chi q}}>\frac{(\frac{1}{s_A}-\theta)}{\theta(1-a\Delta)} \tag{A.18}$$

(equivalently $\chi>\overline{\chi}$), then from (A.15) it must be that $\omega'>0$ and so $\gamma_A^*=0$. If instead $\chi<\overline{\chi}$, then from (A.15) it must be that $\hat{\omega}'>0$ and so $\gamma_A^\star=1$. At the non-generic value $\chi=\overline{\chi}$, then we can also have an interior solution for γ_A^*. Suppose instead $\gamma_A^\star\in(0,1)$. Following a symmetric argument, we can show that if (A.18) holds then $g_A^\star=t_Aq$ and if instead $\chi<\overline{\chi}$ then $g_A^\star=0$. At the non-generic value $\chi=\overline{\chi}$, then we can also have an interior solution for g_A^*. Finally, observe that if neither g_A^* nor γ_A^* are interior then from step 1 we have either $(g_A^\star=t_Aq,\gamma_A^*=1)$, or $(g_A^\star=t_Aq,\gamma_A^*=0)$, or $(g_A^*=0,\gamma_A^*=1)$. When $(g_A^\star=t_Aq,\gamma_A^*=0)$, then $\hat{\psi}'>0$, $\psi'=0$, $\hat{\omega}'=0$, and $\omega'>0$. Then it must be that $\chi>\overline{\chi}$. Symmetrically if $(g_A^*=0,\gamma_A^*=1)$ then it must be that $\chi<\overline{\chi}$.

To avoid unfruitful complications in the analysis from now on we will assume that at $\chi=\overline{\chi}$, when the elite is indifferent between investing in g_A or in γ_A, the elite invests first in g_A and then invests in γ_A only if g_A reaches its upper limit. In the paper we consider only the case where γ_A^* and g_A^* do not reach their upper limit.

We next show uniqueness of the equilibria to be used in the proceeding results. We show that the LHS of

(A.16) is strictly decreasing in g_A when $\gamma_A = 0$ and that the LHS of (A.15) is decreasing in γ_A when $g_A = 0$. If the first order conditions give us a unique critical point, this guarantees that it solves the optimization problem. Assuming an interior solution, we rewrite the first-order conditions with respect to g_A and γ_A:

$$\frac{q(1-q)e_B\,(NB_{e,A} - NB_A)}{qe_A(qe_A + (1-q)e_B)}\theta(1-a\Delta)\frac{\sqrt{(1-q)qe_B}}{2q\sqrt{NB_A}} = (\frac{1}{s_A} - \theta) \tag{A.19}$$

$$\frac{q(1-q)e_B\,(NB_{e,A} - NB_A)}{qe_A(qe_A + (1-q)e_B)}\frac{t_B(1-q)}{\chi q}\frac{\sqrt{(1-q)qe_B}}{2q\sqrt{NB_A}} = \frac{t_B(1-q)}{s_A} \tag{A.20}$$

where

$$\begin{aligned} NB_{e,A} - NB_A \quad = \quad & \theta g_A + (1 - \frac{g_A}{t_A q})\frac{t_A q}{s_A} + \frac{(1-\gamma_A)t_B(1-q)}{s_A} \\ & -\theta g_B(1 - a(C_B - C_A)) \\ & -\theta g_A(1 - a\Delta) + \theta g_B(1 - a(C_B - \frac{q}{2})) - \gamma_A \frac{t_B(1-q)}{\chi q}. \end{aligned} \tag{A.21}$$

It can be shown that the LHS of (A.19) is decreasing in g_A because e_A and NB_A are increasing in g_A and $NB_{e,A} - NB_A$ is decreasing in g_A (given Assumption 1). Similarly, the LHS of (A.19) is decreasing in γ_A because e_A and NB_A are increasing in γ_A and $NB_{e,A} - NB_A$ is decreasing in γ_A.

