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# Confirming Carneiro: Resource Scarcity and Pre-Modern Warfare

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## Abstract

In 1970, Robert In 1970, Robert Carneiro introduced a theory called circumscription. The theory suggests exposure to certain environmental conditions is the main determinant for conflict in the premodern era. Well-received in some circles, others scrutinized whether the theory was as capable as it claimed (See, for instance, the symposium published by American Behavioral Scientist 31:4 March/April). Though disagreement remains as to whether Carneiro?s theory retains any merit, the results of empirical tests of his theory, more often than not, fall in his favor (Carneiro 1988; See also Deflem 1999). This paper adds to those empirical results and confirms environmental conditions play a role in the presence or absence of war.

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***Index terms***— resource scarcity, conflict, war, circumscription theory, carneiro.

# 1 Introduction

n 1970, Robert Carneiro introduced a theory called circumscription. The theory suggests exposure to certain environmental conditions is the main determinant for conflict in the premodern era. Wellreceived in some circles, others scrutinized whether the theory was as capable as it claimed (See, for instance, the symposium published by American Behavioral Scientist 31:4 March/April). Though disagreement remains as to whether Carneiro's theory retains any merit, the results of empirical tests of his theory, more often than not, fall in his favor **??**Carneiro 1988; See also Deflem 1999). This paper adds to those empirical results and confirms environmental conditions play a role in the presence or absence of war.

Understanding the reason for war in the premodern era is important for discerning potential causes of war in the modern era. As climate change worsens and extreme droughts, famine, and displacement of individuals increases, so, too, will conflicts over territory and resources. Stressing the link between environmental conditions and the potential for war is necessary to call attention to potential crises that will arise in the future. Moreover, knowing the cause of war in the premodern era can also help explain why strong states formed in some areas, like Europe, but not others, such as Africa **??**Carneiro 1970; **??**illy 1992;Young 2022). This knowledge also helps us understand the rise and fall of empires, like Rome for example.

Before introducing the model I use to test circumscription theory, I explain Carneiro's theory in more detail and survey others who also find environmental conditions matter when it comes to the presence or absence of war. Then, using time series, panel data from 0 -1600, I test whether access to resources matters when it comes to the potential for conflict. The results confirm Carneiro was right. Environmental conditions do matter when it comes to determining when and where conflict occurred in the premodern era.

# 2 II.

# 3 Literature Review

The reason for war varies. Some suggest "warfare as an organized phenomenon originated spontaneously, independently, and with cross-cultural characteristics in at least three separate regions of space-time in antiquity" **??**Claudio Cioffi-Revilla 1996, 17). Scholars argue, the causes of war range from ethnic, religious, and tribal tensions to issues related to prestige, honor, economic purposes, or revenge. Tacitus, after observing several battles of the German Tribes, found wars were fought "among the chieftains" to determine who would "have the largest and keenest retinue" ??Fukuyama 2011, 74-75). When it comes to issues of prestige or honor, however, these triggers for war are "actually more commonly associated with higher levels of political centralization (that is, chiefdoms and states) than with band or tribes" ??Keeley 1996, 115). Rather, war in band level societies was most likely to occur for two reasons: "revenge for homicides" and because of "economic issues" ??Keeley 1996, 115). In fact, when it comes to band level societies, or the most primitive groups, a lack of resources resulting in a need for territory is what most often led to war. More specifically, band level societies in the premodern era experienced war most frequently because of disputes over territory arising out of the need to feed a large population with only scarce resources to support it ??Carneiro 1970).

According to Robert Carneiro, war in the premodern era was contingent on the presence or absence of three environmental conditions. The ratio of these conditions vis-à-vis each other "greatly affect ??ed] the rate of political evolution that" occurred and "how far that evolution carried the societies involved" ??Wenke 1999, 499). Societies facing shortages of resources and overcrowding conditions were more likely to engage in competition, or war, with neighbors ??Carneiro 1970, 734). The root of this competition was first a result of ecological circumscription.

