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Strategic Vulnerability: An Analysis of Physical Geography, Environmental, and Material Components of Force Structure

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Strategic Vulnerability: An Analysis of Physical Geography, Environmental, and Material
Components of Force Structure

Kyle Christensen

Dissertation submitted to the College of Arts and Sciences at West Virginia University in partial
fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Political Science

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Abstract

Strategic Vulnerability: An Analysis of Physical Geography, Environmental, and Material Components of Force Structure

Kyle M. Christensen

The selection of a military recruitment method has historically been based on material capabilities and military objectives. Recruitment strategies range from coercively conscripting soldiers to encouraging volunteer enlistments. Historically, states around the globe have used large conscripted armies to wage war when they become fully mobilized for protracted military engagements against another state. However, the occurrence of war is by its very nature a rare occurrence in the international system. This begs the question of what types of military recruitment states are using as a function of choice rather than necessity.

Existing literature on the selection of force structure is far more complex than existing historical models would imply. A range of factors including material capabilities, geopolitical conditions, foreign policy objectives, and institutional characteristics have all been proposed as potential explanations for the adoption of military manpower systems. These factors reflect the wide degree of variation among states in their choice of recruitment strategy. Existing case literature implies that states with similar geographic and socio-economic conditions may cluster around a given recruitment method. However, much of the realist scholarship in international relations implies a strong emphasis on power or security maximization, thus implying a more uniform policy calculus. However, there has been little theoretical or empirical research in political science or geography to date that effectively addresses this crucial policy area.

This study explores the relationship between physical geography, environmental factors, and force structure in order to investigate a small portion of the classical geopolitics literature. In order to investigate the problem of recruitment strategy, this study must develop a metric for comparison. Geographic Information Science (GIS) is used to develop an Index of Strategic Vulnerability for all states in the international system. This measure is composed of geographic and environmental variables including elevation, area, precipitation, and temperature. Data generated in the GIS are used to conduct duration models to examine the effects of geographic and environmental variables on the length of militarized interstate disputes. The results of this analysis indicate that increasingly difficult geographic and environmental conditions produce significantly longer conflicts. These findings provide empirical support for the existing case literature that claims geography and environmental factors matter in the conduct of war.

Next, the geographic and environmental data are used with political and institutional control variables to empirically evaluate the relationship between force structure and the operational conditions. Statistical analysis is used to empirically test the impacts of geographic and environmental variables have on force structure. Results indicate that geographic factor of size increases the probability that a state will use conscription. The only environmental factor to achieve significance was a state's annual level of precipitation which favored the use of volunteer forces. These findings indicate that there is a tremendous amount of variation in terms of geographic and environmental conditions that states face. This also means that the adoption of military manpower policies in the international system is a reflection of these operational conditions.

Dedication

For Samantha and Aubrey.

Acknowledgements

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Chapter 1

Linking Geography and Military Manpower

Introduction

States face a variety of different challenges as they develop defense policy. An important factor is the physical environment that they must defend. Similarly, the role of a state's military also must adapt to the conflict environment as interests move beyond maintaining territorial security. Force structure, geopolitics, and foreign policy are fundamental concepts in international relations, though limited scholarship has addressed the patterns and relationships among these factors. Research related to military manpower policy has also failed to empirically test geopolitical assumptions.

This study seeks to explore the fundamental assumptions presented by the geopolitics literature. Geopolitical arguments frequently make explicit force structure recommendations based on geographic characteristics of states or foreign policy postures. Exploring the assumptions that link geography and the environment to force structure presents a variety of challenges. New tests and procedures must be developed to explore key aspects of these assumptions. Similarly, it is necessary to develop new data sources and utilize new techniques to provide a more encompassing analysis of these assumptions. The process of developing such a test involves several key steps. First, this chapter outlines the appropriate basis for this inquiry in light of the philosophy of social science literature. Fundamental points concerning the use and application of dominant theoretical and methodological arguments are presented. Next, this chapter presents an outline for this project. Here crucial junctures are presented in light of differing perspectives. This chapter serves as a guide for the reader regarding the structure and substance of this dissertation.

Defining the Appropriate Type of Inquiry

The first obstacle that this project must overcome is the ability to reconcile different theoretical and methodological perspectives. Conflicts exist relating to the appropriate theories and techniques to study the key questions of interest. This study approaches key topics in geography and political science. Both fields have unique theoretical debates that are linked to vibrant areas of research. However, the use of an interdisciplinary perspective crosses many discipline specific norms and leaves this research open to critiques from both perspectives.

In order to address theoretical and methodological concerns it is necessary to address the dominant philosophy of social science arguments from both disciplines. The political science aspect of the question links into a series of works about what types of questions are appropriate and what caveats must be made to a particular form of inquiry. Quantitative studies of politics take the viewpoint that the ideal form of analysis reflects the scientific method. This means that the study is empirical and provides reproducible results. Similarly this perspective favors parsimonious explanations to broader forms of understanding or subjectivity found in qualitative methodologies (King et al. 1994; Creswell 2009). It follows the dominant trend presented by Kuhn (1962) in which “normal” science progresses based on established method and theories. The benefit of previously mentioned works is that they provide a consistent, stable foundation to build upon.

However, these perspectives are not without critique. Several scholars in political science have railed against the dominant perspectives for several reasons. First, the presence of broad based comparisons can greatly limit understandings of political phenomena. This goes as far as limiting research due to issues of semantics or understandings (Winch, 1958). Even if the issues of semantics are overlooked, serious problems are present when locating data that are

comparable if they are available at all (Peters 1998). The “traveling problem”, as it is referred to in comparative politics, presents significant challenges to any cross national research program, particularly those looking at complex social processes and institutions such as the military. A second line of critique also has to do with the structures of “normal science” regarding political science. According to Ricci (1984), key problems exist with the current process of research in political science. First, he notes that the dominant scholarship is heavily quantitative. This removes a great deal of understanding as graduate students place more emphasis on methodological rigor rather than substantive understanding as a function of their training. Similarly, he notes that the rise of modern academic institutions forces scholars to publish journal length manuscripts which typically ignore broader social or normative implications of research found in books. Ricci argues that works in political science should have broad relevance to politics and substantive debates of the day.

These positions are essential to develop a plan for research which allows for critique from a variety of disciplines. It is also important to note that there must be a balance between understanding and parsimony in order to develop research that is both relevant and useful to a broader audience. Attempts to produce research that are overly broad, such as Dror’s (1988) text on policymaking under conditions of “adversity”, seek to incorporate too much material and produce few useful contributions. In order to avoid this trap, scholars advocate using methods and theories that are falsifiable while not excluding methodologies because of a particular bias (Popper 1963). This perspective provides for a set of diverse theoretical and methodological approaches to problems. Katzenstein (1996) argues that this approach produces a valuable debate between scholars in the international relations.

Geographers also have complex problems associated with the use of various methods and theories. The debates present in the geography literature are similar to those found in political science. These debates center on classical qualitative and quantitative arguments regarding the role of understanding versus explanation. Geographers have seen the rise of a new technology, namely geographic information systems (henceforth GIS) as a new methodological tool. Similarly, there are proponents that wish to claim the title of science for this new field (Goodchild 1992). The rise of this set of new methodological tools has brought about a great debate about the proper applications and usefulness of these techniques in social science research. This critique is particularly relevant for interdisciplinary research because geographers have yet to settle many of these key debates. This means that GIS practitioners from other fields must be mindful of the implications associated with using geographic data. This has caused some scholars to be critical of the applications making use of these technologies (Taylor 1991; Crampton 1995; Onsrud 1995).

Another key area of concern relates to appropriate applications of geographic data. In particular, use of data to make deterministic statements can cause significant problems for any analysis (Frenkel 1992; Sluyter 2003; Platt 1948; Peet 1985). These concerns are non-trivial as the inappropriate use of geographic data has served as core of some of the most virulent ideologies in modern history. Even a benign use of determinism can result in inappropriate interpretations that deny social context and human agency. These concerns must be expressly addressed in any analysis using geographic data.

Theoretical contributions from sociology and political science provide some help exploring linkages between geographic structures and agency. Work by the Sprouts (1971), Giddens (1984) and Wendt (1995; 1987) provides a theoretical basis for the application of

current models. These perspectives advocate key interactions between ideas and material structures. Until recently, these perspectives provided an interesting basis for case analysis. However, new methodologies allow for empirical tests to help inform these approaches. These theories are a pivotal part of developing the Strategic Vulnerability Framework which serves as the basis for subsequent analyses.

Moving Forward

This project explores the linkages between geographic and environmental factors and the selection of military manpower systems. The process of testing these assumptions is a complex process. The key difficulties are the lack of any empirical research that explores many of these core assumptions. This requires a great deal of new scholarship to adequately address these concerns. Several key steps are in order to test these classical assumptions.

Chapter 2 explores several key issues in the geography and conflict literatures. First, a review of key literature pertaining to determinism and classical geopolitics is presented. This includes specific recommendations for the appropriate use of geographic data. Second, key theoretical perspectives from political science and geography are discussed in light of classical geopolitical thinking. Here the core assumptions of geopolitics and force structure are presented and critiqued. This serves as a central theme in subsequent empirical tests.

Chapter 3 provides some empirical support for the importance of geographic and environmental factors. Classical studies of the impacts explore the “importance” of conflicts across a range of cases (Winters et al. 1998; Collins 1998; Guevara 1961). However, limited empirical research exists to provide support for this assumption. This chapter provides an empirical test of the operational significance of geographic and environmental factors relating to the Strategic Vulnerability Framework. Failure to establish this operational linkage would

undermine any attempt at exploring the linkages between geographic and environmental factors and force structure.

Next, chapter 4 presents a review of the military manpower systems literature. Several factors are explored here including classic linkages between geopolitics and force structure. Domestic political factors are also explored, particularly the role of regime type, citizen rights and responsibilities, and the latent impacts of conscript service. This chapter also seeks to build support for a nuanced approach to the discussion of military manpower. It does so by exploring key literature which reflects the importance of regionalism and varying levels of political development. This chapter also explores the historical experiences of key states to provide illustrative examples of the key considerations for selecting a manpower system. The findings in this chapter serve as a necessary precursor to empirical tests presented in chapter 5.

Chapter 5 develops an empirical test of the classical linkages between military force structure and geographic and environmental conditions. This chapter serves as a basis to test competing claims concerning military force structure. Key findings indicate that the selection of a military manpower system involves a significant interplay between historical context, institutional factors, and the operational environment. These results serve as a useful starting point for a variety of studies into patterns of military manpower.

Finally, chapter 6 provides conclusions and a short outline for future research. This project explores a simple assumption in the classical geopolitics literature in a preliminary fashion. Additional avenues for research are presented in light of the findings from the empirical chapters and reviews of the relevant literatures. Based on the work in this project, this chapter also addresses key shortcomings and potential solutions for unresolved issues from this project.

This project addresses a small linkage in the classical geopolitics literature. This assumption was difficult at best to explore and is frequently assumed away by the dominant theoretical perspectives in political science. This study seeks to move beyond assumptions and establish a clear basis for sustained investigation into the development of military manpower policy in the international system.

Chapter 2

The Impact of Geography on the Study of Conflict

Introduction

The impacts of geographic and environmental factors are seen as essential in applied materials relating to the conduct and planning of war. However, little academic research in political science or geography has explored the linkages between geographic and environmental factors and the defense policies of states. Research in this area parallels the broader progression in the social sciences with early work consisting of theoretical and normative thought. This was followed by the behavioral revolution in the 1950's and 60's in which initial studies of geography and politics began to focus on empirical factors such as distance and contiguity. This outline concludes with research conducted recently, the period dating from the 1990's to present. This period is characterized by the refinement of classical theories and the ability to develop and test new models based upon advancements in modern software and computing ability.

The first section of this chapter focuses on the classical literature in geopolitics. In this section key geographic and environmental factors are directly related to force structure and military planning. Similarly, this research relates military, geographic, and environmental factors to foreign policy objectives. There are several deficiencies in this early research. First, it fails to provide empirical evidence beyond a broad historical narrative. The dominance of this approach has limited the advances in the field and is thus problematic. Second, this scholarship consistently fails to take the role of technology into account. This static conception of politics greatly limits this literature's applicability, though this has not prevented modern theorists from relying heavily upon this work.

The behavioral revolution ushered in a variety of different attempts to quantify factors associated with conflict. Key geographic factors investigated in this period relate to distance, contiguity, and number of neighboring states. Several of the major issues that limit these studies include the lack of available data or suitable analytical tools to effectively test the key theories presented. The inability to test the impacts of a full range of geographic and environmental factors prevented scholars from gaining an empirical test of the cumulative impacts of these factors. These problems are consistently noted during the classical period and continued to be problematic during the behavioral revolution.

Recent has produced a number of empirical and theoretical studies that have attempted to advance scholarship work on the geographic and environmental factors. Perhaps the most exciting area of this research is the sheer number of projects focused on these topics. However, this body of research is hindered by the lack of effective interdisciplinary collaboration. This relates to different norms across academic disciplines and the relative novelty of many software advances in the area of Geographic Information Systems. This section will review existing interdisciplinary research in both geography and political science while providing a clear understanding of major theoretical and methodological concerns.

Finally, this chapter provides a discussion regarding future avenues for research. Particular attention is paid to the implications for military force structure and subsequent research on geographic and environmental factors. The remainder of this chapter will provide a basis for subsequent analytical chapters.

Classical Literature

Classical research on the linkages between geographic and environmental factors and military force structure are undeniable. Sun Tzu's *The Art of War* (1963, 124-136) in which an

extensive outline of the importance of terrain and climate are discussed at length in order to determine what the most effective method for the conduct of war. Sun Tzu viewed geographic and environmental facts as pivotal factors both operationally and strategically. Similarly, Carl Von Clausewitz (2008) provides a clear understanding of terrain as it relates to maneuver and conduct of war. These works are typically focused on the explicit conduct of war. They present varying levels of attention on understanding the broader social or political context of conflict or foreign policy. It is important to note that these works directly relate to security, though broader issues of society and politics are present.

Work by Mackinder (1904) provides a position that favors land power. Mackinder's theory was rooted around the pivot area located in central Eurasia which serves as the central landmass for invading armies across time. Control of this landmass provides a huge geopolitical advantage based on location and presence of resources. These ideas are in stark contradiction to Mahan's work, which was based on the logical assumption that sea power was much more valuable during periods of rapid expansion and discovery. Similarly, the ability to rapidly control and move across large expanses of terrain supported these arguments. This perspective obviously favors the development of powerful land forces.

Mahan (1918) focused heavily on the naval capabilities in order to gain control the sea lanes. This was in direct contrast to the earlier work by Mackinder (1904). This was based largely on the ability of the sea to connect the major landmasses, thus serving as a form of control over supply and communication. Ultimately, the logic of control of the seas was rooted in the colonial expansion of European powers and of the unique geopolitical position of the United States. Control of colonial territories was based upon logistical support via the seas and absence of an effective alternative means of transport. This in turn led to policy

recommendations favoring a modern naval force complemented by an army to control relevant territories. This research also provided little room for advances in technology which would quickly challenge the supremacy of sea power.

Geopolitical thought of this era also has strong political and normative implications. The work of Karl Haushofer with the development of the magazine *Geopolitik* supported the rise of Nazi ideology (Taylor 1985,41-43). Haushofer's work is based on the premise of *lebensraum*, or living space, which served as a key justification for Nazi foreign policy. This viewpoint was similar to the Monroe Doctrine in that all the major powers of the day needed select spheres of influence to expand in. This provided the social scientific justification for a foreign policy of expansion.

The influence of Haushofer's work cannot be overstated. Modern scholarship is geography is particularly sensitive to the normative implications of geopolitical work. The legacy of Haushofer and *lebensraum* also point to the links between geopolitical goals and the military. While no explicit outline is provided for manpower or force structure the underlying foreign policy requires development of a modern military to achieve the broader objectives of the state.

Another set of geopolitical arguments was developed by Nicholas Spykman in his early works (1938a; 1938b). His arguments are centered on key factors associated with geopolitics. The basis for his argument is rooted in the zero-sum nature of resources. The presence of key constraining factors such as climate and topography serve as conditioning factors for state behavior. These factors are premised on Spykman's understanding that the foreign policy of a state is formed based upon a state's existing resources, the ability to capture and convert new

resources, and the conditions present in the international system. The nature of this argument is extended to border regions based on the desire to control access to either rivers or sea coast for purposes of trade and development (Spykman 1938b). The goal of developing access to these features is seen as critical, but weighted against the existing balance of power in the region. Similarly, Spykman also addresses the role of weaker powers and the great constraints they are presented. These articles are based primarily on the experiences of the European powers and their colonial possessions. This would appear to limit the scope and applicability of Spykman's work, however the core elements of foreign policy and regionalism that pervades these articles is undeniably applicable to modern scholars, particularly for developing states with limited ability to project power.

Spykman and Rollins (1939a;1939b) focus on foreign policy behavior of states. They premise their argument on the desire of states to expand, all else being equal. The only limitations on the desire to expand are found in the balance of power and the physical geography (Spykman and Rollins 1939a, 394-395). Key physical features that play a role in frontier policy include natural resources, rivers, and mountains. Similarly, states may produce a buffer state in order to maintain security between two larger powers. Spykman and Rollins (1939b) also note that access to waterways serves as a central part of foreign policy, with conflict or cooperation as the basis for these actions. These articles provide the basis for the study of borders in political science. The lack of a structured thesis or empirical tests limit the relevance of the material in these articles, though the logic present in these articles pervades much of the current literature on these topics.

A clear example of the normative applications of this early research can be found in Sprout's 1941 essay on the frontiers of defense. This article argues that Monroe Doctrine is

ineffective and ultimately unable to perpetuate the security interests of the United States. Sprout argues that the United States' role in international affairs must extend beyond the Western Hemisphere and that it is essential to engage in World War II. This article presents this change in light of changing capacity for war as a function of technology. While this analysis clearly relates to the debates about U.S. involvement in World War II there are clear normative implications in this work. Arguments based upon geopolitics and political agendas are at the heart of the critique of these early literatures. This example of Sprout's work may be one of the most benign examples of such work, but it is nonetheless a heavily biased piece of scholarship [based on a clear foreign policy agenda of the author.](#)

The Behavioral Revolution

The study of geopolitics fell out of favor because of the heavily politicized doctrines that are found in these early works. Geopolitical work also fell into disrepute because it failed to effectively accommodate the role of technology. Similarly, this body of research failed to provide any empirical analysis.. Scholars in the behavioral revolution rose to the challenge of developing new models to explore these classic assumptions while producing new theoretical arguments to augment or supplant existing work.