□

Proof of Proposition 3: Expression (18) is the first order condition with respect to g_A, which can be written as

$$\frac{q(1-q)e_B\,(NB_{e,A} - NB_A)}{qe_A(qe_A + (1-q)e_B)}\theta(1-a\Delta)\frac{\sqrt{(1-q)qe_B}}{2q\sqrt{NB_A}} = (\frac{1}{s_A} - \theta) \tag{A.22}$$

We can rewrite (A.21) as

$$NB_{e,A} - NB_A = \theta g_B a(C_B - C_A) - a\theta g_B(C_B - \frac{q}{2}) + \Omega \tag{A.23}$$

where Ω is a term that does not depend on g_B. When $C_A \leq \frac{q}{2}$ we have that $NB_{e,A} - NB_A$ increases in g_B. By Lemma 1, NB_A and e_A decrease in g_B. Then, we have that the LHS of (A.22) increases in g_B. Finally, since the LHS of (A.22) decreases in g_A, this proves Proposition 3. Note that $C_A \leq \frac{q}{2}$ is a sufficient condition (not a necessary one). □

Proof of Lemma 2:

The Lagrangian of the problem with λ_A is

$$L(g_A, \gamma_A, \lambda_A; \psi, \omega) \quad = \quad (U^+_{e,A} - U^-_{e,A})(\frac{\chi qe_A}{\chi qe_A + \chi(1-q)e_B}) + U^-_{e,A} - e_A \tag{A.24}$$

$$+\psi g_A + \omega\gamma_A + \nu\lambda_A + \widehat{\psi}(t_A q - g_A - h\lambda) + \widehat{\omega}(1-\gamma_A) + \widehat{\nu}(1-\lambda_A)$$

where ψ, ω, ν, $\widehat{\psi}$, $\widehat{\omega}$ and $\widehat{\nu}$ are the multipliers of the constraints $g_A \geq 0$, $\gamma_A \geq 0$, $\lambda_A \geq 0$, $g_A + h\lambda_A \leq t_A q$, $\gamma_A \leq 1$, and $\lambda_A \leq 1$.

Our results present the case where equilibrium policies do not hit their upper constraints. For homogenization this implies $\lambda_A^* < 1$.

When $g_A^* = 0$ it is immediate that homogenization is of no value to the elite and so $\lambda_A^* = 0$. When g_A^* is interior, $g_A^* \in (0, t_A q - h\lambda_A^*)$, then the first order condition with respect to g_A is

$$\frac{\partial P(e_A, e_B)}{\partial e_A}\frac{NB_{e,A} - NB_A}{P(e_A, e_B)}\frac{\partial e_A}{\partial NB_A} = \frac{(\frac{1}{s_A} - \theta)}{\theta(1 - a(1-\lambda_A)\Delta)}. \tag{A.25}$$

Then either $\lambda_A^* = 0$ or $\lambda_A^* > 0$. If $\lambda_A^* > 0$ then the first order condition with respect to λ is

$$\frac{\partial P(e_A, e_B)}{\partial e_A}\frac{NB_{e,A} - NB_A}{P(e_A, e_B)}\frac{\partial e_A}{\partial NB_A} = \frac{\frac{h}{s_A}}{\theta g_A a\Delta}. \tag{A.26}$$

Since the left hand sides of (A.25) and (A.26) are identical, then λ_A^* satisfies

$$\frac{\theta(1 - (1-\lambda_A^*)a\Delta)}{\frac{1}{s_A} - \theta} = \frac{\theta(g_A^* a\Delta - g_B a(C_A - \frac{q}{2}))}{\frac{h}{s_A}} \tag{A.27}$$

where $C_A = \frac{q}{2}$. It follows that if $\lambda_A^* > 0$ then it is an increasing function of g_A^* :

$$\lambda_A^* = \frac{1-\theta s_A}{h}g_A^* - \frac{1-a\Delta}{a\Delta}. \tag{A.28}$$

□

Proof of Proposition 4:

We continue to consider the case when policy parameters do not hit their upper constraints. Suppose $g_A^\star \in (0, t_A q - h\lambda)$. Then (A.25) holds. From Lemma 2, the optimal level of homogenization is either $\lambda_A^* = 0$ or $\lambda_A^* = \frac{1-\theta s_A}{h}g_A - \frac{1-a\Delta}{a\Delta}$. Following a symmetric argument to Proposition 2, suppose $g_A^* \in (0, t_A q - h\lambda_A)$ then if

$$\frac{\frac{t_B(1-q)}{s_A}}{\frac{t_B(1-q)}{\chi q}} > \frac{(\frac{1}{s_A} - \theta)}{\theta(1 - a(1-\lambda_A^\star)\Delta)} \tag{A.29}$$

it must be that $\gamma_A^* = 0$. If the reverse inequality holds then it must be that $\gamma_A^* = 1$ (a case we do not consider). Suppose $\gamma_A^* \in (0,1)$. Then by the same argument, if the inequality in (A.29) is reversed then $g_A^* = 0$ and it follows that $\lambda_A^* = 0$.