Ecological circumscription occurred when fertile lands were surrounded "by areas of lesser productivity such as desserts, mountains, or oceans" ??Wenke 1999, 357). If populations remained sparse enough that arable land was sufficiently available to sustain each autonomous group, then not only was warfare less likely, but the conflict that did occur led "to a dispersal of villages because the means for agriculture [could] be found elsewhere" ??Deflem 1999, 37). In other words, instead of staying to fight to protect precious resources, villages could simply flee to other areas since arable land was abundant. Though villages had some vested interest in the land on which they already settled, Carneiro argues the archeological record demonstrates when faced with constant conflict from neighbors, when possible, tribes simply moved to safer ground and started over. When population was dense in highly circumscribed areas, there was no place to run to escape neighbors. Sustaining a population required access to arable land for food production. In this situation, the cost to flee and risk surviving in agriculturally unfavorable conditions far outweighed the cost to defend one's territory. Thus, war was more likely to occur.

Carneiro also argues resource concentration matters. He found settlements in the Amazon did not suffer from ecological circumscription but engaged in conflict despite an abundance of resources. Because annual floods replenished the area with fertile silt, the territory was highly desirable. In this area, even though "there was no sharp cleavage between productive and unproductive land?there was at least a steep ecological gradient. So much more rewarding was the Amazon River than adjacent areas?and so desirable did it become as a habitat that peoples were drawn to it from surrounding regions" (1971, 736). 1 Thus, even if arable land was abundant, a piece of territory viewed as more valuable may also have become a source of contention and war. In addition, some territory is valuable because it has strategic importance. "In particular, states can gain a buffer zone that helps protect from attack by another state, or that can be used to launch an attack?" ??Carneiro 1988, 150-151). Germany and France's longstanding battle over Alsace-Lorraine, the continuous struggle over "blood diamonds" throughout Africa, and even the fight over oil rich territories, are good examples of areas that provide economic dividends. Societies predating the modern state were no different according to Carneiro; they also viewed certain resources or tracts of land as so valuable that warfare was more desirable than abandoning the 1 The Nile River in Egypt is another area so rich and desirable that it attracted much attention from many conquering neighbors throughout its history.

# 4 area.

Finally, population density matters. Many scholars who study war maintain high levels of population density increased the potential for conflict. Carneiro refers to this phenomenon as social circumscription. Social circumscription occurred when "a high density of population in an area" put pressure on those "living near the center of the area." The effects, according to Carneiro, "are similar to the effects produced by environmental circumscription" ??1970, ??37). Nicholas Chagnon (1968) first noticed this phenomenon when studying the Yanomamö villages that inhabit "an extensive region of noncircumscribed rain forest" in Venezuela. These villages should "be more or less evenly spaced," but at the center of the territory he discovered that "villages are closer together than they are at the periphery." Both he and Carneiro believe this pattern occurred because those groups at the nucleus have less chance to escape than their neighbors on the edges of the territory. The absence of any major river in the area amplifies the difficulty of fleeing. As a result, warfare was more likely to occur since the only option was to stay and defend one's resources ??Carneiro 1970, 737;Chagnon 1968). In addition, population mattered because the likelihood of surviving attack (or winning if you are the attacker) increased the larger the size of your village. Because groups at the center were more likely to face conflict, Chagnon concluded, these groups formed larger territories.

In antiquity, growth brought with it an increase in the complexity of society. New hierarchical arrangements that gave leaders more power resulted. 2 Though these groups did not develop into mature states, Carneiro adds, "while still at the autonomous village level of political organization, those Yanomamö subject to social circumscription have clearly moved a step or two in the direction of higher political development." He finds further support for social circumscription in other areas such as Amazonia, specifically when investigating the Mayan and Petén civilizations, as well as the rise of the state in the Hwang Valley of northern China ??Carneiro 1970, 737). Francis Fukuyama (2011) supports Carneiro's findings. He argued once societies became stationary, populations increased, and society became more complex. The increase in population resulted in groups living in closer proximity to each other. The decreased buffer zones and the increased competition over territory and resources made war more likely. In addition, increased complexity resulted in the emergence of the rule of law. Leaders established "standing armies?capable of enforcing rules throughout a defined territory" (2011, 110). Fukuyama, thus, concluded war occurred as a natural consequence of societies maintaining law and order, but all of which resulted from increased population levels.