This section will briefly outline the strengths and weaknesses of the early behavioral work. First, key theoretical assumptions about the role of technology, agency, and environmental determinism are presented. Next, a discussion of the early formal modeling literature is presented as the first attempt to unify theoretical and empirical assumptions. Third, early work in political science regarding contiguity and territoriality is outlined. Finally, the deficiencies of this research are outlined and contrasted against works in classical geopolitics regarding implications for defense and foreign policy.

Early work on environmental politics is most notably associated with Harold and Margaret Sprout. Their work focused on critiques of classical geopolitics based on the static nature of the assumptions present in this material (Sprout and Sprout 1960). This critique extends to the way in which scholars present geographic material in the form of static cartography which provides a sense of permanence. Additionally, they note that key technological revolutions and changes in the structure of the international system challenge the existing geopolitical assumptions. Similarly, Harold Sprout (1963) begins by discussing the importance of an environmental perspective. This runs counter to classical geopolitical theories based upon the probabilistic nature of this perspective. The environmental perspective expressly welcomes the issue of agent-structure interaction in a holistic sense. Directly addressing agent-structure relationships by noting mutual interaction of these structures provides an improvement over existing theories that simply assume or do not address these concerns. Sprout notes that these assumptions technically allow scholars to make deterministic or semi-deterministic arguments associated with climate and physical geography while not abandoning human agency.

The next major contribution from the Sprouts came in *Toward a Politics of Planet Earth* (1971) in which they provide a detailed outline of an ecological perspective. Core elements of this perspective recognize the duality of physical structures and the importance of human agency in historical processes. Other innovations that the Sprouts encourage include the development of empirical indicators for the study of international politics. They also call for a reexamination of the separation of domestic and international politics. Ecological understandings of politics clearly allow for a broader range of potential defense outcomes rooted in physical geography, foreign policy interests, and balance of power concerns. These contributions provide a strong basis for new theories of international politics, despite the fact that many of the proposed ideas

were not actually testable at that time they were proposed. This is largely due to the lack of statistical and geographic tools capable of empirically verifying their claims.

Another related vein of research in the area of geography and politics is rooted in formal theory. These works are largely aspatial in nature because they assume that geography takes a uniform classification across distance or terrain type. Boulding (1962) provides the best example of this research. His definition of the loss of strength gradient is based on the difficulty of states to project power over increasing distances. This has direct application to a state's security by determining if it is conditionally or unconditionally viable based on a utility calculus. A state that is conditionally viable may be a prime target for an incursion, while an unconditionally viable state is secure according to Boulding's utility calculus. According to this formula, states should select defense policies that make them unattractive to potential threats, thus making them unconditionally viable. This provides some measure of support for a strong regionalism that has historically pervaded geopolitical thought.

Another vein of research focused on the importance of proximity as a facilitating factor for conflict. Early work by Richardson (1960) and Midlarsky (1975) both found a strong correlation between the number of borders a state has and the number of wars the state engaged in. Garnham (1976) also found support for the contiguity hypothesis when conducting simply contingency table analysis. Work by Starr and Most (1976; 1978) focused on the nature of borders between states based upon previous studies. These studies focused on the nature and type of contiguity between states in both colonial and non-colonial borders. They find support for earlier work, but note the need for increased specificity regarding the nature of the conflict participants and the type of the border in question. Starr (1978) also notes that borders serve a dual purpose for policy makers by providing interaction opportunities and willingness based

upon operational feasibility and political conditions respectively. Perhaps the most important finding associated with these early works is linked to social implications of borders. Borders serve as key social demarcations and are critical to security policy of states. They also serve an essential role in defining the polity. This effectively recognizes the importance of place and the societal and political implications derived from these concepts.

Work in the 1980's focused on the diffusion of conflict and the development of the interstate rivalry literature. Most and Starr (1980) found that contiguity and spatial diffusion are key factors in several conflict datasets. Research into the causes of interstate rivalry, defined by enduring conflict between pairs of states, also focuses on geographic factors. Diehl (1985) notes that contiguity between states was a facilitating condition for wars and militarized interstate disputes. His findings indicate the presence of contiguity as a key issue in a large number of conflicts. Diehl found that 92% of wars and 25% of militarized interstate disputes involved contiguous states. These findings support previous work regarding geography as a facilitating condition for conflict. The presence of contiguity is often considered a surrogate for territorial disputes. Diehl and Goertz found that territorial disputes produce violent outcomes in nearly 25% of all cases. Additional support is based on the value of the contested territory in terms of population. These studies prove empirical support for earlier designs by development of new datasets and modification to existing theories.

The early work on contiguity and rivalry was paralleled by similar work focusing on regionalism and spatial modeling. John O'Loughlin (1986) provides evidence of spatial autocorrelation in existing models of conflict. He notes that this process must be corrected just as a researcher must account for temporal autocorrelation. O'Loughlin fails to provide a definitive method for accounting for spatial bias, but this work is crucial for future empirical

studies. Another set of articles by Vayrynen (1979;1984) provide a rationale for the study of regional politics. The key contributions of these works focus on the changing nature of the international system as a result of decolonization (1979) and the potential discontinuities that might exist at a regional level (1984). Vayrynen's work provides for a more complex theoretical linkage between units of analysis. He also makes explicit mention of the importance of variation over time in the system.

This empirical research provided a rich theoretical background for future research. The amount of variation in the style and progression of research based upon the shifts in the academic norms served to greatly advance the study of geography and the environment. However, these shifts moved from broader questions of force structure and foreign policy to smaller questions based largely upon statistical tests. Despite this fact, studies have recognized the increasing complexity of key concepts such as territoriality and regionalism, though few have effectively found ways to integrate these concepts within the empirical literature on foreign policy or defense policy.

GIS-Era Research

The modern period of research into the impacts of geography and the environment on conflict began in the 1990's as a result of the increasing availability of geographic information systems (GIS). This has subsequently led to the development of new models and theoretical constructs that are evolving at an ever increasing rate. For purposes of exposition this section will divide the key literature into several sub-sections based upon relevance to theoretical arguments, empirical studies in international relations, and works associated with comparative politics. These streams of research are heavily intertwined, though they are best treated as separate elements for purposes of presentation and analysis.

The theoretical arguments associated with international relations have become increasingly diverse. Paul Diehl's (1991) review of the geography and war literature serves as an excellent starting point for any discussion of modern work. Diehl reflects trends in the study of geography that include theoretical considerations for factors such as distance, size, climate, and natural resources. This relates to the key themes presented in the classical literature outlined in the previous section. However, Diehl's primary contribution arises in his discussion of future work. He is primarily concerned with the development of work on borders, interstate rivalries, and territorial disputes due to the enduring nature of these conflicts. He also notes the theoretical and methodological concerns that provide a vibrant area for future research.

Another important area of theoretical development exists in the challenge to state centric assumptions used in political science research. Ruggie (1993) argues that the hegemony of state centric thinking has biased a great deal of the way in which scholars approach the study of politics. He notes that the development of the modern state is rooted in social and historical processes that have conditioned the way scholars think about authority structures. Ruggie (1993, 148-152) notes that territory is the basis for differentiation in the international system based in the ability to legitimately use force domestically and against enemies in the international system. Ruggie also notes that systems of authority and property are not fundamentally tied to a static conception of space. He notes alternative systems of demarcation based on kinship and migration. The culmination of Ruggie's argument is that the power of territoriality is rooted in broader social process developed in Europe as a means of solidifying political power. This transformation impacted a variety of social institutions ranging from the military, with the rise of the mass army and establishment of political rights, to the academy, in which the notions of state power and legitimacy have become entrenched.

Other scholars have provided similar contributions to the literature. Vayrynen (2003) provides additional support for a more complex understanding of international politics based upon the redefinition of space from a physical or geographic sense to functional regions defined by economic or environmental factors. This allows for a different conception of the international system with more complex linkages between levels of analysis. According to Vayrynen, these shifts are linked to changes in the international system associated with the end of the Cold War and more complex forms of social organization that have emerged due to forces of globalization. Lemke (2003a; 2003b) provides additional support for the arguments of Ruggie and Vayrynen by exploring the universalistic assumptions made by scholars in the international relations literature. Lemke's (2003a) work on the unique nature of African politics is based on the lack of available data and the suspect nature of the data which are available. He then explores the assumption of legitimacy associated with developed states and subsequently critiques the general application to most states in the continent of Africa. Next, Lemke (2003b) notes that state centric assumptions do not reflect the nature of control in post-colonial states. He claims that this assumption, developed out of the experience of European states, does not apply to underdeveloped states. These works collectively show that the assumptions rooted in our understandings of the state are only applicable in a limited number of cases. Additionally, these works also imply that the nature of borders, territory, and state interests are far more complex than classical theories of international politics would indicate.

Rudolph (2005) explores the increasingly complex linkage between the impacts of increased interconnectedness and the territorial aspects of sovereignty. Interestingly, the increased attention to cross border phenomena has led to increased importance for the territorial aspects of the state for purposes of identity formation. In essence, the modern trends that push

for a globalized society have actually restored the importance of territorial demarcation for purposes of collective identity. Similarly, governmental responses to the forces associated with globalization have led to increased pressure on policy makers to adapt to this changing environment in order to ensure competitiveness and security. Sjøberg (2008) provides an excellent critique of the existing theories in international relations by proposing a scalar approach to international politics. Her conception of scalar politics is based on co-constitution of agents and structure similar to that of the ecological theories proposed by the Sprouts (1971). However, Sjøberg claims that existing theories in international politics do not account for this bias because they either impose improper assumptions upon the data, as in the case of liberal or realist theories, or they fail to provide a proper accounting of structure as in the case of constructivism. This argument provides an excellent critique of issues regarding structure and agency, though it fails to effectively provide an empirically verifiable alternative.

Another key area of contention between scholars in political science and geography is oriented around the proper unit of analysis. The most notable early scholarship on this subject in international relations includes the work of J. David Singer (1961) which provides essential discussion of the levels of analysis. The most common levels of analysis include the individual, the group, and the system. Similarly, work by the Sprouts (1971) indicates that many phenomena transition between units of analysis and are mutually constitutive. Subsequent research has favored Singer's strict conception of the unit of analysis, though increasing numbers of scholars are exploring theoretical and methodological techniques that relax or reexamine these strict assumptions.

Recent work in geography has been focused on the distinct argument between space and place. King (1996) notes that most questions are not a function of context, but of proper

theoretical specification. He notes that issues of context are best explored theoretically rather than attempting to shift the unit or substance of analysis away from social science. King is concerned with arguments that seek to shift the dominant role of social science away from a quantitative approach to a more qualitatively oriented focus. O'Loughlin (2000) notes the importance of the space versus place debate. He argues that it is common to use measurements of space in quantitative models. However, O'Loughlin claims that the idea of place should given primacy when dealing with geographic knowledge because of its recognition of social and historical processes not found in empirical analyses. The space versus place debate is similar to the debates in political science between scholars who argue for thick description as opposed to those individuals who favor statistical designs. This raises broader questions regarding epistemology and the appropriate form of social inquiry. This remains a strong point of contention in both disciplines, so it is a logical extension that these issues should be part of an expanding linkage between political science and geography.

Nicol and Minghi (2005) provide another discussion of key issue of borders. They note that borders are becoming increasingly permeable. This also prevents borders from fulfilling a static or linear conception as a permanent boundary. The authors argue that borders still serve a structural function, but that this role is increasingly being complemented by discursive and perceptual elements. Recent work by O'Lear and Diehl (2007) supports this argument, noting that most studies of international conflict are biased because of the reliance on state centric assumptions. They also argue that these assumptions frequently limit the types of variables being studied as well. Buhaug (2007) provides additional support for the arguments provided by O'Lear and Diehl, noting that state centric assumptions are severely constraining. Additionally, he notes a heavy bias toward case study or cross sectional analyses in the current literature and

proposes that generation of new data along with the use of new analytical approaches to overcome these problems. Dalby (2007) notes that political scientists tend to be focused on following available data, but fail to deal with relevant issues associated with the interaction across multiple levels of analysis. His summary raises serious questions about what effective knowledge can be gained from existing empirical studies.

The substance of these articles reflects the continuing conflict between political scientists and geographers concerning the appropriate way to study international politics. Marked differences in the nature and ability to gain effective knowledge about processes in the international system have significantly decreased the scope and nature of the questions being asked in political science and geography. Limited empirical evidence has resulted in the literature taking a distinct turn away from practical applications to foreign policy or military manpower systems. However, theoretical research provides the basis for a dialogue that will continue to inform interdisciplinary collaboration.

The recent empirical literature has progressed in several different directions. First, studies investigating contiguity and diffusion of war have garnered a great deal of attention in the political science literature. Second, continued research into the role of enduring rivalries has been expanded based on continued research on territoriality. Additional research has focused on environmental conflicts. This research has been highly focused on specific geographic attributes such as conflict over shared rivers or natural resources. Collectively, these areas of research have advanced the empirical support for the importance of key geographic features relating to conflict. However, this literature consistently avoids making substantive policy recommendations based upon these findings.

Empirical studies of conflict in international relations have their basis in the work of the behavioral revolution. This is particularly true of major studies of international conflict that are frequently cited as a basis for other empirical literature. Examples of this research include works by Bremer (1992), Bennett and Stam (2000), and Moaz and Russett(1993). These studies tested or reaffirmed existing empirical assumptions relating to international conflicts, with a particular emphasis on using a dichotomous measure of contiguity. Repeated evidence that contiguity remains an important factor requires scholars to include some measure of proximity in models of international conflict.

The role of proximity and diffusion of conflict has consistently served as a question of key importance in the study of conflict. Siverson and Starr (1990) explored these factors using the opportunity and willingness framework. They noted that only two percent of wars diffused of the 94 cases present in the Correlates of War data. Ultimately, they were able to show that proximity alone is an insufficient factor for conflict. This provides support for the theoretical position presented by the opportunity and willingness framework. Substantively, this finding provides support for bringing political factors associated with political will, also known as willingness, back into the discussion.

Vasquez (1995) explores the role of contiguity, interaction, and territoriality as key causes of conflict. Territoriality is presented as a core factor associated with conflicts due to the fact that contiguity and increased interactions are present in a great many cases without conflict. Similarly, the role of territory strikes at the core foundations of the state, namely the sovereign control of territory, population, and resources contained within a defined geographic space. Failure to protect territory undermines the legitimacy of the state and thus provokes some of the most violent and lengthy conflicts in the international system. Walter (2003) finds support for

the importance of territorial disputes in civil wars. She notes that psychological factors surrounding the length of possession by a minority group increased the likelihood that governments would negotiate over secessionist conflicts in both democratic and authoritarian states. These findings show that leaders are willing to negotiate over territory when they feel that a minority group has a legitimate claim. She also found that states are less likely to negotiate as they have increasing military preponderance and if there is increasing ethnic heterogeneity. These results seem logical, namely that states are willing to hold territory if they have the resources, but are more likely to negotiate in the presence of large, homogenous populations with a legitimate claim concerning territory.

Research into the continued importance of territorial conflict has led to a large number of studies on borders. Starr (2002) develops empirical measures for the opportunity and willingness framework. Opportunity is accounted for using an index of interaction comprised of presence of roads, railroads, and the steepness of terrain within a buffer of the border region. Similarly, measures of willingness are taken from presence of key infrastructure such as cities. This addition to the literature provides a much richer conception of territory than existing dichotomous measures of contiguity. However, Starr's measures are cross-sectional in nature, thus having limited application to the extensive time-series designs proposed by most studies of international conflict.

Starr and his colleagues have consistently expanded the use of geographic knowledge in the study of international politics. Starr (2006; 2005) discusses key issues of space and place. Here Starr references geography as a facilitating condition and a source of conflict. These reviews explore the complex linkage between these factors and the associated political phenomena. Starr and Thomas (2005) develop an international borders dataset in order to test

the opportunity and willingness framework. They explore the onset of rivalries across borders and find that rivalries develop in areas where the ease of interaction and the value of the border region converge, in essence where states are maximizing political gains from their behavior. Extreme environmental conditions or highly permeable borders restrict behavior or encourage formation of security communities respectively. Similarly, Senese (2005) explored the interaction between contiguity and territoriality. He found that contiguity promoted the onset of militarized interstate disputes, but decreased the probability of escalation to war. Similarly, he noted that presence of territorial conflicts escalating is also more likely amongst non-contiguous states. These findings support the opportunity and willingness framework by noting that the key factors in conflict escalation are fundamentally tied to political factors rather than to proximity. Collectively, these studies have advanced the empirical study of geography and territoriality in conflict. These studies continue to ignore valuable policy implications that might be derived regarding defense policy.

Research focused on geographic clustering and the appropriate scale of analysis has also been a central issue for empirical studies of international politics. Enterline (1998) examined the role of regime change within established regions. The findings from this analysis confirm the pacific nature of established democratic regions and the danger of new regimes changing from established autocratic structures. Gleditsch and Ward (2000) present arguments for controlling for special effects in data. They argue that failure to account for this bias greatly hinders conventional statistical models that assume independence of events. Use of the Moran's I statistic is recommended to test for spatial autocorrelation. This method, coupled with exploratory spatial data analysis, is recommended to explore spatial characteristics of data prior to conducting an analysis. Buhaug and Gates (2002) critique traditional approaches concerning

civil wars. They note that the use of state centric assumptions greatly limits the study of localized conflicts. Use of new measures such as distance from the capital and the scope of conflict, as defined by proportion the total area affected by conflict, are key contributions developed using geographic information systems.

Research on localized forms of conflict is a growing area of research in the empirical studies of geography and conflict. The major areas of research are focused on environmental conflicts associated with resources and enduring rivalries. Rasler and Thompson (2000) evaluate existing research on enduring rivalries and key theories regarding contiguity. They discover that territorial issues are of key importance, but that a state's desire to change its position in the international hierarchy is also likely to escalate to war. Key findings note that positional issues are of equal importance for the study of rivalry. Next, Rasler and Thompson (2006) expand linkages between territory, contiguity, and strategic rivalry. They are particularly concerned with sequencing of events in conflict, noting that contested territory exists prior to most conflict. They also find additional support for the interaction between contiguity and territorial conflict as a precursor to militarized interstate dispute onset. Tir and Diehl (2002) also explore the interaction between territoriality, contiguity, and conflict escalation. They note that contiguity and territorial disputes are both significant factors in rivalry development. Similarly, they note that the severity of the territorial dimension is a major factor in conflict escalation. Increased attention concerning the interaction between various political dynamics associated with conflict processes continues to be a vibrant area of research.