Compared to the threshold when nation-building is not feasible, we note that the right-hand side of (A.29) is weakly lower, thus weakly increasing the set of parameters for which public good is provided.

Proof of Proposition 5:

First note that e_A^* continues to be given by the expression in (A.6), but the term NB_A in e_A^* becomes

$$NB_A = \theta g_A \left[1 - a(\frac{C_A^2}{q} + \frac{q}{2} + C_A)\right] - (1-\lambda_2)\theta g_B \left[1 - a(C_B - \frac{q}{2})\right]. \tag{A.30}$$

The expected utility of the elite continues to be given by

$$EU_e = NB_{e,A}(\frac{\chi q e_A}{\chi q e_A + \chi(1-q)e_B}) + U_{e,A}^- - e_A \tag{A.31}$$

where, as with benchmark homogenization,

$$NB_{e,A} = \theta g_A + (1 - \frac{g_A + h\lambda_2}{t_A q})\frac{t_A q}{s_A} + \frac{(1-\gamma_A)t_B(1-q)}{s_A} - \theta g_B(1 - a(C_B - C_A)). \tag{A.32}$$

It continues to hold that the elite always chooses at least one of $\gamma_A^*, g_A^*, \lambda_2^*$ to be strictly positive. The Lagrangian of the problem with λ_2 is

$$L(g_A, \gamma_A, \lambda_2; \psi, \omega) \quad = \quad (U_{e,A}^+ - U_{e,A}^-)(\frac{\chi q e_A}{\chi q e_A + \chi(1-q)e_B}) + U_{e,A}^- - e_A \tag{A.33}$$

$$+\psi g_A + \omega\gamma_A + \nu\lambda_2 + \widehat{\psi}(t_A q - g_A - h\lambda_2) + \widehat{\omega}(1-\gamma_A) + \widehat{\nu}(1-\lambda_2) \tag{A.34}$$

where ψ, ω, ν, $\widehat{\psi}$, $\widehat{\omega}$ and $\widehat{\nu}$ are the multipliers of the constraints $g_A \geq 0$, $\gamma_A \geq 0$, $\lambda_2 \geq 0$, $g_A + h\lambda_2 \leq t_A q$, $\gamma_A \leq 1$, and $\lambda_2 \leq 1$. We continue to consider the case where policy choices do not hit their upper constraints. Then the first order conditions with respect to γ_A, g_A, and λ_2 are respectively

$$\frac{\partial P(e_A, e_B)}{\partial e_A} \frac{NB_{e,A} - NB_A}{P(e_A, e_B)} \frac{\partial e_A}{\partial NB_A} = \frac{\frac{t_B(1-q)}{s_A}}{\frac{t_B(1-q)}{\chi q}} - \omega' \tag{A.35}$$

$$\frac{\partial P(e_A, e_B)}{\partial e_A} \frac{NB_{e,A} - NB_A}{P(e_A, e_B)} \frac{\partial e_A}{\partial NB_A} = \frac{(\frac{1}{s_A} - \theta)}{\theta(1 - a\Delta)} - \psi' \tag{A.36}$$

$$\frac{\partial P(e_A, e_B)}{\partial e_A} \frac{NB_{e,A} - NB_A}{P(e_A, e_B)} \frac{\partial e_A}{\partial NB_A} = \frac{\frac{h}{s_A}}{\theta g_B(1 - a(C_B - \frac{q}{2}))} - \nu' \tag{A.37}$$

where ω', ψ', and ν' are the values of ω, ψ, and ν scaled by positive constants. Note that Δ in A.36 is not a function of λ_2.

We follow the same strategy as previous proofs. Suppose $\gamma_A^\star \in (0,1)$. When

$$\frac{\frac{t_B(1-q)}{s_A}}{\frac{t_B(1-q)}{\chi q}} < \min\left\{\frac{(\frac{1}{s_A}-\theta)}{\theta(1-a\Delta)}, \frac{\frac{h}{s_A}}{\theta g_B(1-a(C_B-\frac{q}{2}))}\right\} \tag{A.38}$$

then it must be that $\psi' > 0$ and $\nu' > 0$ and hence $g_A = 0$ and $\lambda_2 = 0$. When the inequality in (A.38) is reversed, the only way the first order conditions can be satisfied is if $\omega' > 0$. This implies $\gamma_A^* = 0$.