Others agree the increase in population placed significant pressure on society to expand and seek out additional resources and territory (Diamond 1999). Areas that historically could not provide food to support a large population did not develop into capacityintensive states. He suggests the lack of food resulted in lower population densities which made conquest more difficult. Those that did have adequate supplies continued to see population increase. Eventually, societies engaged in a battle of the "haves" versus the "have nots" as a consequence of trying to improve living conditions for their ever-expanding populations **??**Sinor 1990, 4-5).

The lack of high population densities and abundance of land in Africa explains the lack of war in that region. The difference between European and African societies is the demarcation of control over territory. Space was abundant and population densities were low in Africa during the pre-modern period. Europeans placed higher value on territorial control of boundaries because of the significant investment in the land required to sustain high populations. African societies, on the other hand, had a "far more nuanced understanding of control of territory?made possible by the fact that land often was not a scarce resource?[leaving]?few imperatives to developing a zero-sum understanding of demarcating authority" **??**Herbst 2000, 41). Instead of facing attack, groups simply found less hostile areas and resettled. As a result, African societies escaped "the brutal history of continual war" **??**Herbst 2000, 112). In short, "low population density has meant that new land was usually available; people could respond to the threat of conquest simply by retreating farther into the bush." States in Africa had this luxury, but for European states, "the motives and possibilities for conquest were much more" abundant **??**Fukuyama 2011, 90-91).

Other scholars maintain if population pressure did, indeed, result in warfare, then it is logical to presume societies would have simply restricted population levels (Cowgill 1975;Schacht 1988). Archeological evidence of hunter-gatherers does suggest that members of these groups did restrict population growth through the practice of infanticide (Wenke 1999). Carneiro adamantly maintains, however, that an examination of "any major area of the world where states formed" will show, "without exception, an enormous multiplication of people from the introduction of farming to the development of states and empires" **??**1988, **??**04). Moreover, Malthusians argue population continues to increase exponentially out of control and will one day result in an ecological disaster (Hardin 1968). Despite some exceptions where a concerted effort is made to control population levels, such as India and China for example (Sen 1994), little is done to curb growth. In fact, the world's population continues to increase at a rate of 1.14%. Though this may seem low, it equates to a doubling of current population levels within 61 years (Population Reference Bureau 2012). This indicates the dangers posed by population growth go largely unheeded by individuals. Infanticide is certainly not practiced to stave off this warning since such actions are considered abhorrent in most cultures. It is not unreasonable to assume that either this norm developed in early societies at some point, or they were unaware ever-increasing populations were also increasing the likelihood of war. However, if Carneiro is correct and the archeological evidence does prove that conflict occurred where population was most dense, then perhaps these groups developed a culture like most modern societies where the birth of children was not a burden, but an advantage.

Certainly, more children to harvest crops when scarcity of food is an issue yields benefits; especially considering the low survival rate of children during this time period. Thus, without the technology to restrict population, an unwillingness to engage in infanticide, and possible benefits of having more children, populations increased. Though war was a likely consequence, it is possible groups did not alter their behavior to avoid it altogether since the costs of war did not outweigh the benefits of children. Finally, it is even possible by the time groups recognized population pressure was resulting in conflict, if they did at all, it was too late to curtail it. Finally, consistent with findings from modern day scholars of war (i.e. Tammen et al 2000) it is not unreasonable that groups would welcome large populations since it means more bodies able to fight.

What Carneiro also implies is that areas that did not engage in war, did, in some sense or another, restrict population levels (either by choice or consequence) since densities remained relatively low. This opens the possibility that some groups still maintained old hunter gatherer practices of restricting growth, or in Cowgill's view, developed the capacity to reason that having too many children would eventually result in war, thus, maintaining low levels to avoid this consequence. Or it is possible the groups simply did not have the capacity (e.g. food supplies) necessary to support a large population. Whatever the reason for the difference, the conclusions are still the same -areas with high population density and low access to resources were most likely to engage in conflict or war.