Additional contributions to this literature relate to methodological advances caused by the sustained study of geography in political science. Braithwaite (2005) developed a geocoded dataset for militarized interstate dispute data. This improvement in the availability of such data

allows scholars to avoid issues of the modifiable areal unit problem associated with using state level data in geographic studies of conflict. In addition, issues of exploratory data analysis are discussed in relation to the appropriate application of geographic data. Exploratory spatial data analysis consists of examining patterns and themes in data to provide a fuller understanding of its characteristics. Additional work by Braithwaite (2006) explores the factors associated with the geographic diffusion of conflict. Key factors related to the geographic diffusion of conflict include longstanding conflicts, territorial issues, forest terrain, and mountainous territory. These studies incorporate a diverse array of data sources, though a key deficiency relates to the static nature of these variables. These articles serve as an excellent example regarding the increasing interdisciplinary nature of geography and the study of international conflict. Like most recent literature on the study of conflict, these studies are largely devoid of a major policy component.

Research on environmental conflict has also received increasing attention in the literature. Studies in this area have focused on key resources such as shared river boundaries (Wollebaek et al. 2000; Farlong et al. 2006), population growth (Tier and Diehl 2001) or various natural resources (Le Billion 2001). These studies also reflect rifts between scholars who favor a broader empirical approach (Gleditsch 2001) and those who argue for case based approaches (Schwartz et al. 2001). Environmental studies have proven to be a particularly fruitful area of research given the diversity of conflicts and actors involved.

Recent work by Phillipe Le Billion (2001) provides an excellent overview into studies of environmental conflict. Le Billion notes that the role of conflict is present in instances of resource scarcity and abundance. Other useful characteristics of resources include lootability and geographic spread of a resource. Lootable crops or point resources can be claimed or carried off easily. Diffuse commodities are spread over large distances and are thus harder to control or

manipulate. These factors are typically associated with different types of political ramifications. For example, a point resource such as oil is likely to produce a narrow social structure based on maintaining and defending these materials while social structures developed around diffuse resources are not likely to be as exclusive. In addition to noting geographic characteristics of resources, Le Billion (2001) presents the impact of the social construction of resources and the importance of the ideational and material structures associated with them.

Similar studies revolve around particular types of resources or population characteristics. Tir and Diehl (2001) explore the implications of population growth on the propensity to engage in militarized interstate disputes. They find support for increased involvement in conflict based on population growth, but not on population density. These findings indicate that large demographic shocks rather than static societal forces tend to encourage conflict. The authors also note that creative capacity of individuals may also alleviate some of these factors and control for this in their models. Research focusing on water boundaries is also likely to produce conflict (Wolleback et al 2000; Furlong et al. 2006). It is important to note that both studies find support for conflict in regions with shared river boundaries, but that many instances of shared river boundaries also produce a great deal of cooperation in the form of treaties. These studies serve as excellent examples of the advances being made in the coding and application of geographic and environmental variables in the study of conflict. However, these studies rarely make policy recommendations as they often deal with conflicts in an aggregate form.

The study of environmental conflict is not without critique. Gleditsch (2001) notes that there are several substantive and methodological concerns that the literature on environmental conflict has failed to address. First, he notes that issues of scarcity and degradation have not been addressed in the literature. Similarly, lack of definitional clarity and problems of variable

omission also plague many models. These critiques are also countered by the fact that environmental conflicts frequently cross units of analysis. Finally, classical critiques of conflict studies are also present including issues of selection bias and development of theoretical models that lack parsimony. These critiques provide a clear methodological challenge, particularly to existing case based research.

Schwartz and his colleagues (2001) respond to Gleditsch's claims that existing case based research on environmental conflict is both biased and provides little knowledge. First, they claim that case based research frequently yields a great deal of information which can later be incorporated into statistical models. Second, key arguments are made in favor of understanding complex phenomena rather than purely pursuing parsimonious theory. Finally, logical similarities between comparative cases studies and statistical approaches are also presented. These articles indicate that issues associated with philosophy of social science will continue to remain vital components of this emerging research paradigm.

The last remaining area of literature in political science that has been directly affected by the developments in geography is work on comparative politics. Specifically, studies relating to policy diffusion and convergence typically have strong regional clusters that are part of a broader set of spatio-temporal processes. These studies provide additional support for a wide range of methodologies that are sensitive to these factors.

Early research by Castles and colleagues (1993) notes the importance of "Families of Nations" based on similar geography, language, and culture. These "families" are used as a basis to explain public policy outcomes based on institutionalization of similar policy preferences. Work by Castles and Obinger (2008) provides additional support for the Families of Nations approach using cluster analysis. They note that new clusters have emerged in Europe beyond the

three original clusters of English speaking, continental, and Nordic groupings present in the 1993 work. The more recent work provides for new clusters based on the divisions between the continental group and inclusion of former communist states. The continued use of this typology is relevant and has a strong geographic component.

Research focusing on clustered convergence is developed by (Goetz 2006) based on the Families of Nations framework provided by Castles (1993). Here key divergence is explained by the accession process in the European Union. The accession process acts as both a spatial and temporal phenomenon. This may seem obvious, but exploration of these dynamics has plagued students of European politics. Caporaso (2000) provides a similar critique of the study of comparative politics based on the use of state centric assumptions and the use of highly abstract concepts to explain political phenomena. Frequently key concepts are operationalized in an overly simplistic fashion while being comprised of highly complex terms. Examples of this pattern include terms such as territoriality and sovereignty which both entail a diverse range of concepts. These concepts are typically studied in dichotomous fashion, thus defeating many of the nuances present in the terms and underlying social processes. Taken together, the works of Goetz and Caporaso provide a clear critique on the way in which comparative political processes are studied. Questions regarding the proper specification of models based on spatial and temporal characteristics have become the hallmark of quality research in comparative politics.

The inclusion of geographic factors in comparative politics and international relations research has made great strides in recent years. Research in these areas has focused largely on empirical questions, though some notable theoretical contributions have been made regarding the appropriate applications of theories and methodologies being adopted from geography. A key failing of this literature is the lack of relevance to an applied policy community, particularly

those in foreign and defense related sectors. Recent scholarship has failed to directly link scholarship to these major policy relevant questions. This effectively limits the scope of the audience and the overall relevance of the research. In sum, these developments should be seen as promising, but ultimately fledgling in nature.

Geography and Political Science

Research in political science has closely followed relevant work in geography. The literature outlined in this section is focused primarily on scholarship from the behavioral revolution to the present with key emphasis being placed on theoretical and technical innovations rather than empirical tests of models of conflict. Key areas of concern are the appropriate applications of geographic theories in the social sciences, particularly with the development of Geographic Information Science (henceforth, GISci). This section will briefly outline key theoretical and methodological concerns.

The previous discussion regarding the comparative politics and international relations literatures implies a significant influence for the role of geography in relation to defense policy in the classical geopolitics literature. In order to appropriately apply work from geography to this topic it is necessary to provide a discussion of key theoretical concerns regarding the use of these techniques. The classical roots of geopolitics provide a problematic history for research that incorporates a geographic perspective. This is because early linkages between the two have been seen as deterministic and have been used to justify oppressive political ideologies across the globe. In addition, modern scholarship in political science tends to focus on simplistic variable operationalizations with little or no discussion of relevant policy areas. This is largely due to a lack of technical sophistication required to generate the data and because quality datasets are not widely available. This section proceeds in two distinct parts. First, a discussion of historical

literature is outlined with special attention being given to the topics of structure and determinism. Next, a discussion of Geographic Information Science (GISci) is presented to highlight key theoretical and empirical problems with the use of these technologies. This discussion is essential to any research using geography in models due to its abuses in the historical literature and potential misrepresentations associated with GIS.

Makinder (1904), Mahan (1918), and Spykman (1938a;1938b) are some of the earliest proponents of geopolitics. Collectively, this early research presents a normative framework for the conduct of foreign affairs and the development of the military. However, these early studies are particularly benign versions of existing geopolitical research. These scholars promoted particular force structures based on their scholarship or relevant foreign policy positions. This scholarship does not compare to geopolitical thought which was later used as part of the justification for expansion and mass murder. For example, more extreme examples of geopolitical arguments were used as a key justification for Nazi ideology in World War II (Walsh 1948; Taylor 1985). This also coincides with the rise of arguments associated with geographic and climatic determinism which were both highly normative and inherently flawed. Determinism in geography claims that individual behavior is predetermined based on a set of geographic and environmental conditions. This effectively limits any role for human agency. Platt (1948) introduces a discussion of the importance of moving beyond the constraints of determinism and clearly stating assumptions in order to provide better models of human behavior. He also notes the inability of deterministic arguments in geography to effectively deal with all possible outcomes or with any time varying phenomena. Manley (1958) provides a similar argument relating to determinism. He comes to these conclusions after analyzing the work of early Victorian geographers, noting that determinism frequently lacks any predictive

power. Additionally, he notes that researchers should carefully examine the case at hand before venturing to make deterministic assumptions.

Lewthwaite (1966) echoes the early critiques of determinism, noting the role of various heuristics and the tendency of these predictions to fail to explain social phenomena and the inability to account for temporal variation. This leads him to the conclusion that the issues of determinism and environmentalism are likely to continue to appear a vibrant part of this literature because of the inherent interaction of humanity with its surrounding environment. Instead, Lewthwaite argues for a critical discourse that challenges the deterministic elements in geography while not entirely eliminating them.

More recent arguments have also brought to the forefront issues of geographic and environmental determinism. Peet (1985, 326-329) notes that the use of environmental determinism is essentially an outgrowth of evolutionary theory in the hard sciences which led to the cooptation and misapplication of concepts in the social sciences. Examples of this can be seen with the rise of theories of race and cultural superiority which have since been refuted. However, Peet argues that this should not prevent scholars from engaging the concept of environmental structure as long as the necessary precautions concerning agency are addressed. In a similar vein, Frenkel (1992) provides case analysis of the expansion into the development of the Canal Zone in Panama and the role that dominant ideas regarding environmental determinism played in legitimating segregation and other discriminatory practices. Finally, Sluyter (2003) elaborates on Jared Diamond's *Guns, Germs, and Steel* (1997) in which elements of determinism are presented as sound social science in a best selling book. These examples clearly show that issues of determinism are present in analyses that employ structural components in theory and modeling. It is important to note that Diamond's research does incorporate several key caveats

for the role of human agency similar to those of the Sprouts (1971). These caveats are essential for any theoretical perspective dealing with structure in order to avoid overly deterministic assumptions.

The rationale behind the use of a geographic perspective also relates directly to the historical literature regarding the conduct and theory of war. Use of geography has been a hallmark of models of conflict dating back to Sun Tzu's *The Art of War* (1963, 124-136) in which an extensive outline of the importance of terrain and climate are discussed. It should also be noted that these structural factors are directly linked to morale and training of the military forces. This provides a holistic view of warfare based on a proper understanding of these concepts.

Additionally, modern case based research on the historical study of warfare and the current methods of teaching military tactics liberally discuss the use of climate and terrain (Winters 1998; Collins 1998; Guevara 1961). Winters discusses the role of geography and the environment in the context of World War II. These environments range from the sweltering conditions of the northern Africa to the jungle environments of the South Pacific. Winters' work notes that even with high levels of technological innovation, the power of environmental factors can greatly constrain military operations. Similarly, Guevara's work is rooted directly in the Cuban revolution (1961). The shift in Guevara's work represents the use of geography and the environment as a basis for political consolidation of revolution. Here the use of difficult terrain to shield the revolutionary movement is seen as a critical component to success. Collins (1998) provides an excellent example of military geography with an emphasis on the use of terrain and environmental factors to maximize military effectiveness. Elements of human geography and politics are recognized as important factors in conducting effective operations. Given the

breadth and scope of the literature citing the importance of geographic and environmental factors, it is surprising that the social sciences fail to devote more effort to this problem. Systematic research into the impacts of geographic and environmental factors needs to be conducted in a rigorous manner to determine what impacts these factors have outside of isolated case studies.

A serious limitation concerning geography is its use by the military on an operational level, but the absence of a clear and consistent application by scholars to broader issues of policy (Fettweis 2006). In essence, the theoretical literature and current operational literatures make strong use of geographic and environmental factors regarding the conflict environment, but few empirical studies to date effectively models these processes effectively. This study seeks to remedy this shortcoming by providing a broad based approach for comparison of these key factors.

This section provides a brief discussion of the key concerns between the areas of political science and geography with regard to the study of international conflict. However, there is a literature surrounding the use of GIS that must also be discussed because of its relevance to this research. Geographic information systems provide a powerful set of tools for analysis, but have raised several substantive and epistemological issues that must be outlined.

First, use of GIS biases arguments because of its highly technical nature. This presents serious problems when discussions concerning a project are encountered by non-users due to the technical complexity of the systems and the inability to disaggregate results. Second, the use of GIS also imposes a worldview based on a cartographic representation. In essence, it is not possible to include case based information or local knowledge in these systems as they stand today. These are crucial elements for any constructivist interpretation of defense policy and thus

require further analysis to accommodate this deficiency. Next, questions of agency and determinism must also be addressed regarding the use of spatial data. Ignoring this key factor may result in a flawed interpretation of the results. Finally, the inability of GIS to effectively deal with spatio-temporal data is also central in its applications in political science. Failure to address this issue requires use of other software packages to loosely couple models, thus limiting some of the functionality of the GIS. These debates within geography regarding the key issues of ethics and proper methods of analysis are essential to any interdisciplinary collaboration.

Early attempts at defining the field of geographic information science were plagued by debates regarding use of GIS as simply a tool or as a valid area of inquiry. Goodchild (1992) provides the first substantive claim supporting the title of a science of geographic information. First, he notes that the process of spatial data is unique because of the ability to display information in multiply dimensions. He notes the strong tendency from within geography to treat a GIS as a new method of cartography, in essence denying the true power to handle a variety of spatial information (Goodchild 1992, 32). He then proceeds to describe the unique attributes of a GIS based on eight key dimensions which include: (1) Data collection and measurement (2) Data capture (3) Spatial statistics (4) Data modeling (5) Data structures, algorithms, and process (6) Display (7) Analytical tools and (8) Ethics. He notes that the underlying science associated with the technology and the new questions being posed as a result of the spatial characteristics deserve the title of geographic information science.

Mark (2003) provides a somewhat updated version of Goodchild's criteria. He notes that many of the original concepts remain at the core, but that new issues are emerging as the discipline expands. Specifically, he notes that questions of ontology and epistemology have remained central as the field expands. Similarly, broader questions of technical sophistication

such as data management, standards, and quality are also key concerns (Mark 2003, 6-10). In sum, Mark provides a contemporary outline of the field and the continuing debates within it.

Early discussions of GIS also brought about serious critiques of the technology. Pickles (1997) presents a resounding critique of GIS and its practitioners' claim to the title of a science. He begins by noting that about a great deal of early work in GIS escaped theoretical and normative debates about the role and application of this newly developed set of tools. This is crucial as the development of GIS occurred after the debates centered on positivism during the mid 20th century, therefore avoiding the stringent critiques associated with the philosophical debates in the social sciences. Additionally, Pickles notes that GIS is a relatively new paradigm in academia and thus draws its members from a very small pool of scholars. He argues that this led practitioners to focus more on applications and technical innovation rather than on theoretical contributions to the field. Pickles concludes by stating that debates about the assumptions of models and the broader applications of GIS must occur amongst the practitioners of GIS, particularly because so much of the community is now being driven from outside of the academy.

Additional arguments have surfaced regarding the ethical use of GIS. Onsrud (1995) notes that no ethical standard for GIS users exists. He claims that this is problematic because of the pervasive use of the technology across different academic disciplines. The broad use of the technology is problematic because of the varied ethical standards found across different professions. He notes that the use of professional associations to develop standards of ethics can be problematic because of the tendency of the association to favor vague rules which are difficult to enforce. This discussion concerning the establishment of a standard of ethical standards is critical for the advancement of the field. Crampton (1995) argues that the development of ethical

standards is essential based on two broad arguments. First, it is important for the field as a part of establishing standards of inquiry for practitioners. Second, broader concerns of GIS in society are important, especially given the normative debates associated with the use of any mode of inquiry. Crampton also provides a key link between the theoretical and the applied uses of GIS as he notes the role of geodemographics in profiling individuals in society and the powerful interests associated with the economic basis for future development and expansion. Finally, he concludes by stating that it is crucial that a sustained debate occur between both developers and academics and the commercial users within the field.

Ethical discussions concerning GIS have also shifted focus from the debates regarding the academy to broader applications. Crampton's (1995) discussion of the use of geodemographics provides an example of these concerns. Key themes regarding the applications of GIS include issues of democratic participation, use of contextual or local knowledge, and issues of security and privacy. The use of GIS biases arguments in favor of a methodological standpoint which does not allow for alternative viewpoints. This makes critiques or open discussions of this technology with non-practitioners difficult. These areas of interest provide substantial debates regarding the application of technologies and implications for those individuals impacted by a GIS.

Taylor (1991) provides yet another critique of the use of GIS based on normative grounds. Taylor is concerned with a concept known as structural knowledge distortion which is essentially the development of information which biases against other competing perspectives. He notes that behavioral violence, known as systematic efforts to exclude competing academic positions, is also common, with groups within the academy seeking to protect a set of academic

agendas. This results in the marginalization of fields that do not use or prescribe to this set of theoretical and methodological viewpoints.

Similarly, Mackay (1982) discusses the economy associated with the generation of and usage of data. He notes that for information to be generated the cost of gathering the information must be less than the risks imposed by uncertainty. This means that groups in society without resources are unable to have the necessary information needed to address problems. This raises key concerns with regard to who should be able to address the deficiencies associated with the lack of resources and technical expertise.

One of the key debates pertaining to the use of GIS is the way in which the technology might be used to bias debates within society. The ability of a trained analyst to develop maps or other forms of analysis can hinder public debate about a topic, particularly for those individuals that do not have access to the technology or the necessary skills to analyze the information at hand. This is particularly relevant to debates concerning GIS because of the market driven nature of the technology and the interests associated with its development.