Condition (A.38) is equivalent to $\chi < \min\{\overline{\chi}, \widetilde{\chi}\}$. Thus when $\chi > \min\{\overline{\chi}, \widetilde{\chi}\}$, then $\gamma_A^* = 0$. The choice between using g_A or λ_2 is driven by the inequality

$$\frac{(\frac{1}{s_A}-\theta)}{\theta(1-a\Delta)} > \frac{\frac{h}{s_A}}{\theta g_B(1-a(C_B-\frac{q}{2}))}. \tag{A.39}$$

If (A.39) holds, since we cannot have both $\psi' > 0$ and $\nu' > 0$ (otherwise all policy choices would be zero). Then it must be that $\psi' > 0$ and so $g_A^* = 0$ and $\lambda_2^* \in (0,1)$. A symmetric argument holds to show that when the inequality in (A.39) is reversed then $g_A^* \in (0, qt_A)$ and $\lambda_2^* = 0$. The inequality in (A.39) gives us the sign of φ. When $\chi = \min\{\overline{\chi}, \widetilde{\chi}\}$, then the elite is indifferent between using either γ_A or one of the other instruments. For simplicity of statement, we assume they invest in one of the other instruments. When $\varphi = 0$ then the elite is similarly indifferent between using g_A or λ_2. For simplicity of statement, we assume they invest in λ_2. □

Lemma 3: *Equilibrium war effort, elite's payoffs and public policies under enemy-neutral homogenization coincide with the ones obtained under the "benchmark" form of homogenization.*

Proof of Lemma 3: Under the benchmark utility, the average net benefit of winning in the country is

$$\begin{aligned} NB_A &= \theta(g_A - g_B - g_A a(1-\lambda)(\frac{C_A^2}{q} + \frac{q}{2} - C_A)) \\ &\quad + \theta g_B a(C_B - \lambda C_A - (1-\lambda)\frac{q}{2}) + \gamma_A \frac{t_B(1-q)}{\chi q} \end{aligned} \tag{A.40}$$

Under "enemy neutral" nation-building the average net benefit of winning in the country is

$$\begin{aligned} \widetilde{NB}_A &= \theta(g_A - g_B - g_A a(1-\lambda_1)(\frac{C_A^2}{q} + \frac{q}{2} - C_A)) \\ &\quad + \theta g_B a(C_B - \frac{q}{2}) + \gamma_A \frac{t_B(1-q)}{\chi q} \end{aligned} \tag{A.41}$$

Both net benefits are identical when $C_A = \frac{q}{2}$. It also follows that if $C_A > q/2$, "enemy neutral" would be preferable for the elite to the "benchmark" one, and vice versa when $C_A < q/2$. When $C_A = \frac{q}{2}$, since the two forms of nation-building affect the elite utility only through the probability of winning, and since the elite's payoffs do not depend on nation-building, we have that economic outcomes under the two forms of nation-building are identical. □

Proof of Proposition 6: From Lemma 3, enemy-neutral and benchmark nation-building yield the same outcomes. De facto, the elite must therefore choose between two forms of nation-building: negative (denoted λ_2) and positive (denoted λ_A). First, note that when $\lambda_A = \lambda_2 = 0$ the net benefit of winning is the same for both types of nation-building. The net benefit in case of negative indoctrination can be written as

$$\widehat{NB}_A = \theta(g_A - g_A a(\frac{C_A^2}{q} + \frac{q}{2} - C_A)) - \theta(1-\lambda_2)g_B(1 - a(C_B - \frac{q}{2})) \tag{A.42}$$

The derivative of the average net benefit with respect to λ_2 is

$$\frac{\partial \widehat{NB}_A}{\partial \lambda_2} = \theta g_B(1 - a(C_B - \frac{q}{2})) \tag{A.43}$$