# 5 III.

# 6 Research Design and Methods

What causes conflict between or among groups in the premodern era? To answer this question, I construct the following model: a) Dependent Variable Conflict: Although many conflict databases exist, finding comprehensive data that begins before 1800CE is a difficult task. I rely on George C. Kohn's Dictionary of Wars (2000), a one-volume reference source on conflicts from ancient times to present. Though it does not account for all conflicts throughout history, it does include a comprehensive list of all major and many minor conflicts that occurred across the globe from 3000BCE to 1999CE. In addition, Kohn relies on a broad classification of war defined as "an overt, armed conflict carried on between nations or states (international war) or between parties, factions, or people in the same state (civil war)" **??**2000,5).

Kohn defines international war as those events involving "territorial disputes, injustice against people of one country by those of another, problems of race and prejudice, commercial and economic competition and coercion, envy of military might, or sheer cupidity for conquest." Kohn includes any "organized effort to seize power," such as a rebellion, insurrection, uprising, or revolt, as a civil war. Finally, Kohn adds "conquests, invasions, sieges, massacres, raids, and key mutinies" to the list of entries. Having such a broad definition of war is useful because it allows a diverse range of disputes in the data. This is particularly beneficial for earlier time periods, since present-day states had not yet formed, and classification of many battles fall outside the scope of international wars, biasing the results.

The model tests the hypothesis that the levels of population density and resources determine the presence or absence of war. Since I am only concerned with whether a state was involved in a war or not in this model, I consider only two factors: 1) What country or countries were involved in the dispute, and 2) In which years did the conflict take place? To construct the variable, I tally the total number of conflicts per year for each country. I list each total so that it corresponds with the appropriate period in the dataset. Finally, I create a binary variable coded "0" if a country was not involved in a conflict during a particular time period and "1" if it was. b) Independent/Control Variables Population Density: I obtain the population density for each region from the Krumhardt/ARVE estimates for population densities. This data source contains population estimates for countries in all regions from 1000 BCE -1850CE. It uses the Atlas of World Population History as one of its prime sources. A variety of other sources were used to fill any gaps in the Atlas. Durand (1976), Clark (1977), and Biraben (1979) provided the majority of supplemental information, but region-specific sources were used in some instances. 3 Resources: The Global Agro-Ecological Zones (GAEZ) dataset provides a combined measure of climate, soil, and terrain conditions to estimate the maximum potential crop yields for resource measurements for 158 countries (Fischer et al 2002). 4 I construct the variable by subtracting the total amount of non-suitable land from available land, then dividing the difference by the total land available. This yields the total percentage of suitable land for crop cultivation.

The ratio of arable land per person necessary for sustainable food security is 0.5 of a hectare per person under optimal conditions. The amount does not account for land degradation or availability of water (FAO, 1993). In countries like China, for instance, this is particularly problematic, considering half of the cropland is irrigated and up to four-fifths of the harvested grain requires irrigation (Brown 1995). Therefore, it is impossible to say for certain what the optimal level is for each country since conditions vary. Researchers suggest, however, less than 1.0 hectares per person is likely not sufficient in most cases.

Conflict Adjacent: After remaining at a relatively steady rate with few exceptions for centuries, around 1000-1200CE, the amount of conflict dramatically increases. Because the external environment in which a state resides matters (Waltz 1979), it is possible states located next to a conflict-prone state will also engage in conflict (offensive and/or defensive; see Mearsheimer, 2001) regardless of its internal environment. To control for this effect, I include a dummy variable coded "1" for any country next to one involved in a conflict and "0" for those countries not adjacent to a conflict-prone state. Although I do not include Middle Eastern countries in the dataset, I used the Dictionary of Wars to determine if any of those states were involved in a conflict. I coded any adjacent country in the dataset appropriately.