Development of an introspective critique has been at the core of the GIS community. Sheppard (1993) provides an early critique of the development of GIS, its assumptions, and the interests behind these developments. These assumptions are particularly important because of the substantial impacts associated with the misuse of geographic data. These points are particularly relevant for any interdisciplinary work in which misuse or application may be more likely to occur. Sheppard plays a key role and provides a number of relevant critiques. First, Sheppard moves to dismiss the monolithic image of the GIS by discussing it as a social process rather than a fixed methodology. He also points out the nature of logic within a GIS is Boolean and thus does not match that of human cognition which is largely associative. This has serious

implications for anything which does not fit within the GIS. Furthermore, Sheppard acknowledges the powerful role that GIS has in shaping debates, particularly because of the privileged position it affords its practitioners. These critiques are central to a broader discussion of the normative debates associated with the use of GIS in society, particularly since most academicians recognize GIS not as a tool, but as part of a much larger social process. This means that use of GIS must be used in the context of an understanding of place rather than just as a tool to analyze spatial relations.

Obermeyer (1995) notes the role that this powerful technocracy can have upon the substantive debates in government. Building on early work by Weber, Obermeyer discusses the development of scientific management and the rise of technocratic governance (1995, 77-80). According to this model the use of local knowledge or individual opinion is replaced by the needs of the majority. This produces a biased environment for competing ideas and thus cripples any hope of vibrant debate. Lastly, Obermeyer correctly identifies the work of Giddens and structuration theory which allows for powerful individuals to manipulate situations via the control of key situations using their expertise. In order to counter these threats, she recommends development of meta-data and standards of inquiry which make work tractable for those individuals that would like to challenge the technocracy. These broadly based normative critiques represent a clear understanding of the implications of the use of spatial data.

However, there are serious functional limitations to the use of a GIS in political science. As stated earlier, GIS does imply a limited perspective based almost exclusively on empiricism. This also applies to the types of analysis that are able to be conducted using this tool. A major deficiency of GIS functionality in political science relates to the inability of GIS to handle spatio-temporal data. This functional limitation greatly hinders the ability of GIS to provide

accurate representation of change for a number of reasons. This section of the chapter addresses the limitations regarding time orientation and lists possible solutions with regard to specific data models and object orientation in database structures.

The current consensus among scholars of GIS is that the technology does not handle spatio-temporal data well (Yaun 2008, Peuquet 1998, Langram 1992). This is largely due to the complexity involved in producing a topological model that will monitor change in multiple dimensions effectively. The result is a large scale use of the discrete or snapshot method of data collection in which time slices are produced to represent change over time (Peuquet 1998, 94). The rationale behind developing this system of discrete measurements to emulate change over time is related to the power of the GIS in producing high quality materials in a cross-sectional design. The use of a SNAP or snapshot method is the most commonly available method and is best represented in the use of Environmental Systems Research Incorporated's (Henceforth, ESRI) Tracking Analyst package as the closest model of a widely available tool to visualize temporal information.

Clear drawbacks are associated with the use of discrete methods to model change over time. The first major obstacle to this method of data collection is the growth in size of the data set over time. In order to effectively capture the nuances of the changes in the data numerous time points must be captured. This requires saving the entire project at multiple intervals, thus dramatically increasing storage requirements over the entire project (Peuquet 1998). Additionally, problems arise with the level of temporal aggregation. Collecting large time intervals introduces the risk of missing key shifts in behavior. However, collecting data at small intervals greatly increases storage and processing requirement. Determining the correct level of aggregation is a matter of experience and available resources.

Early researchers recognized the challenges associated with the introduction of time to spatial data. Langram (1992, 28) notes that many of the problems associated with integrating the two topics has led many scholars to loosely couple models to the GIS. The early 1990's did see discussion of future attempts at solutions to issues of time with key discussions of change, the nature of real versus database time, and the idea of incremental change. This early solution was discussed as a base state with incremental changes, thus solving many of the data problems associated with the previous SNAP method (Langram 1992, 40-44).

Langram's early discussion of incremental change is a precursor to the idea of using new methods to capture data in a continuous fashion (Yuan 2008, 171). This viewpoint takes the position of a multi-level ontology with continuous properties in order to capture changes in the objects which are interacting across time and levels of analysis. Similarly, Peuquet (1998, 95-97) discusses the importance of object oriented databases because of the unique abilities of encapsulation and inheritance associated with the object classes. Encapsulation entails storing all the internal components of a unit together and inheritance is related to the ability of object classes to have similar properties. These methods make the reproduction of more sophisticated representations possible within the GIS.

The issue of analysis in multiple dimensions still eludes most of the GIS community. Yuan (2008) outlines the three dominant perspectives, but notes that these efforts have yet to permeate the majority of the software market. The three existing models include the raster specific spatio-temporal data model, the geomorphologic spatial model and the three domain model. The last model is not specific to either topology, but has yet to include spatial queries which seem to be the next major hurdle in spatio-temporal GIS.

The issues facing GIS users are largely a function of limitations in terms of programming. The existing literature clearly shows movement towards development of tools for spatio-temporal models in GIS, though work has progressed at a slower rate than that of the commercially driven applications in the discipline. The key shortfall in the GIS community relates to Mackay's (1982) notion that certain knowledge is generated because of a need to reduce uncertainty, most often for economic reasons. Until there is a vibrant market for time-series GIS applications, there will likely be no software development unless something is produced by the academic users. In light of these facts, it is unlikely that this issue will be easily overcome in the near future.

It is crucial to recognize the broader limitations of GIS in relation to this study. First, a potential limitation of employing GIS is that it implies a map centric view of the world. This means that other methodologies must be used to investigate variation within cases. Similarly, this also biases research away from the benefits of thick description found in case research. Third, the challenge of GIS also produces the vexing problem associated with technocratic knowledge. In essence, the constant goal of keeping the research grounded in language and practice that are approachable and easily interpretable by individuals outside of the academy is the central aim of this project. Finally, use of geographic and environmental variables requires clear specification to guard the notion of agency amongst actors under study. GIS is a powerful tool, which ultimately requires proper specification when being used in any analysis.

The broader debates within geography clearly represent concerns associated with a constructivist interpretation of international politics. Issues of philosophy of science and normative implications of deterministic scholarship have remained central to the ongoing work in geography. These concerns are typically addressed together because they are so difficult to

separate in history of the discipline and particularly with the rise of GIS. Therefore, it is essential that any work in political science incorporating the use of a GIS also accommodate these practices by incorporation of multiple competing perspectives.

Discussion

The literature associated with conflict and defense policy is extensive and delves into several sub-disciplines in political science and geography. This review of the literature serves to outline some of the key historical patterns present in these literatures, noting the presence of important developments and an increasing trend of interdisciplinary collaboration. Additionally, this review should be viewed as a warning regarding the misuse or inappropriate application of geographic data. The most egregious abuses of geographic and environmental theories have served as a basis for some of the most repressive political regimes in history. Therefore, these concluding remarks take great care to suggest methods to effectively integrate geographic and environmental variables into research on defense policy while avoiding key issues of determinism.

Incorporating geographic and environmental factors into the study of defense policy requires a number of fundamental improvements over the existing literature. Considerations must be made to ensure that any model developed provided ample room for agency while noting relevant structural factors (Diamond 1997, Sprout and Sprout 1971). The recent literature has provided some theoretical examples, but most existing studies prefer to focus on narrow outcomes and abandon any discussion of applications to foreign or defense policies.

The obvious question that stems from this review of the classical geopolitics literature is how to effectively incorporate geographic and environmental variables into studies without incurring the overly deterministic problems present in the classical research. Research on

clustering and regionalism in comparative politics and international relations provides some key guidance. Scholars in these fields have been able to effectively examine aggregate trends in light of clusters, Families of Nations, or regional patterns to provide a much more nuanced understanding of policy. Similarly, the developments in the study of conflict provide useful tools for future research. This relates to the redefinition of security from high politics to incorporate domestic concerns, particularly in underdeveloped states. The inclusion of these factors is a response by scholars to the need for models that move beyond simple balance of power explanations. A direct result of this transition is the recognition of the manifest and latent functions of defense policy. Simply, this shift is grounded in a more explicit recognition of the domestic political ramifications of defense policy being included in discussions of defense policy. This effectively links domestic politics to defense and foreign policy, which is a marked shift from classical thinking.

These competing policy concerns are likely to impact states differently based upon material capability and the ability to project power or change status in the international system (Rasler and Thompson 2000; Boulding 1962). Similarly, research presented on regionalism supports a more nuanced approach to the study of policy in general (Lemke 2003a; Vayrenen 2003; Goetz 2006). The use of universal concepts, which is typically applied to studies in comparative politics and international relations, is also increasingly under attack (Caporaso 2000). Based on these findings it would be inappropriate for scholars to approach defense policy from a universalistic perspective.

These findings indicate that it is necessary to bridge the gap between existing quantitative studies and qualitative approaches. Existing research in geography based upon geographic information systems and quantitative international relations focuses heavily upon these

deterministic assumptions. Any research which seeks to make a substantive impact within the dominant academic discourse must therefore approach the topic using the most widely accepted tools to some degree, in essence challenging the dominant theoretical and methodological paradigms using similar empirical tests. Failure to do so would allow for excellent critiques, but limited generalizability or policy applicability.

However, research in comparative politics has shown the utility of various forms of exploratory data analysis and cluster analysis in defining unique groupings of states within the international system (Goetz 2006; Castles 1993). This allows for a more detailed discussion of defense policy in light of similar operational parameters in hopes of providing recommendations based on a variety of factors. Similarly, this may help the development of theories or heuristics that can be used to inform future research. A more encompassing approach to politics also provides relief from the constant critique associated with determinism that is inherently present using geographic and environmental factors in social science research.

The findings in the literature provide for a clear course of action. First, an empirical test of conflict duration is needed based upon classical literature (Boulding 1962; Winters et al. 1998). This relates directly to the costs of projecting power under various environmental conditions. This speaks directly to relevant policy concerns and builds the basis for differentiating states based on empirical measures rather than existing normative classifications. Findings from this research will inform subsequent research on defense policy and open avenues for future research endeavors.

Chapter 3

Modeling Vulnerability

Introduction

This chapter attempts to establish the links between geographic and environmental factors and conflict duration. A brief discussion of the existing theoretical literature serves as the basis for the introduction of the Strategic Vulnerability Framework. An empirical test of the framework follows with a limited set of international conflicts. Results from the initial analysis will serve as a basis for subsequent research into broader implications for defense policy.

Theory

The development of a theoretical framework that incorporates geographic and environmental variables is seemingly the antithesis of a constructivist approach to international politics. Constructivists are often associated with work on ideational concepts rather than empirical analysis regarding conflict. However when careful attention is paid to the work of Giddens (1984) and Wendt (1995; 1987) it is evident that the inclusion of these structural variables in models provides the necessary contextual information missing from the dominant discourse. More specifically, the lack of a theoretical discussion about the context of defense policy formulation inhibits proper specification for any constructivist theory because it ultimately fails to recognize the structures that agents are engaging. Inclusion of this spatial and environmental perspective provides a basis for the discussion of divergent policy outcomes while preserving the role of agency for the actors under study.. This treatment of structure and agency is lacking in most studies of international relations.

The inclusion of a more encompassing perspective that includes the relationship between geographic and environmental factors with human agency can be found in the work of the

Sprouts (1971). The development of an ecological perspective attempts to account for the importance of structure and agency. Additionally, the notions of interrelatedness and interdependence are central to thinking about the relationship between actors and the environment (Sprout and Sprout 1971,26-27). The ecological perspective also worked against the impacts of determinism by expressly holding to the notion of environmental possibilism. This concept argues human agency is central to our understandings, but that key factors of the environment can in fact enable or constrain behavior. Concepts like environmental possibilism are necessary when dealing with geographic data because they avoid the fundamental bias associated with environmental determinism.

The work of Harvey Starr and his colleagues provides another major step in the incorporation of geographic factors into models of international conflict. Starr and Most (1976; 1978) produced an empirical analysis of borders in international politics. This early work posited a calculus that decision makers would incorporate based on opportunity and willingness. This work is based on a rational calculus, despite noting the symbolic role of territory.

Subsequent research based on the issues of contiguity progressed towards a broader study of territorial conflicts. Diehl (1985) and Diehl and Geertz (1988) provide support for the role of contiguity in conflict, but also introduce the importance of territorial conflicts as a central factor in the study of conflict. Vasquez (1995) notes that the key reason for engaging in conflict does not solely rest with issues of contiguity, but with territorial disputes. Subsequent work on enduring rivalries by Tir and Diehl (2002) and Senesse (2005) add support to the role of territory as a key factor in rivalry escalation. The most recent literature notes that most contiguous dyads have no conflicts at all. This leads researchers to explore the territorial dimensions of conflicts

surrounding border regions. Territorial disputes, no matter how trivial, strike at the core of a state's existence and therefore produce protracted conflicts.

Other contemporary work has focused on including geographic information systems (GIS) applications in the study of conflict. Starr (2002) and Starr and Thomas (2005) develop a border data set based on the opportunity and willingness framework. Similarly, advances in the study of civil war and rivalries by Buhaug and Gates (2002) and Gleditsch and Ward (2000) attempt to provide more accurate applications of geographic data in political science. The increasing application of GIS driven modeling in political science is important, but it raises key issues associated with the lack of major theoretical contributions. The use of a geographic perspective also brings about problems associated with determinism.

It is important to note that most of the contemporary literature on conflict has been focused on empirical testing rather than theoretical development. This has been particularly troublesome due to major advances in methodological options available to scholars with little theoretical development. Notable exceptions include Rasler and Thompson (2000) and Rudolph (2005) because of their broader conception of the nature of rivalry and the reassessment of the role of territory in the current international system respectively. The existing literature focusing on geography and the environment is in its infancy and thus requires additional attention from scholars.

States in the international system vary markedly in terms of geographic and environmental features. These characteristics serve as critical components relating to feasible choices of defense policy based upon these constraints, all else being equal. Additionally, structuration theory (Giddens 1984) notes that use of environmental variables also serves as an

enabling factor, particularly if coupled with existing knowledge of material capabilities. This environmental structure will henceforth be known as Strategic Vulnerability.

Strategic Vulnerability is a concept which encompasses the environmental and geographic components of states in the international system. This concept is comprised of a state's absolute distance from the sample mean temperature, absolute distance from sample mean precipitation, standardized area, and standardized mean elevation¹. States that are considered relatively vulnerable using this theoretical framework are small, have a temperate climate with average levels of precipitation, and possess relatively low levels of elevation. These states are considered strategically vulnerable. Examples of strategically vulnerable cases include Ghana and Benin. The most impervious states are those which possess extreme climatic factors, large strategically secure. Examples of strategically secure states would include South Africa, Kenya, and Algeria. These variables provide the structures within which bureaucrats must formulate defense policy with available material capabilities. This is a highly structural approach to the study of defense policy, which implies that there is a great deal of room for agency based upon human innovation and available resources. It is important to note that this should produce a high degree of variation in terms of conflict duration and force composition.

This theory is rooted in constructivism in that it also seeks to provide for divergence in terms of force composition and operational parameters. Traditional theories that deal with international politics fail to account for the interplay between actors and the environment. Similarly, comparative studies of military manpower policy also fail to address operational environments. Strategic Vulnerability provides for an empirical foundation for a sustained discussion in these areas. This implies that states not only use military force for issues of high

¹ Note that future work will employ a structured query language to provide the most precise measures of environmental conditions over a given conflict. This will be accomplished by deriving monthly statistics for measures of vulnerability and calculating the mean value over period of the conflict.

politics, but that militaries also provide a number of latent functions which are deemed useful in society. It also seeks to unify the previously outlined theoretical literature associated with military history, military geography, and revolutions based upon the use of structure to define unique contextual environments. It is important to acknowledge the importance of agency within each case as geographic pronouncements in the past have been deemed overly deterministic and have been used to support ethnocentric ideologies.

In order to minimize the impact of determinism on the analysis, material capabilities are used to provide a surrogate for agency. This provides an empirical proxy for the capacity of states to engage the system. While this does not provide a perfect measure of the sum of human ingenuity in a given state, it certainly provides a decent measure of what governments have at their disposal in order to create policy. Use of this measure does not predetermine behavior, but provides a metric for comparison using widely accepted structural measures. These material factors, coupled with geographic and environmental variables, are used to produce a two dimensional index which forms the logic for comparison and discussion of comparative defense policy.

Research Design

In order to effectively test the assumptions of the theory it is only fair to begin by examining the question of defense policy using the realist framework as a basis for departure. In order to do so, this study will use the state as the primary unit of analysis. In addition, the study will employ large-N statistical models to first determine if the presence or absence of Strategic Vulnerability and its components affect conflict duration in aggregate. This will provide an initial test to determine whether Strategic Vulnerability is worth pursuing, in essence providing an answer to the “so what” question. Additionally, tests of the Strategic Vulnerability with

regard to force composition will follow the duration modeling. This subsequent work will focus on the impacts of force composition, military spending and geographic and environmental conditions. These models attempt to provide a broader understanding of policy formulation given varied sets of constraints and capabilities.

Figure 1

The goal of the existing research design is rooted in the desire to empirically investigate concepts which have previously been linked by anecdotal evidence. While the topics at hand

have been heavily debated in the literature, no systematic comparison or analysis of this scale exists in geography or political science. The goal in incorporating multiple methodologies is rooted in the desire to better understand the phenomena under study (Berg 2004, 5). In addition, this approach seeks to answer a question of substantive importance while generating a whole range of data not previously incorporated in models of conflict. This, coupled with the ability to test a parsimonious theory, marks key elements for optimal research designs (King et al. 1994, 15-30).

The theory of Strategic vulnerability produces a series of testable hypotheses regarding conflict duration. The dependent variable in the model is conflict duration for the dyads, measured in days. These data are taken from the Correlates of War Militarized Interstate Dispute Data Set. Independent variables in the model include contiguity, dyadic capability preponderance, level of democracy in the dyad, the defenders measure of Strategic Vulnerability, and the level of trade in a dyad. Additional variables are also incorporated in the model to control for spatial clustering in the data and for violent conflicts. This model should provide some aggregate measure of the importance of geographic and environmental variables in relation to the existing literature on conflict. The following hypotheses are derived to test conflict duration.

H1: As the preponderance of capabilities increases in a dyad, the duration of conflict will decrease.

H2: As the defender's measure of strategic vulnerability increases, conflict duration will increase.

H3: If states in the dyad are geographically contiguous, conflict duration will increase.

H4: States that are militarily aligned will experience shorter conflicts

H5: As the level of trade in the dyad increases, conflict duration will decrease

H6: As the level of democracy in a dyad increases, conflict duration will decrease.

H7: Presence of military casualties will produce longer conflict durations.

H8: If there is a great power in the conflict, dyadic conflict duration will increase.