From (A.8) the derivative of the net benefit with respect to λ_A is

$$\frac{\partial NB_A}{\partial \lambda_A} = \theta g_A a \Delta \tag{A.44}$$

For the equilibrium value of g_A^*, if the following holds

$$\theta g_A a \Delta < \theta g_B(1 - a(C_B - \frac{q}{2})), \tag{A.45}$$

then $\widehat{NB}_A \geq NB_A$. This implies positive homogenization is not used since the elite value homogenization only through its impact on the net benefit of winning the war. Using the fact that fiscal capacity puts an upper bound on spending, that is $g_A < qt_A + \lambda h \leq qt_A$, if

$$t_A < \frac{\theta g_B(1 - a(C_B - \frac{q}{2}))}{q\theta a \Delta} \tag{A.46}$$

then homogenization, if used, will be negative homogenization. □

Binding fiscal-capacity and loots of war

Assume $\lambda = 0$. Suppose that equilibrium policies are not bounded away from their maximal levels –i.e., either $\gamma_A^\star = 1$ or $g_A^\star = t_A q$. Simulations show that public spending might be provided before the cutoff $\overline{\chi}$. This occurs when $\gamma_A^\star$ hits the upper constraint and the elite are left only with the less efficient instrument (public good) to further boost effort. In fact, note from Figures A.1 and A.2 that when $\chi \leq \overline{\chi}$, spending is strictly positive precisely when $\gamma_A^\star = 1$. Similarly, from Figure A.2 we observe that soldiers' pay is positive when $\chi > \overline{\chi}$. This occurs because the elite is already using public spending, the most efficient instrument, at full capacity. The graphs below show that qualitatively results are similar to those stated in Proposition

2. It bears stressing that the cutoff is the same one derived in Proposition 2.

Figure A.1

public goods

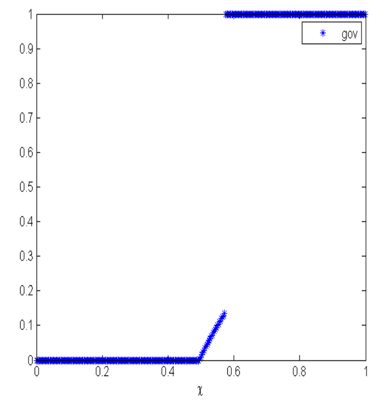


Figure A.2

soldiers' pay

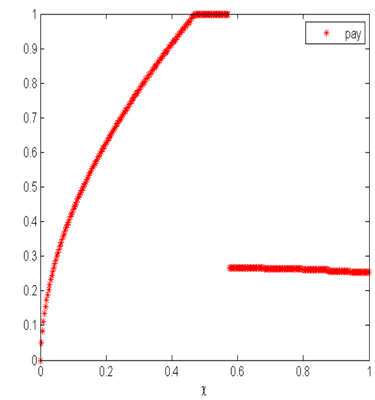
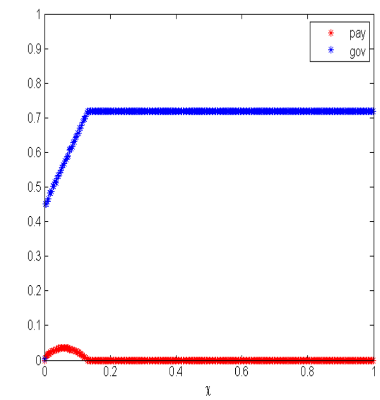


Figure A.3

quasi linear utility



Quasi-Linear Utility

Assume the following quasi-linear utility function for all $i \in [0, q]$

$$U_{i,A} = \ln(g_A)\theta(1 - a\,|i - C_A|) + c_{i,A} \tag{A.47}$$

Under peace, the elite maximizes

$$U_{e,A} = \theta \ln(g_A) + y_A + \frac{(1 - \pi_A)t_A q}{s_A}. \tag{A.48}$$

subject to the government's budget constraint. It is immediate to compute that under peace, if the solution is interior (i.e., fiscal capacity is not too low), optimal spending is

$$g_A^\star = \theta s_A \tag{A.49}$$

Compared to Proposition 1, there is public good provision under peace as well and public spending increases in θ and s_A. Under war (assume $\lambda = 0$), if the solutions for $g_A^\star$ and $\gamma_A^\star$ are both interior, we have

$$g_A^\star = \theta s_A + \chi q \theta(1 - a\Delta), \tag{A.50}$$

This implies that an increase in army size raises spending, as in the model in the main text, but in a continuous way. We can simulate a path for spending and soldiers' pay as a function of army size. When army size is small, the solution is interior and public spending increases in χ according to (A.50). As army size gets sufficiently large, soldiers are not paid anymore and public spending is constant thereafter.