# 7 Contiguous States:

Prior research indicates states that share a border with one or more states are more likely to engage in conflict. Following the lead used by the Correlates of War project for coding the contiguous characteristic of states, I counted the total number of known societies bordering the societies within the current territorial boundary of any given state from -1600. I relied on an exhaustive review of historical data 3 See Kirsten M. Krumhardt "Methodology for Worldwide Population Estimates: 1000 BCE to 1850" http://arve.epfl.ch/people/kristenkrum hardt for a more detailed description of data sources and methodology. 4 A number of scholars have used this dataset to assess the impact of land abundance, agricultural productivity, and even climate change. Of particular interest, James Fenske (2011) used the dataset to determine if land abundance explains the development of African institutions prior to colonialism. and accounts of the various groups in each area, including all minor and major actors, to determine how many bordering neighbors any one state or society had during this time period. Some states, like Tajikistan and Uzbekistan, for instance, were not coded due to lack of available information. Landlocked: I include a control variable coded "1" for landlocked countries and "0" for those that are not. Island: I also include a control variable coded "1" if the state is an island and "0" if it is not. Regional Controls: Qualitative case studies reveal state formation occurred at different times and at different rates. Asia developed much sooner but a lot slower than Europe, which arrived late on the state building scene but progressed rapidly; Africa lagged behind both. In addition, each region has a distinct climate, which contributed to the timing and rate of development. To account for regional distinctions, a dummy variable is included for Asia, Eastern

Europe, Western Europe, and Africa. Foreign Invasion: Foreign invasion is shown to weaken and strengthen a state depending upon circumstances. Many states in the early phase of development were overcome with foreign threats of conquests; others resided in a peaceful environment. A dummy variable is included to account for the impact foreign invasion has on state development. All states that have mention in their historical record of a foreign invasion by a group other than Rome are coded "1." No foreign presence in the state is coded "0." Roman Occupation: Qualitative case studies reveal the presence of Rome in a state significantly impacted its growth. The findings indicate while Rome may have helped elevate most states slightly in strength, in the long term, their presence actually weakened the states' development. This resulted because, despite Roman institutions created to maintain the military establishment, the state in which Rome occupied did not strengthen. This is evident after the fall of Rome. Left with no rule of law, and because Rome did little in the way of state building in these areas to help the inhabitants enforce it on their own, Europe's states' strength was weakened. The Dark Ages are the result. Though states recovered from Rome's retreat, it is evident Rome set states back in their development, at least temporarily. Every state in which Rome had a presence is therefore coded "1." A lack of Roman presence is coded "0." Roman Withdrawal: Since the fall of Rome was so problematic for its foreign territories, the first year in which Rome's presence was no longer dominant is coded "1." All other years are coded "0." Plague: Qualitative case studies also reveal states suffered significant setback in population levels and, in many cases, their strength as a result of several devastating plagues that occurred throughout history. Thus, any year in which the historical record indicates a state suffered a severe loss from a plague is coded "1." Plague-free years are coded "0."

# 8 c) Hypotheses

Having operationalized the variables of interest, I propose the following hypotheses: H1: If population density is high, and there is an abundance of land and resources to sustain the population, then less conflict will occur.

# 9 H2:

If an area has a high population density and does not have an abundance of land or resources, then more conflict will occur. H3: In areas where there is moderate population density, with a moderate supply of resources and land, then some conflict will occur. The amount of conflict in these areas will vary but will not occur as frequently in resource-scarce, population-dense areas. It will occur more often, however, than in low population density, resource-abundant areas.

# 10 IV. Data Analysis and Discussion

Data reveal the area with the highest number of conflicts is Europe. From 0CE -1600CE the continent of Europe experienced 470 different conflicts. Asia experienced 256. Of those 256 conflicts documented, 43 of them involved inhabitants from Europe. Africa, on the other hand, only saw 26 major conflicts erupt during this time. The number of conflicts remained roughly the same for Europe and Asia for the first 600 years represented in the data. Conflict began to increase for both Asia and Europe from roughly 600CE -1300CE, yet both remained relatively even in the number of conflicts each region saw. However, after 1300 Europe saw an explosion in the number of conflicts which occurred, while Asia experienced only a moderate increase. Africa remained relatively stable.