These hypotheses are taken from a long and diverse tradition of research on conflict. The first hypothesis is rooted in the conflict literature, which says that as the preponderance of capabilities by one actor in the dyad increases, duration will decrease (Bennett and Stam 1996; Long 2003). This deals with the ability of the dominant actor in the conflict to defeat the enemy. As capability preponderance becomes greater, the ability to make war, project power and achieve military objectives becomes easier. This should thus lead to shorter conflicts. In addition to the inclusion of capability preponderance in a dyad, a dichotomous measure of great power presence is also included. The logic of controlling for a great power is similar to capability preponderance and is included as an additional control for this reason.

The second hypothesis is linked to the classical literature on geography and conflict (Sun Tzu 1963; Clausewitz 1832; Mackinder 1904; Spykman 1938a, 1938b) and the recent applied literature relating to theory and practice of war (Winters et. al. 1998.; Guevara 1961, Collins 1998). These literatures link the importance of rigorous terrain and environmental conditions to the conduct of war. Based on the evidence in these literatures, the more difficult the environmental conditions the defending state possesses, the longer conflict should last.

The third hypothesis is taken from a standing literature which notes that geographically contiguous states are more likely to engage in conflict (Boulding 1962, Vasquez 1995; Sense 2005, Starr 2005, 2002, 1978; Starr and Most 1978; Tir and Diehl 2002). This literature recognizes the complexity associated with power projection and conflict. Similarly, this literature is also sensitive to the fact that contiguity often facilitates conflict, but is not a

sufficient factor to cause conflict (Senese 2005). This analysis includes a dichotomous measure of contiguity to follow existing literature in this field.

In addition to contiguous dyads, the idea of regional clustering of phenomena is also explored using regional dummy variables. The logic for these variables is based on an increasing recognition of regionalism in the international relations and comparative politics literatures (Gleditsch and Ward 2000; Lemke 2003a, 2003b; Gartzke 2007; Vayrynen 2003, 1983, 1979). Controlling for any impacts of spatial clustering improves model specification as well as providing guidance for future work on a regional level.

Hypothesis 4 is taken from the standing literature on conflict processes (Gartzke 2007; Moaz and Russett 1993; Bremer 1992). The logic that underpins this hypothesis is that militarily aligned states should be far less likely to engage in conflict because of shared interestes and established channels of communication. This should lead to lower levels of conflict, with shorter durations between alliance partners.

Similarly, the fifth hypothesis is taken from the literature on conflict processes which states that higher levels of trade increases shared interests between states, thus reducing levels of conflict (Gartzke 2007; Maoz and Russett 1993, Bremer 1992). This does not preclude states with shared trading ties from having conflicts, but it does provide them with a rationale for resolving these conflicts short of war. Therefore, dyads with higher levels of trade that do enter militarized interstate disputes should be more likely to resolve these conflicts more quickly.

Hypothesis 6 is based on the established Democratic Peace literature. This literature states that as the level of democracy within a dyad increases, there is a significant negative impact on conflict (Moaz and Russett 1993). The logical extension of this finding is that

democratic states will have additional mechanisms to resolve conflicts than dyads comprised of mixed regime types.

Hypothesis 7 is based on the logic that states suffering casualties are likely to engage in protracted conflict. The rationale for this hypothesis is based on the relatively low level of casualties suffered in militarized interstate disputes. Indeed, most of these events are non-violent displays or threats of the use of force. States that engage in conflicts resulting in casualties are more likely to continue these conflicts. The logic for this analysis is based on the enduring rivalries literature which states that conflictual dyads get drawn into conflicts which neither side is able to back down from because of significant political cost (Goertz and Diehl 1993).

In order to test these hypotheses, a Cox model is used to determine the impacts of the geographic and environmental variables have any effect in a multivariate analysis. Use of additional statistical techniques to explore force composition and the impacts of geography will follow in subsequent chapters.

Statistical Model Selection

The choice of an appropriate model to examine survival time in international relations has been much debated. A great deal of work has been applied to the refinement of models for events data. This is particularly beneficial as survival of states during conflict reflects an underlying Poisson process, thus making this the most appropriate methodological literature. King (1989) notes that there are three methods of presentation in international relations, including (1) descriptive statistics; (2) methods for examining continuous interval level data, of which linear regression is the most common tool; and (3) Poisson process models,² which are applicable to event data. King notes that the third set of models should be used to examine

² Poisson process models are frequently used to model rates of failure, policy adoption or death over time. These models are usually parametric or semi-parametric in nature and are commonly referred to in the literature as event history models or as survival analysis.

events data by virtue of the discrete time measure of many continuous processes. This measure by its very nature produces a Poisson distribution. Additionally, attempts to use a linear regression model or logged linear model produce poor results plagued by heteroskedasticity, thus making linear regression methods poor choices for model selection (King 1988).

In addition, King and Zeng (2001) report that logistic regression in events data must be viewed with caution because of the frequent ability to underestimate the probability of a rare event in large sample sizes. They note two pressing concerns regarding current events data. First, the lack of detailed explanatory variables in models greatly limits the substantive understanding of the phenomena under study. The use of more detailed measures that provided a better understanding of rare events is one potential solution to producing better inferences. Second, the use of case control sampling techniques in which cases are selected on the dependent variable with random inclusion of non-events to act as controls. This provides a correction for the underprediction of events in standard logistic regression models, using a series of corrections dependent upon the makeup of events and non-events in a model. These methods produce superior results in estimation of rare events, particularly in large samples.

The development of parametric models such as a Poisson regression for use in events data served as the hallmark of the discipline in the 1980's and 90's. However, Box-Steffensmeier and Jones (2004; 1997) provide an improved method of estimation in the Cox proportional hazards model. This model is superior to previous parametric statistics because it does not presuppose a hazard rate on the data. Rather, the data produces a unique hazard rate, which is then applied across the model to produce a semi-parametric form of estimation. Use of Cox models provides more refined estimates than previous parametric models such as Poisson, Weibull, or Log Normal models.

In addition to producing more refined estimates as a function of using a hazard rate derived from the source data, the Cox proportional hazards model also eliminates the bias of the cases that do not actually fail during the period of analysis. This is referred to as right censoring of cases and is used to remove information from the hazard rate, but not from the overall survival function (Box-Steffensmeier and Jones 2004)

There are several concerns regarding the use of a Cox model. First, the issue of how to deal with ties is a fundamental concern. This analysis will employ the Efron method to deal with ties, which requires that the ties are computed to determine the best possible order for all ties rather than treating them sequentially as per the standard Breslow method (Box-Steffensmeier and Jones 2004). It should be noted that this process is much more computationally intensive but does produce refined estimates. Second, the use of a semi-parametric model requires that a test for proportional hazards assumptions be carried out. Violation of the test may imply that unobserved heterogeneity is plaguing the model, thus requiring the use of a frailty model to deal with confounding cases. Lastly, the issue of left censoring, or selection of the starting point for the analysis, is always of key concern. This is generally a function of available data, but should always be considered because of time dependent effects.

Statistical Analysis

The use of a Cox proportional hazards model was selected because of the nature of the phenomena under study. The choice of model selection is based on the premise that if environmental factors play a serious role in defense policy formulation as early formal models imply, then this should be manifest in combat duration, all else being equal. In order to test these

assumptions an analysis of militarized interstate disputes will be used from the period 1992 to 2001. Use of a global sample generates a pool of 513 observations for the study period. This period is selected because of limited data availability regarding political boundaries data and the relative stability of the international system since 1992. Use of a Cox model means that the dependent variable in the model is conflict duration measured in days. The independent variables that are included in the model are taken from classical models of conflict and include dyadic regime score, dyadic capability preponderance, direct contiguity, presence of a violent conflict, the defender's composite Strategic Vulnerability score, presence of a great power and regional dummy variables.

$$H(t) = \exp(\alpha + B1(\text{Regime Type}) + B2(\text{Capabilities}) + B3(\text{Vulnerability Score of Defending State}) + B4(\text{Contiguity}) + B5(\text{Dyadic Trade}) + B6(\text{Alliances}) + B7(\text{Violent Conflict}) + B8(\text{South America}) + B9(\text{North America}) + B10(\text{Europe}) + B11(\text{Africa}) + B12(\text{Asia}) + B13(\text{Great Power}))$$

Political Science Data Sources

Data used for the statistical analysis in this model are taken from the Correlates of War Project's Militarized Interstate Disputes (MID) Data Set (Ghosn et al. 2004). These data provide coverage from 1945 to 2002. The period of interest for this analysis spans the time period 1992 to 2001. This provides a sample of 513 cases for the time period. This pool of cases was reduced to 399 cases after review of the MID narratives were examined to eliminate any naval engagements from the analysis. The distribution of conflicts for the period is presented in Figure 2.

The 1992-2001 time period was used due to lack of other available data on political boundaries. Similarly, the lack of geocoded militarized interstate dispute data also prevents other forms of spatial analysis from being conducted. This makes results preliminary in nature, but future work in this area should expand available analytical tools and data to make longer time

series available. In addition to these limitations, the period is also dominated by conflicts in the Balkans and in the Persian Gulf which may bias this analysis. Future research is needed to determine to what degree these factors limit the external validity of the findings.

Figure 2

Data regarding contiguity, material capabilities, and great power status are also taken from the Correlates of War Data Project (Stinnett et al. 2002; Singer et al. 1978). The capabilities data are a composite of number of military personnel, military expenditures, total population, urban population, energy consumption, and iron and steel consumption. Collectively, these data are classical measures associated with the conduct of war. These data are used in a logged format to reduce the impact of outliers. Data regarding contiguity are included in the statistical model, but are not included in the index because of the desire to independently test its effect against the hypothesized assumptions. Additionally, contiguity in this analysis is coded dichotomously, with 1 indicating contiguity.

Data relating to alliances are also taken from the Correlates of War Project (Gibler and Sarkees 2004.). These data contain the relevant alliance information from 1816 to 2000, and

indicates the presence of alliance membership in the dyad. Additionally, data for regime type are taken from the Polity IV project (Marshall and Jaggers 2000). The Polity project provides a ranking of states regime type from democracy at 10 to autocracy at -10. The Polity project provides the best comparative measure of regime type available to date.

The listed independent variables were selected based on their use in existing studies of conflict (Moaz and Russett 1993; Bennet and Stam 1996 Gartzke 2007). The rationale for including these variables rests on the theoretical importance of many of these factors and the desire to situate this work within the existing literature.

Geographic Data Sources

Several key data sources make up the concept of Strategic Vulnerability. Strategic Vulnerability is defined as the degree to which temperature, precipitation, area, and elevation allow for conflict in a given state. The use of geographic factors as a causal mechanism produces a high degree of determinism as a single predictor of conflict and therefore must be coupled with existing variables relating to material capabilities. This second dimension effectively recognizes the deterministic quandary that arises from the use of geographic variables in the model while acknowledging the role that structures play in real world decision making.

The concept of vulnerability for this study incorporates four key variables. First, two climatic variables are used to assess vulnerability. Mean temperature in degrees Celsius and mean precipitation in millimeters are used to provide a measure of climatic factors. These data are taken from the Climate Research Unit at the University of East Anglia (Mitchell and Jones 2005). The data set consists of .5x.5 degree latitude and longitude raster grids interpolated from station data around the world. Data coverage exists from 1901 to 2002 for the entire world.

Next, data from Environmental Systems Research Incorporated (ESRI 2005) is used to generate measures of area in square kilometers. Additionally, the Political Boundaries polygons from the Digital Chart of the World provide 1:1,000,000 million scale coverage of the entire globe.

Third, a digital elevation model (DEM) from the United States Geological Survey (henceforth, USGS) (1993) will be included in the analysis. This data set has compiled from a variety of sources and is presented in a spatial resolution of 30 arc seconds. Elevation will be presented as a mean measure in meters, which is standardized in order to produce comparable figures.

Geographic and Environmental Variables

The process of developing this model follows the logic of a loosely coupled design (Longley et al 2005, 377). This involves using the GIS software to generate the data, which are indexed and analyzed using a statistical software package. This was done because there are no existing bridges or forms of coupling software to link Stata to ArcGIS.

In order to conduct the analysis, tables for mean precipitation, measured in millimeters, and temperature, measured in degrees Celsius, were developed from the monthly files using Microsoft Access. These values were then used to reclassify raster data. It should be noted that the annual values for temperature and precipitation are standardized and then have the absolute value taken in order to make extreme temperatures functionally equivalent. These converted values are then restandardized and used to reclass the relevant raster data. These data were then used to calculate values using zonal stats³ feature in Arc GIS 9.2. These values were recorded by country using Political Boundaries polygon layer from the Digital Chart of the World (ESRI

³ Zonal Stats is an operation in a GIS in which data for polygons (I.E. states) are extracted from a raster data set. Raster data are cell based and are generally used to represent a continuous surface such as elevation, temperature, or precipitation.

2005) and standardized. Second, the country boundaries polygons were used to calculate a standardized measure of area found in the attributes table.

A digital elevation model is also used to provide a mean measure of elevation. The digital elevation model from the USGS required the rasters to be mosaiced or joined together prior to performing the zonal statistics operations. After calculation these data were exported and joined to the other Access data table. The standardized measures are then added and restandardized to produce a single measure of Strategic Vulnerability.

Several key problems must be addressed concerning the appropriate use of geographic data in this analysis. The data sources being used bring up several key problems regarding validity of the model in which they are used. First, the interpolation⁴ method used in the construction of the climate variables suffers a severe lack of data for developing states. In addition, there are problems with comparison across units with regard to scale⁵. Taken together, this leads to a potential bias in the form of ecological fallacy pertaining to the interpolation and modifiable aerial unit problem with regard to issues of scale (Longley et al. 2005, 148-152).

The literature on the impacts of geographic and environmental factors on conflict expressly relates to issues presented in these models. Winters (1998) discusses the severe impacts various forms of climate can have based on historical military campaigns. Winters examines issues of temperature, precipitation, and terrain on the conduct of war. These factors are viewed as a cumulative process that can produce severe constraints for personnel and equipment. Winters most recent examples come from World War II with examples of Hitler's

⁴ Interpolation in a GIS is conducted by using known data points and developing values for unknown locations based on a computational model that accounts for these unobserved values.

⁵ Issues of scale in geography pose serious problems. Spatial aggregation can obscure underlying patterns, which serves as the basis for the modifiable aerial unit problem. In this case, data would be more accurate for smaller states like Ghana or Costa Rica than for Canada or the United States given the level of aggregation involved in generating mean statistics for temperature and precipitation.

campaign in Russia and the Allied invasions of North Africa and New Guinea as key illustrations of the cumulative effects of the environment on conflict.

Additional theoretical support comes from classical works on the conduct of war. Sun Tzu's *The Art of War* (Griffin 1963), written over two thousand years ago provides additional support. Two of five tenets of war are present in discussion of terrain and weather alongside issues of morale, leadership, and training. Similarly, Clausewitz (1832, 92-93) notes that both terrain and weather serve as core elements in the conduct of war. These classical works support the logic of Strategic Vulnerability while allowing for human agency in the form of command, morale, and training.

Finally, issues of technological advances have been raised in modern discussions of warfare. Current applications of military geography (Collins 1998) clearly note that advances may have made the conduct of warfare much easier. However, examination of the MID data indicates that most conflict occurs between non-great power cases. This accounted for 335 of 399 cases. This fact shows that most states are of relatively modest military capability, thus confirming the important role of geography despite the presence of modern technologies found in a minority of militaries around the world.

It is important to note the importance of scale when using geographic data. The data on climatic conditions suffer from a measurement bias in the form of better measurement in the developed world for the temperature and precipitation. Critiques of this and of regional differences can be found in Lemke's work on Africa (2003a; 2003b) and in Singer's (1961) work on the unit of analysis problem. This fundamental concern relates to the ability to provide a consistent state centric assumption across the international system and the relevant measures that many international relations scholars consider to be a constant. Current debates between

geographers and political scientists about method of analysis are embodied in the notion of “place vs. space” in which some geographers such as John Loughlin (1997) take the position that sociological and cultural factors are of primary concern in understanding the phenomenon under study. King (1997) and Tier and Diehl (2007) note that this position is limited by the fact that many nuanced factors are in fact accounted for by better generalizable measurements and that efforts should be made to incorporate both perspectives into future analyses.

Similarly, it should be noted that the analysis of environmental variables employs a monthly time interval in this investigation. However, the median duration for a militarized interstate dispute in this sample is 31 days, thus providing a good fit for the sample. Similarly, the median size of a state in the sample is 19,000 square kilometers, a space between the size of Connecticut and New Jersey. This degree of aggregation is important to note for previously mentioned factors and is significantly larger than that of the broader data on the international system. Additionally, the cases under study are significantly more arid as well. Finally, the sample also possesses significantly higher elevation values than that of the global population. These characteristics may be useful in the discussion of results. Future research will attempt to expand the sample, but this will require additional work concerning digitizing political boundaries in order to get accurate measurements.

Findings

Initial findings provide support for the existing research stating that geographic and environmental factors influence conflict duration. These findings thus allow this research to proceed to determine how policy makers are engaging the diverse structures in the international system. Subsequent chapters will determine if any linkage exists between these key factors and force composition.

The first model provides mixed support for many of the existing hypotheses. Many of the environmental factors proved to be significant. Variables such as presence of great power and direct contiguity followed expected outcomes. However, several variables in the model presented results that ran counter to predicted outcomes. A fuller discussion of the individual results follows.

Variables related to power preponderance provided mixed outcomes. Great power involvement produces significantly longer durations, accounting for a 42% increase in conflict duration against non-great power dyads. This result was significant and in the hypothesized direction in both models. However, the balance of dyadic capabilities indicates that as power preponderance in the dyad increases there is a slight, but significant decrease in conflict duration. This hypothesis was in the predicted direction and is counter to the expectations found with the great power dummy variable. This result may be an artifact of the given sample or it may point to a more complex interaction in militarized interstate disputes. Similarly, the presence of great powers in dyads is exceedingly rare, implying that these disparate results may represent different dynamics across the range of actors involved in conflict.

The dyadic trade variable reported a significant impact on MID duration. However, the results of the trade variable must be viewed with skepticism despite having significant findings due to the hazard ratio confidence intervals being so close to the reference category,,, indicating no clear effect.. The finding in this case provides no clear conclusion and suggests sufficient room for exploration in future models.

Joint alliance membership is another variable that was improperly signed but failed to achieve significant results. This variable was negatively signed, indicating that these dyads resolved conflicts more slowly than pairs that failed to have common alliance membership. The

fact that this result failed to achieve significance may be a function of the fact that existing diplomatic channels may reduce the occurrence of such conflicts prior to militarized interstate disputes onset, thus resulting in a slight selection bias. Future work is needed to provide more accurate results for this finding.

Direct contiguity between states has no significant effects on conflict duration. In addition, this variable is also in the direction of the hypothesized relationship. The lack of significance with this result is curious because many contentious issues involving resources and territory are linked to contiguous dyads (Tir and Diehl 2002; Senese 2005; Vasquez 1995). This finding may be a function of sample size or it may indicate that most contiguous states prefer to avoid protracted conflict. This result requires further examination in future research.

Interestingly, there were no significant regional effects present in any of the models, as indicated by the regional dummy variables. This is particularly confusing, given the nature of conflict during this period. However, exploration of regional effects is crucial if scholars are to approach the study of conflict in a nuanced fashion.

The level of democracy in a dyad has an initial pacifying effect on conflict duration. Results indicated a significant decrease in conflict duration, with a substantive difference of ten percent decrease in duration length per unit increase in dyadic democracy score. However, inspection of the proportional hazards assumption using global and individual residual tests indicated a violation of the proportional hazards assumption. The solution for this error is the incorporation of a multiplicative interaction term with the log of time to allow the offending covariate to vary over time (Box-Steffensmeier and Zorn 2001). The inclusion of this interaction term shows that as the dyadic democracy score initially decreases conflict duration by ten percent. , However, as conflicts become protracted, democracies are increasingly likely to

remain committed to those conflicts. Results show that after interacting the democracy score with the natural log of time, more democratic dyads remain in disputes, almost 51% longer than mixed dyads.

Violent conflicts in which there are military casualties result in conflicts that are significantly longer, but only result in a 2% increase in duration. This seems logical, as states that engage in militarized interstate disputes resulting in fatalities should be willing to stay the course. This being said, this class of conflicts exist short of the thousand battle death threshold for a war in the international relations literature. This limited nature of this effect could be a consequence of this range of political behavior, in which decision makers are making careful calculations prior to full scale mobilization.

The Strategic Vulnerability score is significant, but not in the hypothesized direction. Substantive effects indicate an 11% decrease in MID duration based upon a one standard deviation increase in vulnerability score. Examination of a disaggregated model found in Table 2 shows that the only significant variable in the index is the absolute measure of temperature. This variable produced a 53% shorter duration per one standard deviation increase. As noted earlier, the nature of the sample may diminish the validity of these results given the lack of precipitation and the high levels of elevation in the sample. However, the second model shows the findings of the first model to be robust. These findings show that severe environmental factors play an important role in the duration of conflicts. This also raises several important questions regarding the impacts that these variables have on dispute initiation and termination.

Table 1			
Composite Strategic Vulnerability Model			
Variable	Hazard Ratio	Standard Error	Z Score
Great Power Involvement**	0.58	0.10	-3.18
Alliances	0.98	0.14	-0.15
Direct Contiguity	0.96	0.11	-0.32
Capabilities**	1.00	0.00	2.17
Dyadic Democracy Score**	1.10	0.03	3.25
Composite Strategic Vulnerability***	1.11	0.03	3.82
Dyadic Trade**	1.00	0.00	-2.13
South America	1.69	1.78	0.50
North America	1.12	1.16	0.11
Europe	1.67	1.69	0.51
Africa	1.28	1.30	0.24
Asia	2.16	2.19	0.76
In time x Dyadic Democracy***	0.49	0.06	-5.48
Violent Conflicts***	0.98	0.01	-2.62
Log likelihood	-1960.38		
Number of observations	399		
LR chi2(14)=68.25			
*=P<.1 **=P<.05 ***=P<.01			

Table 2			
Disaggregated Strategic Vulnerability Model			
Variable	Hazard Ratio	Standard Error	Z Score
Great Power Involvement**	0.57	0.10	-3.18
Alliances	0.94	0.14	-0.39
Direct Contiguity	0.95	0.11	-0.41
Capabilities*	1.00	0.00	1.86
Dyadic Democracy Score**	1.11	0.03	3.27
Dyadic Trade**	1.00	0.00	-2.19
Absolute Temperature**	1.53	0.27	2.45
Absolute Precipitation	1.09	0.15	0.65
standardized Elevation	1.08	0.06	1.29
Standardized Elevation	1.06	0.05	1.08
South America	2.39	2.64	0.79
North America	1.46	1.58	0.35
Europe	1.96	2.07	0.64
Africa	1.68	1.79	0.49
Asia	2.87	3.02	1.00
Ln time x Dyadic Democracy***	0.98	0.01	-2.62
Violent Conflicts***	0.50	0.07	-5.31
Log likelihood	-1958.29		
Number of observations	399		
LR chi2(17)= 72.44			
*=P<.1 **=P<.05 ***=P<.01			

Conclusions

The initial sets of duration models provide several conclusions worthy of future study. First, the analysis points to the power of the environment to limit the duration of conflict based on the increasing distance from mean temperature. This finding seems counter to historical evidence (Winters et al. 1998; Collins 1998) in which conflicts during full scale wars are protracted, given environmental conditions. However, the use of MID data presents an interesting situation in which policy makers are unwilling to risk full scale war. Similarly, the limited time period under study may play a key role in these findings. The majority of MID

cases result in no casualties at all which clearly represents a level of hostility that is far below the full mobilization present in full scale wars. These results do provide empirical support for an expanded study of these factors on conflicts.

Second, the lack of significant findings in the disaggregated model presents questions. The level of spatial aggregation in the models may have diminished the effects present in these cases. Additionally, the characteristics of the sample may have impacted the results as well. The clustering of militarized interstate disputes during the time period of the analysis may have biased the results. Similarly, the presence of higher than average sample temperatures could have limited the impacts of other key variables. Subsequent research needs to include a larger sample of cases in order to bolster or refute the findings in these models.

Third, the models present new avenues for research in other types of conflict once expanded climate datasets are created. Tests with conventional wars, civil wars, and enduring rivals seem to be logical progressions in this research field. Higher quality geo-referenced locations for conflict will also allow for better measurement and results. Additionally, models of war initiation and termination are necessary to test the impacts of environmental factors on the behavior of decision makers as they plan and implement a range of conflictual activities.

Finally, analysis of how states respond to the geographic and environmental conditions is also necessary. This research question serves as the topic for the remainder of this dissertation. The remaining chapters will focus on exploring the linkages between military manpower systems, geographic and environmental factors, and a series of political control variables to determine what factors cause states to adopt particular sets of policies.

Despite the limitations of the present data and time period, this work does provide a number of beneficial conclusions. First, it provides a preliminary test of environmental

indicators which can be expanded across a range of conflicts. This will allow policy makers and strategists to explore the importance of environmental factors in conflict, controlling for other key factors. This makes a key contribution in the literature, given the importance of the existing case study literature and the lack of any empirical results. Second, this work provides the basis for exploring the linkages between environment and military manpower policies. Determining how states prepare their militaries to meet the environmental conditions associated with territorial defense is another key area that has yet to be explored fully in the literature. In addition, this research has numerous policy specific applications in the defense and intelligence circles, thus providing some contribution beyond academia.

The incorporation of geographic and environmental factors into political science models is still a relatively new process. This research seeks to broaden the scope of this research by integrating some of the methodological strengths of both perspectives, while noting the difficulties associated with this process. Results from the analyses provided mixed support for classic assumptions about the use of these factors. Future research will require more data and more nuanced theoretical specification.

Chapter 4

Exploring Military Manpower Policy

Introduction

Empirical tests have shown the importance of geographic and environmental factors on the duration of militarized interstate disputes. This provides a basis for claiming that the operational parameters influence decision makers. The next step in untangling the role of geopolitics in defense policy is to explore what factors impact the formation of state policies. This chapter seeks to untangle these factors using a broad based comparative approach.

The ability to discuss defense politics in a comparative perspective is limited by several severe hurdles. Issues of measurement and data availability provide significant problems for any scholar studying comparative defense policy. International relations scholars frequently advocate the use of material capabilities data driven by population and industrial capability. Scholars of comparative politics advocate per capita spending measures or an analysis of force structure and outcomes which figure heavily in the comparative public policy literature. Similarly, the approach of security studies experts or military personnel might deal with the acquisition of specific weapons systems and their functional integration into a broader force structure. These diverse perspectives have various strengths, though the comparative perspective is best suited to provide an encompassing perspective for a fuller understanding of defense policy.

A comparative perspective was selected for the theoretical underpinnings of this chapter. This decision was made because of the usual emphasis on the great powers and subsequent measures of capability found in the international relations literature. This reliance on hard power leads scholars to undervalue the variation of policies adopted by states in the international

system. Similarly, the use of an in-depth approach to small sets of states fails to provide a sufficient rubric for comparison, thus limiting any studies goal of generalizability. The richness of these case studies effectively prevents any hope of global comparison.

Studies based on applied security studies frequently fail to discuss any broader comparisons at length. This is because of a heavy concentration on individual states or weapons systems in this literature. In order to move beyond this approach, a universal policy area is needed to provide a useful surrogate for the specificity in this literature. The broad nature of military manpower policy makes it well suited for a comparative approach because of its universal application. Similarly, broader historical trends and transitions make this policy area a useful surrogate for many areas rooted in security studies.

The choice of the comparative perspective must be based on solid foundations. First, this subfield approaches the interaction of international and domestic politics more explicitly than does international relations. Similar attempts have been made in the international relations scholarship, but the scope of these endeavors is largely limited to areas of foreign policy analysis (Putnam 1988). Next, comparative politics is better situated to approach the study of domestic political institutions, culture, and diffusion than is international relations (Peters 1998). The study of defense policy has several internal implications, such as distribution of resources, training, and security. External implications exist in terms of security and signaling to other states. A comparative approach acknowledges these facts and seeks to understand this variation rather than producing assumptions that exclude these important elements.

Another benefit of the comparative approach is its explicit recognition of the importance of regionalism. This entails recognition of social processes that exist as a function of historical circumstances unique to each region. This fact is also one of the key critiques of the comparative

method, namely that scholars are so focused on a particular region that they cannot accurately isolate key factors for comparison or generalization to other cases. This critique, like many others, is valid only when the work in question is limited in scope. In other instances, the explicit recognition of regionalism or clustering in the data should be seen as favorable characteristic.

Next, it is important to note the role of specific linkages between the operational environment of militaries and the manpower policies being developed. Most conflict in the post 1945 era consists of intra-state conflict, civil war, or localized regional conflicts. Understanding the operational environments should have a key impact upon the formation of military manpower policy based upon the classical geopolitical assumptions (Mackinder 1904, Mahan 1918, Spykman 1938a; 1938b; 1939a; 1939b). Recent realist scholarship also advocates force structures based on geopolitical circumstances and state foreign policy objectives (Mearsheimer 2001, 83-137). Similarly, we must recognize the importance of classical and applied literatures that provide a direct link to the conduct of war ranging from classical authors such as Sun Tzu's 5th Century *Art of War* to Clauswitz's *On War* (1832) to modern interpretations (Guevara 1961; Winters et al. 1998). The failure to address these concerns posited in the classical geopolitics is largely based upon the power of realist thought and the lack of attention being paid to developing systems. The emphasis on great powers functionally limits the ability of scholars to explore the diversity of the international system. Previous research by Boulding (1962) notes the tyranny of distance, thus assuring that the experience of most states should overwhelmingly be "local" based on regional security concerns. The inability to do so functionally limits the ability of researchers to fully explore the nature of these key questions regarding the optimal force structure for developing states.

Developing an understanding of the importance of geographic and environmental factors based upon the development of military manpower policy and per soldier defense spending is essential. This chapter operates on the premise that a broad empirical approach must be used to speak to the scholarly community associated with international relations and comparative politics by providing a survey of policy adoption based on functional military concerns at the international level, using available data sources. Prior to engaging in this analysis it is important to discuss the fundamental elements of military manpower systems. To do so, this chapter outlines the historical, social, and economic literature associated with military manpower systems. This provides the necessary material for an encompassing discussion regarding effectiveness and security, broadly defined.

Analyzing the nature of military manpower requires an understanding of several key areas. First, a discussion of the various typologies of military manpower systems is presented in light of operational and strategic objectives. Second, an outline of the domestic political ramifications follows. Here debates about equality and the balance between rights and obligations remain central to any discussion of manpower policy. The use of the military as a tool for socialization and social promotion is also presented. These domestic interests serve as a direct contrast to many key arguments about balance of power politics, though the two arguments invariably become intertwined.

Finally, a discussion of military manpower systems in the international context is presented. This is central to understandings about effectiveness and expediency in the conduct of war. This literature is perhaps the least developed in terms of conscription, but does provide useful contributions regarding the behavior of conscript systems compared to other states in the international system.

Comparative Studies of Military Manpower Systems

Research on military manpower systems has shifted markedly over time. Elements of the research paradigm have focused on various institutional factors, foreign policy goals, and state interests as key determinants of force structure. Similarly, a strong bias towards particular force structures has strong roots in the geopolitics literature. This provides for a particularly vexing situation that needs to be clearly discussed in light of general theoretical concerns. In addition, a discussion of the international relations and comparative politics scholarship is essential to a thorough understanding of the divergences within the literatures. This section will briefly explore the typologies of service outlined in the literature and the rationales for selection of a given force structure.

Recent bodies of research into the comparative studies of military manpower systems focus on analyzing the policies of states based upon a series of heuristics for various force structures. Typically, systems of recruitment are discussed using heuristics for several reasons. First, the lack of systematic research on this topic makes applications limited, if present. Second, the use of heuristics greatly simplifies the range of applications. Third, most studies of military manpower systems focus on a relatively narrow range of European cases, making application of a heuristic device appropriate (Haltiner 1998; Imbens and Van der Klaauw 1995; Jehn and Selden 2002; Cohen 1985; Mjøset and Van Holde 2002; Kier 1995). Research into the presence of conscription found that colonial origin had a strong and significant effect, thus supporting the application of heuristics based on the ideas of shared “Families of Nations” (Castles 1993; Castles and Obinger 2008; Goetz 2006; Mulligan and Shliefer 2005).

Cohen (1985) discusses the history of U.S. military manpower systems using comparative references. He notes that the classical arguments associated with military manpower are based in geopolitics, ideology, and war (1985, 25-38). Cohen notes that geopolitics is perhaps the most important guiding factor in terms of force structure, particularly for small states. However, he is careful to outline the differences in the international system and the strong focus on great powers who are able to project power beyond a particular region. Next, the discussion of ideology plays a key role in legitimating service in society. Central ideological elements in liberal democracies relate to the equal burden of defense associated with a conscripted service. This is countered by the necessity of states to maintain a strong economic base. This biases the selection process in a conscript system because of exemptions for individuals with special skills or political resources. Debates about the proper role of ideology and service are still at the heart of debates in Europe and in the United States. Finally, issues of war are extremely important to consider. Cohen notes that small wars and large wars differ greatly in terms of manpower needs and mobilization strategies. Undergirding the entire argument of Cohen's book is the subtle nature of politics, particularly in increasingly volatile electorates.

The typology of force structures developed by Cohen consists of a militia based system, an extensible or modular system, a cadre/conscript system, or an all volunteer force (1985, 60-120). Cohen notes that all systems of service eventually incorporate some type of conscription during total war simply because of the raw manpower requirements. However, the use of conscription invariably requires a selective nature because of the need to maintain a productive base of operations during the war. Similarly, Cohen notes that the use of a large standing army during periods where small wars or conflicts leads to an inefficient application of manpower,

particularly as cohort size increases. Therefore, he notes that the use of all volunteer forces or mixed cadre/conscript systems are preferable. Use of militia or extensible systems are seen as highly useful forms of mobilization, though both are subject to dangers of being overwhelmed by powerful offensive strikes preceding full mobilization. Cohen's argument is valid in that there is no perfect force structure to meet every need. Indeed, his discussion of the U.S. transformation to the all volunteer force was premised on the goal of remaining technologically superior while avoiding the high political costs associated with maintaining an increasingly unequal system of conscription (Cohen 1985, 166-182).

A counter position to military effectiveness and mobilization is the use of the military in development. McWilliams (1967, 29-34) provides an excellent typology of the military in developing states. He notes that some militaries are defined as not playing a role in the development of the state and are thus non-institutional. Opposite these state are the vanguard armies that have largely arise out of revolutionary movements to protect the states. Finally, the institutional militaries are a happy medium, with stable recruitment and training policies that provide the optimal role in aiding development practices. This typology is based around the premise that militaries are functional components of integration within society and that they play vital role in the process of economic development. The perspectives represented here provide much higher premium on the social and cultural aspects of military service.

Finally, a set of heuristics focus on institutional and historical experiences. Mjøset and Van Holde (2002, 4-10) note that military service exists in a wide array of service formats from domestic forces recruited via conscription or volunteer systems. They also notes the importance of foreign volunteers. Mjøset and Van Holde also distinguish the type of mobilization in a similar sense as Cohen (1985) does, noting the ad hoc versus permanent arrangements in

recruitment policies. Moller (2005) develops a five part mixed typology based on ad hoc mobilization, private forces, militia, and conscript systems. This covers the range of potential recruitment strategies states could use, though the most commonly used systems are variants of conscription, volunteer forces or a cadre conscript hybrid.

Applications of these existing typologies serve a clear illustrative purpose. However, these applications are functionally limited by the inability to provide any discussion of process of policy adoption. Key issues associated with both international and domestic politics are either excluded or presented as contextual history without serious effort to explain convergence or divergence in public policy.

Social Implications of Comparative Military Manpower Systems

Militaries serve as separate social systems for their members. They provide for the daily routines of soldiers and establish behavioral norms via a systematic training and drill. These social systems are maintained under the strict social hierarchy, with similar characteristics of total institutions that control every facet of an individual's life (Goffman 1961). Debates about the appropriate form of mobilization are invariably linked to the societal implications of military institutions. Directly related to these debates are normative questions of individual liberty, societal obligation, and appropriate means of defense.

Early research into the military has focused on the historical and classical institutional elements of military manpower systems. Researchers in this period were heavily influenced by military sociology, history, and philosophical arguments. Key questions relating to the early work regard the military as a laboratory for social science research as in the *The American Soldier* (Stouffer et al. 1949) which explored virtually every aspect of service during World War II. This study did a great deal to dismiss sweeping allegations about the behavioral influences of

service. Additionally, it provided the basis for a wide range of future research into the habits of soldiers in various institutional settings. This massive research project paved the way for a series of behavioral studies on the lingering impacts of military service.