# 11 Figure 1

When comparing the number of conflicts that occurred with the population density of the regions, a pattern emerges. According to the data, Europe experienced the highest level of population density, the lowest availability of resources, and the highest number of conflicts. The region also produced the strongest state structures. Africa, on the other hand, experienced the fewest number of conflicts, had the largest availability of resources, and produced, on average, the weakest state structures. Asia falls somewhere in the middle in terms of conflict, population density, resources, and the type of state structure that developed. Around 1000CE, however, population density began to increase rapidly. At the same time, conflict also saw a sharp increase. When population density declined around 1300, so did the number of conflicts. I test my hypotheses (H1, H2, and H3) using logistic regression and time series panel data arranged by country name and year (Î?"100, 0-1600). I also control for fixed effects for year and region. Model 1(a) finds both suitable and popdens statistically significant and in the right direction. In addition, conflict-adjacent and landlocked are also statistically significant. Whether or not Rome occupied the area also matters. Thus, if a state is next to a conflict-prone neighbor, its probability of conflict increases. On the other hand, if the state is landlocked or occupied by Rome, it is less likely to engage in conflict. Controlling for fixed effects reduces the magnitude of the coefficients slightly, and Roman occupation no longer matters. Plotting the predictions for Roman occupation reveals that while its presence does reduce the likelihood of conflict, this effect happens rapidly and with great variance. Since fixed effects control for time at Î?"100, and the effect of Rome's presence occurs within the first few years of its occupation, this likely explains why the variable loses significance. In fact, goodness of fit tests indicate controlling for fixed effects only improves the model marginally (See Tables 2 and 3).

Although it appears suitable is a necessary condition, it is not sufficient since a state must have people to fight in battles over resources. Population density, on the other hand, appears to be necessary and sufficient. If population is too large, and resources are scarce, however, then there are limitations to waging war, since a state needs resources to support the men fighting. Creating the interactive term and plotting the results shows if a threshold exists when population density is still necessary but no longer sufficient. Model significant at $P > 0.05$. In addition, conflict-adjacent states are more likely to experience conflict ($P > 0.00$). Landlocked states, as well as states occupied by Rome, are less likely to experience conflict ($P > 0.00$). To interpret the magnitude of the coefficients, I predict the margins of the interactive term by setting both suitable and popdens at its minimum and maximum. Figure **??** shows the fewer resources a state has when population density ranges from 0 -15 km 2 , the higher the probability of war. For example, an area with only twenty percent (20%) of arable land and a population density of 10km 2 is over twelve percent (12%) more likely to experience conflict than an area with the same population density but with eighty percent (80%) arable land. When population density reaches approximately 15km 2 , then the probabilities converge, and the relationship changes so that, although the probability continues to increase with population density, the more people and resources a state has, the more likely war. When population density reaches 50 km 2 , all areas at this level have the same probability of experiencing some sort of conflict regardless of available resources, with two exceptions. Areas with twenty percent (20%) arable land continue to have a slightly lower chance of conflict until population reaches 70 km 2 . The probability for areas with nominal resources continues to increase but at a much slower rate (and with much less precise confidence intervals).

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The results support the hypothesis that conflict is more likely for areas with low resources and high population densities, up to a point. Once population density reaches a certain threshold, it appears the competition-scarcity relationship changes. Specifically, when population density reaches approximately 15 km 2 , the probability of conflict is roughly the same for all areas, though areas with more arable land begin to increase in the likelihood of conflict while resource scarce areas are less likely. What causes this change in relationship though? It is arguable that once population density reaches a certain level, the level of resources needed to sustain that population also increases. This would force even resource abundant states to seek out more resources to sustain such large levels of population. That would not explain, however, why areas with more resources have a higher probability of conflict than resource-scarce ones. Instead, a sharp increase in the probability of conflict should increase for all, with resource-scarce areas still maintaining the highest probability. A closer look at the data reveals something else is occurring in the international system that changes the nature of conflict.

As Figures **??** and 6 show, at approximately the same time that population density reaches 15 km 2 for over half of the countries in the sample, the total number of conflicts also increases dramatically. The number of states next to conflict-prone neighbors therefore also increases.