Other early works on a variety of topics describe the military as an encompassing social system. Huntington (1957) argued that the officers serve within a completely encompassing profession that is effectively subordinated to civilian authority. Huntington's argument treats the culture present among officers as static and almost patriotically linked to the broader populace. His argument yielded some benefits regarding the study of organizational culture in the military, but many of his early propositions have been rejected in favor of more encompassing analyses associated with bureaucratic structure and institutional characteristics.

Janowitz (1960) argues that the military serves as a social system with development of norms and skills. His argument transcends Huntington's thesis that the military is purely about the mastery of lethal force and loyalty to the broader public. Interestingly, Janowitz's approach devotes a great deal of importance to managerial and technocratic aspects of service, thus leading to the critique that he abandons too much of Huntington's notion of organizational culture and professionalism. The arguments presented by Huntington and by Janowitz serve as illustrative models which consistently remain active questions for current research.

Another debated area of service relates to the historical applications of recruitment strategy. Paret (1970) discusses the rise of conscription as the preferred form of military recruitment in 18th and 19th century Europe. Paret argues that elites in France and Prussia began offering political rights associated with citizenship in order to insulate themselves from obligations to military service. This method of recruitment allowed them to recruit and retain massive standing armies for extended periods rather than retaining mercenary armies. This also

matches historical changes in technology which made fielding larger armies more practical. The political basis for the applications of conscription was the fundamental formation of the state which was cemented in the extension of political rights to the lower classes as a means of retaining as much political power as possible. Paret's work provides a key discussion about the egalitarian rhetoric surrounding the application of conscript service. However, Paret notes that the ability of the elite to escape service undermines this egalitarian position. This article also highlights the importance of military effectiveness coupled with political expediency.

Charles Moskos (1976) discusses the applications of the study of the military since World War II. A fundamental part of his analysis is the development of a typology of military organization within the literature (1976, 55). Moskos outlines a five part heuristic based on the power elite soldier, the professional soldier, the common soldier, the citizen soldier, and the third-world soldier. This typology is useful in discussing the present study of the militaries around the world as various topics within the field have remained fairly constant with only minor additions. The present application of the heuristic may in fact merge the first two categories as Moskos was focused on elite soldiers as a part of the political establishment and professionalism of military social systems. The study of the common soldier and the impacts of soldiering takes place sporadically, but few great research projects such as *The American Soldier* have taken place. The fourth category in the heuristic has perhaps garnered the most attention in political science. Here scholars continue to focus on impacts of military socialization and subsequent social, economic, and political behaviors. Work in the final topical area regarding the third world soldier fostered work on development and the military, child soldiers, and a quickly expanding literature on private military contractors. This area is perhaps the least rigorously

studied simply because of the lack of quality available data and the hegemony of the developed world in the study of defense related topics.

Another popular area of discussion relates to the use of military manpower systems as a key determinant for citizenship rights. Bark (1995) discusses the use of military service among African Americans, women, and conscientious objectors in American history as a key role in legitimating status within society. The service of African Americans and women is seen as a core element in equal rights debates. Similarly, the use of alternative service, which may also include service in battle as medical staff, by conscientious objectors is also presented as an alternate form of the blood tax paid for inclusion within the broader society.

Janowitz (1980) provides a detailed discussion of the debate between rights and obligations of citizenship. He notes that citizenship is first a moral judgment based upon socially acceptable behaviors. Second, citizenship is descriptive and carries with it a set of rights and obligations. Janowitz also discusses the balance between modern citizenship and the four primary obligations such as paying taxes, education, military service and increasing social welfare of the community. Lastly, Janowitz argues that many of the current debates have shifted debates toward rights without relevant discussions of obligations of citizens.

The definitions of citizenship are excellent basis for a discussion of military manpower systems. Tilly (1997) claims that citizenship is a term that is defined by governmental agents acting as such or as whole categories of persons identified uniquely by their connection with the government in question. These distinctions note that these are mutually enforceable claims by both parties. Tilly notes that the contractual definition of citizenship is based on contracts between aggregates. It also involves degrees and differentiated membership along with engaging a government's coercive power to enforce.

These arguments show how formative a role military service serves in defining citizenship in society. This is particularly important for marginalized groups in society. A core component of this argument also includes the broader issues associated with the egalitarian nature of service.

A key critique of military manpower system happens to be the method by which soldiers are selected. Most theoretical arguments associated with military service tend to be biased towards collective forms of defense while more modern interpretations of dominant liberal theories favor individual freedoms over obligations. Bunting (n.d.) critiques the modern conflicts in both Iraq and Afghanistan because of the lack of the American elite in the service of the country. He contrasts this with the role of service in both World Wars and Vietnam in which it was a common societal duty in which many elite families voluntarily sent their sons to war. Bunting is unsure of the substantive impacts of this policy, but takes a strong normative position regarding the lack of this segments willingness to serve in the armed forces.

Similarly, Clausen (2003) notes the shift in norms from Vietnam to present. He claims that draft service was present in Vietnam era and serious debate and evasion did occur. Clausen notes that the controversy over the use of the draft was rooted in issues of equality. Clausen notes the role of service as an integral part of the Vietnam generation and argues that a similar form of national service would be beneficial in place of mandatory military service.

Flynn (1998) provides a historical discussion of issues of equity in France, Great Britain, and the United States. He notes that every system employed generous forms of exemption, though the British and French systems were highly centralized while the U.S. system was decentralized. He notes that the logic of military service was initially based on the fundamental principle of a shared defense obligation, but that all of these systems invariably adopted special

deferments for individuals seeking higher education or who worked in critical industry sectors.

Flynn notes that the use of deferments seriously undermined the rationale for service, though the major cause for a shift away from conscript systems in these states was poorly perceived military performance of conscripts.

Flynn's argument is important because the framing of a shared military service obligation also bears considerable political costs. The political costs of conscription limit the viability of this model of service and may lead policy makers to shift to politically expedient forms of recruitment. Indeed, France's move to the all volunteer force was based on the desire to send troops to Iraq in 1991 without having a vote to the National Assembly, thus noting that key domestic political concerns are essential in liberal democracies.

Support for conscription also seems to be heavily dependent upon the nature of the mobilization. Christopher and Lovrich (2009) noted that support for mandatory military service became more ambiguous in the context of the War on Terrorism. Using representative phone samples in the United States, the authors find that support moved away from the "agree" categories and into the "uncertain" response category regarding the use of conscription to fight a protracted conflict against a poorly defined enemy. The authors note that support for mandatory military service may be directly linked to the presence of a definable enemy, noting that support for the draft even in Vietnam remained fairly strong until late in the war. These findings serve the important purpose of raising the issue of political expediency in the recruitment and planning for war. Lack of public consent associated with an uneasy public serves as a major impediment to achieving state objectives.

Karsten (2001) discusses the role of the citizen soldier in the United States. He notes that there has always been considerable resistance to any form of conscription, thus allowing for

political debate. This dispels the myth that Vietnam was the only case in which considerable opposition to the draft occurred. Second, he notes that shift to an all volunteer force has led to a very narrow system of promotion for senior officers as a function of the decrease in military size. This invariably causes younger officers to exit the service as they see little room for advancement. In addition, the “cover your ass culture” defined by Karsten also consists of individuals falsifying unit readiness in order to maintain a satisfactory personnel file for promotion. These points directly undermine the purpose of the all volunteer force, namely to have a better trained and recruited officer force.

Fundamental to the understandings of military manpower are the theoretical underpinnings which support social activities. Carter (1998) notes that liberal political theory faces several key quandaries when it is confronted with conscript systems. First, liberalism at its core is individualistic in nature, which invariably produces less emphasis on communitarian issues such as collective defense. Second, Marxist interpretations of liberal theory view conscription as a form of blood tax which exempts the middle and upper classes. Finally, liberal theories tend to be optimistic about peace, which tends to directly diminish support for large standing armies. Carter also notes that the trend within liberalism has changed significantly, with classical theorists such as Locke and J.S. Mill preferring conscript systems while more modern theorists have favored volunteer militaries as a result of the increasing focus on individual rights.

Moskos (2005) adds an additional critique of the current all volunteer system in the United States. His area of interest focuses largely on the increasing dependence on the army reserve and national guard units. These units are typically less well trained and equipped and are typically given missions as support units. In addition, many of these units do not have well established support systems, particularly for soldiers serving on individual ready reserve far from

a military installation. The increased operational tempo of current conflicts in Iraq and Afghanistan are likely to continue this dependence on the reserves. Moskos proposes developing a force for peacekeeping activities comprised of college graduates serving in roles such as military police to aid in the development of security. He argues that such a program would provide well educated enlisted personnel while making up for existing recruiting shortfalls. He also notes that this could be accomplished without placing undue constraints on the military.

Work by Moskos (2001) outlines some major deficiencies in the current all volunteer army of the United States. First, he claims that there are recurrent issues of a civil-military gap. That is, most citizens in the United States are far removed from any form of military service. Second, Moskos cites serious issues of recruitment and retention. Use of major signing and reenlistment bonuses are seen as an incentive to maintain specialist positions in the military. Moskos highlight the bifurcation of the military with an emphasis on the increasing pressures of an occupational military rather than that of an institutional one. Additionally, he notes shifting institutional roles, in response to the majority of conflicts in the world being oriented toward civil unrest rather than conventional war.

Another critique of the current system of service is presented by Burk (2001). He outlines issues of rights and freedoms associated with service and the consistent protection of the U.S. judiciary for the right of the government to conscript. Burk also notes the role of the military as a tool for social promotion. He notes that this occurs not just in terms of economic benefits and an egalitarian system of promotion, but also with broader societal recognition of service.

Military manpower policies have a variety of normative positions attached to them, based on historical framing within society. Egalitarian norms frequently give way to systems that

exempt the socially privileged. Similarly, groups that are marginalized may look to service as a means of establishing stronger roots within society. This body of literature outlines many competing claims that any policy maker would have to address when developing manpower policy.

Economic Arguments

One of the strongest arguments against the use of conscription has been presented by economists. The power of these arguments is rooted in several key tenets. First, government run programs that draft large cohorts of soldiers are in effect taxing the individuals being conscripted. Second, the use of large cohorts for service greatly diminishes other economic activity they might otherwise engage in. Third, use of a modern military produces increased military effectiveness, allowing for recruitment and retention of better soldiers while avoiding many negative implications for the majority of a given age cohort. These arguments were central in the U.S. shift to the all-volunteer force and remain salient in the debates in many countries. However, the use of economic arguments also consistently makes assumptions that have far reaching impacts in societies.

Lee and Wiesbrod (1967) provide an excellent discussion of the two key economic impacts of conscription. First, they note that conscription has distributive impacts in society. In political science, this tax would be considered redistributive in nature and thus produces some of the most contentious politics associated with implementation. Second, the use of military manpower systems has significant allocative effects regarding available labor. In essence, soldiers that are conscripted tend to be paid lower rates than their counterparts in the private sector, thus creating incentive effects for individuals to seek means of evading service. These

authors also note that the pure economic principles they reference avoid other social or normative concerns associated with debates about military recruitment policy.

Mulligan and Shleifer (2005) explore the key determinants of military manpower systems using a variety of pooled statistical designs. They note that common law legal origins have a significant impact negative impact on conscription. This has to do with stronger protections for individual rights in these systems. Continental systems with a history of state administration are associated with reduced costs of implementation and therefore policy adoption. The authors find that the level of democracy has no impact on the number of years states employ conscription. The initial finding is an informative one, as many of the major arguments in political science have associated democracy with a move away from conscription (Levi 1997).

Critiques of economic perspectives within the field of economics are difficult to find. However, Thomas Borcherding (1971) notes that many of the economic models developed for the selection of manpower policy are rather limiting. First, the idea that all volunteer forces function under market prices is limited by difficulties in determining reserve prices of labor. Similarly, the limitation of equal pay for equal work also produces a significant critique of market based pay solutions. Borcherding notes that it is impossible to condemn the draft without knowing the actual demand functions, thus making comparisons between models difficult.

Many economic arguments are rooted in the experience of advanced industrial states. Weede (1986) explores the impact of military participation ratios on development. He notes that higher levels of military participation may have desirable consequences such as diffusing income throughout society, providing basic skills for workers, and reducing rent seeking activities in society. All of these activities are likely to support economic development and political stability. A key limitation of this study is that it only employed data for the 1970's for 31 developing

states. The discussion in this article provides support for a move away from a universal model of service to a more nuanced approach that is contextually appropriate.

Additional support for economic implications of recruitment systems comes from the works for Graeff and Mehlkop (2006) and Kick, Davis, and Kentor (2006). These scholars found that higher military participation ratios lowered income inequality. Graeff and Mehlkop (2006, 267) use a sample of 50 countries in a cross sectional model with median data used for the period 1990-1994. Interestingly, they note that the presence of secondary education produced similar findings as increased military participation ratios. Kick and his colleagues use a broader sample of sixty six countries from 1970 to 1990 to explore the impacts of military participation ratio on Gini Index. Their findings support the notion that increased military participation lowers inequality. These studies provide additional support of the use of military as a tool for stabilizing society economically as well as militarily.

Some economists have explored the intergenerational implications of conscription. Poutvaara and Wagener (2005) note that conscription and national service are essentially forms of forced labor. These scholars also note that the draft does have ties to systems of national service. However, they note that the conscription is a redistributive tax that involves an older generation effectively manipulating a younger generation. These scholars argue that an all volunteer force is the most equitable and efficient form of recruitment based on these intergenerational dynamics.

Work in the Netherlands explores the impacts of conscript service on future earnings. Imbens and Klaauw (1995) use data from the Dutch military and Central Bureau of Statistics to develop estimates of lifetime earnings for conscript and non-conscript citizens. They find that citizens on average lose about five percent of earning capacity, or roughly one year's worth of

income, based on conscript service. These findings, coupled with increasingly small cohorts, played a major role in undermining support for conscription based on grounds of equality.

Henderson (2005) discusses the role that economists played in ending the draft. He claims the level and quality of the research in the debates surrounding the U.S. move to the all volunteer force was partially brought about by major studies in the field of economics. He claims that these studies were of high quality and were without political motivation, despite being conducted during the politically tumultuous Vietnam War.

The use of an economic rationale provides powerful evidence in favor of the most effective allocation of resources within society. These models clearly favor all-volunteer forces, though some serious critiques arise based on the lack of equality and failures to effectively model incentives needed for troops in the time of war. However, it is important to note that these arguments are some of the dominant factors influencing policy makers, particularly those in the United States.

Organizational Arguments

Debates about the structure and use of the military are often issues in the development of policy. Arguments in this area focus on the development of a strategic culture defined here as the organizational norms held by the members of the defense and security apparatuses of a state given the constraints of geopolitics, domestic politics, and available resources. This perspective provides for a great deal of divergence across the international system and encounters the problem of generalizability. Instead, studies of strategic culture typically focus on a particular country or region to provide an in depth analysis of the nuances of a particular actor or actors in the international system.

Strategic culture arose out of serious questions about the dominant theories in international relations. These primarily related to the inability of structural or interest based studies to provide further understanding of divergent cases. Lantis (2006) notes that the development of strategic culture is based in constructivism which takes its theoretical foundations from pivotal works in sociology. This perspective uses key factors such as geography, climate, natural resources, technology, beliefs, historical experience and defining cultural items such as a foundational texts, myths or symbols (Lantis 2006,15-17; Howlett 2005).

Major critiques of strategic culture have also been leveled against this perspective. First, a key question about what key factors are most important in the development and transmission of strategic culture is important (Lantis 2006). Similarly, definitional issues pertaining to what constitutes culture are difficult to distinguish and even more challenging to measure empirically. Finally, issues of what constitutes change in a strategic culture are also central elements that haunt this perspective (Lantis 2006; Howlett 2005).

The case of France between world wars is an excellent example of how strategic culture can enable or cripple a force. Keir (1995) notes that the domestic politics of the center-left coalition limited conscription to only two years, thus causing generals to develop tactics that heavily favored defense. The historical record shows that these generals could have developed new techniques in armored warfare as the Germans did, but failed to do so because of a belief that the limitations imposed on them would not allow the development of these tactics. She also notes that the air forces selected a different path, leading to point that the culture in the French army's leadership held ingrained beliefs that greatly limited their ability to make war. Arguments concerning strategic culture provide additional support for path dependent or clustering among states with similar political institutions and geographic conditions. However,

the use of this framework also provides an excellent tool to explore the nuances of policy adoption. This framework also informs much of this research, but is currently unable to provide a broad based empirical approach.

Current Country Discussions

The current discussions revolving around the use of force have primarily been focused on the former states in North Atlantic Treaty Organization (NATO) and the Warsaw Pact. These alliances blocs had previously encouraged large scale conscript forces in order to provide a sufficient deterrent force during the Cold War. Several of these states have since made rapid shifts away from the force structures they maintained under the Cold War. These cases provide an excellent contemporary debate for comparing different models of military manpower systems.

Jehn and Selden (2002) note that almost all armies in Europe have switched to an all volunteer force or are reducing the number of conscripts in an effort to make an eventual shift. However, they do note that there are some notable divergences in terms of the complete transition. Jehn and Selden divide Europe into three camps. First, the non-NATO European states tend to use larger conscript systems and are oriented towards militia or heavily defensive postures. Examples of the first group include the Swiss, Austrians, Finnish, and Swedish militaries. These states are adapting their models to assist with peacekeeping missions, but are not entirely phasing out conscription. Second, existing NATO members consistently are shifting away from conscription. Five notable exceptions exist. First, Germany, Norway, and Denmark all have considerable conscript forces and have no current desire to move away from conscription. Greece and Turkey maintain large conscript militaries due to consistent disputes with each other.

Finally, the authors discuss the new NATO member states that show a strong desire to shift to an all volunteer force under the collective security arrangements. Some slight divergences exist because of the inclusion of the Baltic and Balkan states that first need to establish territorial defense. Conscription for these states is seen as a credible first step before additional reforms can take place. This article provides an overview of major policy shifts after the change in the global system structure. It also shows that transitions are not uniform, thus implying that states take very different approaches to the same system.

Leander (2004) provides an excellent discussion about the application of conscription in Europe. She applies a cultural approach to the application of conscription, noting shifts in adoption and application. A key problem Leander notes comes from, the revolution in military affairs, which precludes an effective comparison between conscript systems and volunteer systems due to a myriad of potential configurations. Leander then discusses the four key myths associated with conscription. First, she argues that construction of community is no longer a key function of conscript systems. Second, she notes that military institutions have been supplanted by other tools for developing ideas of civic virtue in society. Third, the notion of exchange of service for rights of citizenship is dismissed as well. Here Leander claims that the collection of taxes is seen as the key function rather than the ability to collect the “blood tax”. Finally, the use of conscription as a tool to control violence among a group of unruly youths is also found to be lacking.