After the fall of Rome, the number of conflicts decreases, also decreasing the total number of states next to conflict-prone neighbors. Despite hostile neighbors decreasing from 0 -300, by 400, conflictadjacent states double and remain fairly constant until 700, when another sharp increase occurs. More than half of all states are located next to a conflict-prone neighbor by 1000. This rate remains relatively steady until another dramatic increase at 1400. These numbers not only reaffirm conflict is more prevalent over time, but data shows that, with few exceptions, conflict does not increase randomly. Instead, it is contagious, spreading from one state to another. As a result, whether a country is located next to a conflict-prone state provides strong evidence for the probability of conflict. In other words, unlike earlier time periods when competition over the scarcity of resources was a main motivator for conflict, after a certain period, conflict itself breeds conflict. To determine the extent of this relationship, I plot the probability of conflict for areas bordering warprone states. As Figure **??**.10 shows, those located in more peaceful areas are thirty-seven percent (37%) less likely to experience conflict. Those next to a conflict prone neighbor, on the other hand, have a fifty-seven percent (57%) chance of war. Thus, the change in the relationship between resources and population density changes as the world becomes more conflict prone. No longer is survival defined in terms of the ratio of resources available but also, and arguably more so, by whether a society is likely to face conflict. Roman occupation decreases the probability of conflict by almost twenty percent (20%). Any other type of foreign occupation, on the other hand, slightly increases the potential for conflict, but only by three percent (3%). In addition, the confidence intervals are much wider, indicating a lot more variability regarding the impact a foreign presence other than Rome has.

# 13 Conclusion

The combination of resources available and the amount of strain by the population on those resources determines whether a group is likely to engage in conflict. Over time, as populations continue to grow, and more areas that had an adequate population-toresource ratio begin to experience scarcity, these groups find themselves fighting battles. Around 1000 CE, however, conflict becomes so prevalent in some regions that the cause of war changes. States are faced with a more hostile international environment. Survival is no longer just about resources, but it also results from fear of the anarchical and conflict-laden system in which a state finds itself. Moreover, war does not randomly happen but is contagious -spreading from one state to those around it and eventually to the states bordering the newly infected. As war breeds war, the states with the most resources become most likely to go to war. Two possible explanations for this exist.

First, the state may be a target for resourcescarce states for its abundance of resources, and thus, it engages in more conflict. On the other hand, as offensive realism argues, the international system may drive states to seek power. Since states do not engage in wars they do not believe they have a chance of winning, those states best equipped to win will be most likely to go to war. Either way, the threat of conflict better explains why states go to war than Carneiro's theory as areas move closer to the modern era. That does not make the Carneiro's theory less valuable, however, since it explains what initially caused autonomous groups to pick up weapons and threaten their neighbors. Something had to spark the first battle that eventually led to a system constantly plagued by war. Carneiro's theory provides that answer. [1] [2] [3]

Figure 1:

Figure 2:

**23**

Figure 3: Figure 2 Figure 3

[1] This is consistent withFukuyama (2011) and others who also argue as societies grow in size it brings with it a certain amount of complexity. This complexity requires new rules and regulations, as well as the development of institutions that have the capacity to govern and, in turn, sustain the growing society.

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Figure 4: F

Figure 5:

**56**

Figure 6: Figure 5 :Figure 6 :

**7**

Figure 7: Figure 7 :

**89**

Figure 8: Figure 8 :Figure 9 :

**1011**

Figure 9: Figure 10 :Figure 11 :

**1213**

Figure 10: Figure 12 :Figure 13 :

**14**

Figure 11: Figure 14 :

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| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Conflict Total Conflicts SAIndex | 648 648 1698 | 0.43 1.66 19.22 | 0.50 3.75 18.42 | 0 0 0 | 1 35 50 |
| SaCat | 1696 | 0.80 | 0.85 | 0 | 2 |
| Suitable | 1700 | 0.41 | 0.25 | 0 | 0.84 |
| PopDens | 1054 | 5.76 | 7.57 | 0 | 69.12 |
| Conflict_Adjacent | 1177 | 0.55 | .50 | 0 | 1 |



Figure 12: Table 1 :

**2**

| Model | 1(a) | 1(b) | 1(c) | 1(d) |
|---|---|---|---|---|
| Suitable | -1.83*** | -1.48*** | -3.08*** | -2.89*** |
| | (0.51) | (0.48) | (0.79) | (0.76) |
| Popdens | 0.14*** | 0.17*** | 0.04 | 0.05 |
| | (0.02) | (0.02) | (0.05) | (0.05) |
| suitable_pop | — | — | 0.23** | 0.26*** |
| | | | (0.11) | (0.11) |
| conflict_adjacent | 1.90*** | — | 1.88*** | — |
| | (0.23) | | (0.23) | |
| contiguous_states | — | 0.03 | — | 0.23 |
| | | (0.06) | | (0.06) |
| Landlocked | -0.97*** | -1.07*** | -0.97*** | -1.05*** |
| | (0.29) | (0.29) | (0.29) | (0.29) |
| Island | 0.08 | -0.20 | 0.06 | -0.23 |
| | (0.29) | (0.29) | (0.29) | (0.29) |
| Foreign Occupy | 0.42* | 0.72*** | 0.26 | 0.56** |
| | (0.24) | (0.22) | (0.25) | (0.23) |
| Roman Occupy | -0.94*** | -1.14*** | -0.95*** | -1.19*** |
| | (0.38) | (0.37) | (0.38) | (0.38) |
| Roman Removal | -0.74 | -0.77 | -0.61 | -0.67 |
| | (0.66) | (0.63) | (0.65) | (0.63) |
| Plague | 0.67 | 1.10** | 0.65 | 1.08** |
| | (0.53) | (0.54) | (0.53) | (0.54) |
| _cons | -1.72*** | -0.82*** | -1.24*** | -0.31 |
| | (0.26) | (0.27) | (0.34) | (0.33) |
| Fixed effects incl. for: | | | | |
| Region | No | No | No | No |
| Year | No | No | No | No |
| (N) | 620 | 604 | 620 | 604 |

Figure 13: Table 2 :

**3**

Year 2023
)
(
Global Journal of Human Social Science -

| Model | 1(a) | 1(b) | 1(c) | 1(d) |
|---|---|---|---|---|
| Suitable | -2.01*** | -1.75*** | -3.21*** | -3.13*** |
| | (0.55) | (0.52) | (0.83) | (0.79) |
| Popdens | 0.14*** | 0.15*** | 0.04 | 0.04 |
| | (0.02) | (0.02) | (0.05) | (0.05) |
| suitable_pop | — | — | 0.22** | 0.25*** |
| | | | (0.11) | (0.11) |

Figure 14: Table 3 :

**4**

| | | | |
|---|---|---|---|
| Log-Lik Intercept Only: | -423.196 | Log-Lik Full Model: | -301.478 |
| D(605): | 602.956 | LR(6): | 243.436 |
| | | Prob > LR: | 0 |
| McFadden's R2: | 0.288 | McFadden's Adj R2: | 0.252 |
| ML (Cox-Snell) R2: | 0.325 | Cragg-Uhler(Nagelkerke) R2: | 0.436 |
| McKelvey & Zavoina's R2: | 0.501 | Efron's R2: | 0.36 |
| Variance of y*: | 6.594 | Variance of error: | 3.29 |
| Count R2: | 0.789 | Adj Count R2: | 0.506 |
| AIC: | 1.021 | AIC*n: | 632.956 |
| BIC: | -3287.024 | BIC': | -153.42 |
| Hosmer-Lemeshow goodness-of-fit test | | | |
| number of observations = | 620 | | |
| number of covariate patterns = | 602 | | |
| Pearson chi2(587) = | 699.74 | | |
| Prob > chi2 = | 0.0009 | | |

Figure 15: Table 4 :

**5**

| | | | |
|---|---|---|---|
| Log-Lik Intercept Only: | -423.196 | Log-Lik Full Model: | -287.796 |
| D(613): | 619.103 | LR(6): | 270.800 |
| | | Prob > LR: | 0 |
| McFadden's R2: | 0.320 | McFadden's Adj R2: | 0.244 |
| ML (Cox-Snell) R2: | 0.354 | Cragg-Uhler(Nagelkerke) R2: | 0.475 |
| McKelvey & Zavoina's R2: | 0.522 | Efron's R2: | 0.388 |
| Variance of y*: | 6.890 | Variance of error: | 3.290 |
| Count R2: | 0.792 | Adj Count R2: | 0.513 |
| AIC: | 1.032 | AIC*n: | 639.592 |
| BIC: | -3205.083 | BIC': | -77.908 |
| Hosmer-Lemeshow goodness-of-fit test | | | |
| number of observations = | 620 | | |
| number of covariate patterns = | 620 | | |
| Pearson chi2(587) = | 668.39 | | |
| Prob > chi2 = | 0.0127 | | |

Figure 16: Table 5 :

## .1 Statements and Declarations

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