Next, Leander compares the cases of Sweden and France. These cases have strong historical linkages to conscription, though the nature of public discourse on the topic varied markedly. The Swedish case shows maintenance of conscription because of the lack of a narrowly defined conception of military service. This prevented arguments about effectiveness

from defeating or undermining that conception. France suffered greatly because of poor performance in the 1991 Gulf War and the lack of the military to serve as a tool for social promotion or integration, thus making it easier to reject because of clearly defined policy failures. Leander's argument about conscription in these cases presents clear differences about societal values, but perhaps undervalues the importance of poor military performance in a major international conflict by the French. This article also shows the importance of a clear understanding of the domestic organizational culture associated with the military.

Williams (2005) provides another useful discussion regarding the broader transition of European militaries to the all-volunteer force structure. Williams notes that arguments in favor of the all volunteer force include a more cost effective model than conscripts can produce. Second, this model also helps meet NATO needs for high technology expeditionary forces. Williams also notes that economists have played a central role in arguments relating to force structure in recent year. She notes the advent of the all volunteer force allows militaries to devote more resources to research and development of new weapons systems rather than having consistent drains on resources in the form of personnel (Williams 2005, 40-41). Additionally, Williams argues that a transition to the all-volunteer force will not be easy for many European states. This argument is presented in contrast to the historical experience of the United States.

Williams cites key difficulties associated with transitioning to an all-volunteer force for NATO member states. First, employee protections limit the ability of states to separate redundant personnel. Second, a key recruiting limitation exists because of the presence of a high quality system of vocational education in many European states, the lack of which serves as a key recruiting tool in the United States. Subsequently, improvements need to be focused on pay and quality of life concerns, improved working conditions, and expanding recruiting effort

(Williams 2006, 45-48). This broader discussion of the transition dictates that costs of transitioning to an all-volunteer force are without serious consideration by policy makers.

Questions about military reform are often oriented around improving effectiveness. Mileham (2001) argues that this question should be at the forefront of debates related to defense transitions. Additionally, several key issues plague the development of a European Security Community. First, the mixture of effective and ineffective forces must be dealt with. Mileham argues for a set of institutional reforms for professional troops to improve overall efficiency. Second, definitions of security differ between states with internal and external postures. Finally, the debates about culturally diverse standards are also considered to be problematic. Effective security implies that officers are trained in combat missions rather than staged military training. Mileham supports his claims with the recent success of professional forces in the policing of Kosovo.

Haltiner (1998) explores the declining levels of military participation in Europe. He notes that transition from the large standing armies of the Cold War to smaller armies is based on principles of technological sophistication. Haltiner explores the ratio of conscripts to professionals to define the existing militaries of Europe. Haltiner (1998, 15-17) develops a typology of military recruitment based upon the use of a conscription ratio measure. He defines some states as Type Zero, implying an all volunteer force. He then discusses Type I militaries which have conscription rates of less than fifty percent. He notes states in this category are transitioning and modernizing their militaries. States filling Type II criteria exist with half to two thirds of their militaries being comprised of conscripts. These states provide a difficult test because of the variety of systems being discussed. Finally, Type III systems exceed the two thirds conscription ratio. These states may transition away from conscription, but are largely

influenced by issues of territorial defense or perceived threat. Haltiner also notes that many states using conscription are either developing forces for international operations in tandem with their existing militaries or are modernizing their militaries over time.

The broad issue of what militaries should be used for is a key question raised throughout this research. Edmunds (2006) argues that modern militaries in Europe are facing this question due to the presence of four fundamental issues. First, the lack of concerns over territorial defense serves as a key factor. Similarly, the development of new threats diverges greatly from previous conventional threats. The use of terrorism and other tactics are typically not combated effectively with large scale conventional forces. Third, debates about shifting toward professional armies have led many states to produce small highly skilled forces for war fighting and peace keeping. Finally, the issue of domestic support for defense policies remains a central point in debates.

Country specific responses to the changing international system have produced a flurry of research. Bloch (2000) discusses the French shift to the all volunteer force after poor performance in the 1991 Gulf War. The transition in France was rooted in the recognition that the mission of the army would be to master violence in all its forms. Bloch indicates that this program is something that the U.S. military could learn from as it moves forward into a variety of new operational roles.

The German case provides an interesting counter position. The development of a large conscript army was part of a functional Cold War defense. Denison (1996) notes that alliance pressures are likely to push for a more assertive Germany to help bolster international intervention. Similarly, Kanz (2003) argues that major debates in German regarding the draft are rooted in the presence of consistent inequality of conscription. Similarly, the inefficiency of this

system is also seen as a consistent challenge to Germany's position as a global actor. Another interesting point is that Germany's system of alternative service is predicated on the existence of conscription. A move away from conscription would be extremely costly as the system of social service would lose a massive supply of low cost labor.

Russia provides a similar case to that of classical conceptions of military service. Niklaieff (1948) discusses the rise of a system of service in Russia in the 18th century prior to the *levee en masse* in France. The development of the service was egalitarian in its inception, but ultimately evolved into a selective system with exemptions. Spivak and Pridemore (2006) have noted the implications of a poorly run conscript system found in modern Russia. Key issues of a lack of leadership, poor funding, and violence against newly recruited conscripts has led to massive draft evasion. They note that arguments for reform are based on the work of civil society groups in order to press for accountability and reform.

Belgium and the Netherlands have also shifted away from the draft to all volunteer forces. The key arguments put forward in these cases are based on the desire to achieve the benefits of the peace dividend associated with the end of the Cold War and the major problem associated with conscripting smaller cohorts over time (Van der Meulen and Manigart 1997). Interestingly, both states attempted to emulate the German model by offering alternative forms of service, but arguments against this were strong in both states. Key issues associated with the transition are consistent problems associated with recruiting and retaining new staff.

The Scandinavian cases provide an interesting divergence from the rest of Europe. Sorenesen (2000) argues that Denmark, Norway, and Sweden all use conscripts for fundamentally different purposes. The Norwegians conscript large numbers for the purpose of developing democratic ideals. The Swedish military is noted for a neutral foreign policy which

is based upon a strong territorial defense which conscription bolsters. Finally, Denmark recruits and uses its conscripts in a variety of roles, including deployments abroad. This is unusual for a conscript system, but provides an interesting case for future study as most states in Europe have legal restrictions pertaining to the use of conscripts abroad. Collectively, Sorensen outlines a striking divergence to similar circumstances post Cold War in three states that have a strong history of service.

Arguments against the use of conscription are found in many quarters. David Bell (2008) argues that conscription has functionally outlived its usefulness because of issues of inequality, changes in technology, and the negligible effects service has on society. He argues that issues of inequality which are presented against the all volunteer force in the United States simply require increases in pay and benefits to attract and retain better personnel.

Strong opposition to the all volunteer force has been registered by academics as well. Kagan (2006) notes that support for highly mobilized forces is largely rooted in the revolution in military affairs that occurred after the Cold War. Essentially, defense planners in the United States, along with NATO allies, realized that they could modernize their militaries while reducing personnel costs by maintaining all volunteer force structures. This system allows militaries to spend much higher levels on technology while maintaining stable personnel costs (Williams 2005, Kagan 2006). However, the rise of the all volunteer force and the development of expeditionary forces that can be rapidly deployed anywhere in the world has led to several unique problems.

First, the force structure is predicated on the ability of the military to destroy physical targets. This objective seems sound at first, but many of the conflicts that the United States finds itself in are asymmetrical in nature, thus requiring a force structure trained and equipped to

handle unique issues associated with this problem. Similarly, the extended duration of operations in Iraq and Afghanistan has raised serious questions about the toll being taken on the troops and their families. Kagan notes that reforms initiated under George W. Bush to improve troop quality of life have actually worked against increasing the size of the military because of the subsequent increase in personnel costs. Kagan clearly provide a strong critique against a “one size fits all military”, particularly given key issues raised by existing U.S. engagements.

Moskos (2005) argues that the current all volunteer force structure suffers from several key deficiencies. First, the structure produces a massive strain on reserve and National Guard forces. He notes that these forms of service have become less appealing to potential recruits, based on the increased demands of training and service. Second, the shift to an occupational conception of the military has diminished the value of service, particularly during times of conflict. Moskos argues that military defense should be rooted in a three tiered personnel system based around military recruitment, homeland defense, and civil service. He also notes that recruiting highly educated young people for service based on work in peacekeeping activities would greatly increase incentives to serve for some of the best educated young people who do not like the current combination of a six year active or reserve obligation.

A similar argument is put forward by Owens (2006), who notes the problems associated with the current force structure. First, he argues the change to 4th generation warfare by U.S. adversaries has placed new burdens on the military. A major emphasis on technological superiority and combined arms has produced a superior fighting force, but one which is not well equipped for these circumstances. Additionally, the key weakness of the current force structure is centered on lowering personnel costs to provide a greater emphasis on research and development. This leads to a situation in which the current force must operate at a greater

operational tempo. Owens notes that shifts in force structure can help make up for these deficiencies, but that additional work must be done with allies and in diplomatic circles to achieve U.S. objectives.

Recent work by Korb and Duggan (2007) note that a serious issue associated with the all-volunteer force is based in areas of recruiting. They note that two key problems plague the military in this area, including the need to offer increased incentives and problems associated with lowering recruiting standards to meet manpower requirements. These authors also describe the use of a stop loss, a unilateral extension of service by the government, as a major coercive tactic which may decrease moral. Finally, recruiters are frequently cited as using manipulative or deceptive approaches to recruit youth.

Debates about the current United States force structure also include modern forms of mercenary soldiers known as defense contractors or private military contractors. Defense contractors have become a major source of military manpower for operations ranging from security details to the menial tasks such as cooking or washing laundry. Cacian (2008) notes that the use of contractors for many of these functions is beneficial for the existing all volunteer force for several reasons. First, most of the positions are better filled by civilian contractors rather than military personnel. Second, shifts in the U.S. army post Cold War placed an emphasis on the combat arms branches of the military. This invariably reduced the role for troops in combat support and combat support services which comprise the key supply, logistics, and communications operations of the U.S. military. Finally, issues of cost are considered to be comparable to that of a soldier, though Cacian notes that a direct comparison of costs is difficult because so many of the costs of a soldier are indirect.

Not all perspectives on the use of military contractors provide such a positive perspective. Steven Schooner (2008) notes that the failure to report on contractor fatalities greatly reduces the death tolls being reported for the conflict in Iraq. This is fundamentally linked to a lack of transparency associated with these injuries and deaths. Interestingly, Schooner's data source came from the Department of Labor rather than from the Department of Defense because no records of foreign contractor fatalities were being maintained by the military. The broader issues raised in this article relate to democratic accountability and the proper role and function of defense policy. Use of contractors artificially lowers body counts, insulates politicians from the political ramifications, and provides a large pool of short term labor which is highly efficient from a cost benefit standpoint. Use of contractors clearly provides an efficient means of conducting war with the existing U.S. force structure, though it does raise serious normative concerns.

Another strong critique of contractors comes from their use in developing states. Private military firms are frequently seen as being superior to domestic forces because of expertise they provide and the ability to break existing cycles of violence (Leander 2006). However, major critiques exist about the economic logic of using mercenary forces. First, there is no defined market and no clear performance indicators can be given across given conflicts, thus placing the supplier in the position to tell the buyer how much and at what cost their services should be acquired. Similarly, normative issues surrounding who can employ these companies raises major ethical concerns about military contractors. Leander notes that the use of these mercenaries can provide external legitimacy, but fails to provide the internal security and legitimacy that other force structures might provide.

Existing case studies from advanced industrial states provide evidence of a general trend which favors volunteer forces. However, notable exceptions exist regarding policy adoption and implementation. Similarly, the presence of a shift to an all volunteer system may also be constraining when larger numbers of troops are needed, thus necessitating private military contractors. Regardless of the policy option, the political costs of manpower policy are nontrivial.

Development Arguments

The role of the military in development has been debated. A key issue associated with development is focused on civil military relations. Janowitz notes that the military arrangements of most states are largely a function of the colonial power that occupied them (1977, 89). He also notes that there are states that rebel from the colonial model or that have not been colonized, but these tend to be the exception rather than the norm.

Janowitz (1965) notes that the military should be studied with an emphasis on modern organizational behavior. He argues that a shift away from research focusing on morale to more encompassing studies that focus on the broader social functions of the military. These functions include impacts on the economy, technological development, and the deterrence of violence (1965, 17-19). The functional outcome also produces linkages with industrial circles and builds the foundation for a system of procurement and mobilization. Collectively, the military provides a basis for social and economic development which must be studied in relation to the broader society.

The military has also been seen as an institution for social promotion and for granting rights. Yanikdag (2004) argues that the Ottoman system of conscription provided a series of skills that would not have been available to peasants during the early 20th century. These skills

range from basic literacy to exposure to new social customs associated with modern society. The training also formed the basis for development of national ideals, though the effectiveness of this training has yet to be quantified.

Similar experiments occurred in Russia (Niklaieff 1948) and France (Mjoset and Van Holde 2002) in which conscripts were granted access to education or forms of social promotion as a function of service. This begs the fundamental question about the formation of identity in the modern militaries and how these historical case studies can be incorporated into current discussions.

Another recent example of the impact of military development has to do with Gill's (1997) work on the socialization of Bolivian conscripts. Her research was focused primarily on the development of gendered norms in the military tradition. However, she does note that the military is used as a vehicle of social promotion based on the credentials needed for key positions in society. In addition, she notes that the application of conscription is not equitable as wealthier citizens are able to avoid service by entering higher education. This biased system frequently leads to a poorly designed training and indoctrination program in which soldiers are frequently harassed and brutalized.

The role of the military in developing a society or forging a nation out of a group of people has been debated significantly. Ronald Krebs (2004) argues that the role of the military in developing a nation is greatly exaggerated. Krebs focuses on three key areas in his analysis including socialization, group contact, and elite transformation. Krebs claims that none of these arguments are valid. First, he argues that socialization effects are in fact trivial. He notes that training and socialization periods are typically not that long and that these systems do not reflect the total institutions which many scholars cite as a key basis for the socialization hypothesis.

Second, Krebs uses evidence from the *American Soldier* to refute the notion of integration via group contact, noting that many soldiers still chose to remain in their respective groups after living and working with other soldiers of different racial or ethnic backgrounds. Finally, issues of elite transformation are rooted in the idea that existing elites will recognize the service of new groups in society and that new elites will rise out of the ranks via systems of social promotion. Krebs claims that this perspective is unlikely.

Critiques of the military in the process of development cannot be ignored. Many of the previous studies presented in the literature dealing with advanced industrial states are then applied to developing states as a matter of best practices. This fails to recognize the broader social and historical context of developing states that are working from these policy recommendations. These best practices also seek to address the political agendas of those states recommending these policies. Rooting the defense of a state in the historical experience, geopolitics, and foreign policy objectives of the dominant actors in international politics may lead to sub-optimal outcomes for many developing countries.

Latent Benefits of Conscription

The selection of a military manpower system for a given state must be based on a number of characteristics. First, the overt function of any military is to provide territorial security of a defined geographic locale, which is the state. Beyond this, the military must also provide functional support for defense of state interests abroad. Second, the military plays a valuable role in society. It provides for a host of valuable skills ranging from vocational training, socialization, and discipline associated with the service. Additionally, many states provide generous policies to veterans and their families as a function of service. This raises broader

questions posed by scholars about which system is the most “effective” and what latent benefits can be garnered from service (Krebs 2004; Leander 2005).

Studying the military from a comparative perspective is extremely difficult, largely because these organs of state power are rarely made available for students of international politics to explore. Issues of development, historical experience, and state objectives must also be considered. However, given the lack of any overarching study, the existing literature on said topics is largely comprised of small case studies dealing with particular aspects of the broader military manpower puzzle. These works focus on the positive aspects of conscription ranging from transmission of political skills and reduction of crime rates to increased income equality. Similarly, the literature also provides examples of studies which focus on the negative implications of conscript service.

It should be noted that the literature tends to treat conscription as a dichotomous policy choice. This dichotomy does not reflect the true diversity of systems, but continues to remain a central point in the policy debates about applications of conscription (Leander 2005). As noted earlier in discussions about the economic impacts of conscription, all volunteer forces do not suffer from these debates because they rely on market forces and economic incentives rather than a state’s coercive power to supply sufficient personnel.

Therefore, a discussion of the latent impacts of service will focus on several key areas. First, an introduction to the notion of service and its impacts on civilian life is outlined. Next, research focusing on identity formation and military training is presented. Third, a detailed discussion of minority service patterns and implications for social promotion are presented. Fourth, issues relating to development of civic skills in relation to the military are outlined. Fifth, a discussion of the implications of service for educational attainment and crime rates is

presented. Finally, a discussion of the negative implications of service is presented in light of the other findings.

The use of military service as a uniform tool for socialization is consistent in the literature. This is largely due to the presence of basic training. However, recent scholarship has questioned many of these assumptions. Higate (2001) also notes that this trend of providing a uniform character to service is rooted in the concept that all soldiers complete basic training. However, he notes that certain occupational conditions may have lasting impacts on soldiers, particularly those serving in combat. In particular, he notes the impacts of physical training and self-reliance may make veterans less likely to seek assistance than other individuals. Similarly, he also notes that soldiers may be drawn into hierarchical or quasi-military occupations as a function of occupational norms. Sørensen (1994) and Moskos (2005) note the distinction between institutional and occupational forms of military service. Institutional forms of service relate primarily with combat arms branches and are typically associated with serving the higher purpose or for patriotic principles. The occupational form of service is frequently seen as a career choice fitted with specific skill sets that are similar to a civilian job market.

Amy Lutz (2008) provides a clear discussion about individuals joining the U.S. military. Her work explores the changing demographic patterns of service from the 1980's to the present in the U.S. military. She examines the impact of race and service patterns, noting that the key determinant of service across any racial or ethnic group is household income. This is attributed to the occupational choices afforded to young people with higher levels of resources. Similarly, work by Backman et al. (2000) notes that there are significant selection effects present among high school students who wish to join the military. Using data from the Monitoring the Future Survey, these researchers explore the dynamics of recruitment among high school seniors from

1975 to 1997. An interesting finding from this research is that they note that military frequently corrects many of the negative impacts of the selection effects during basic training. In addition, this study shows that the poor or those who are predisposed are more likely to join the military.. It also raises key issues of recruiting and retention in these systems, as those individuals with resources to engage in other activities typically do not join the military.

The literature on the socialization impacts of the military is mixed. Krebs (2004) argues that these impacts are trivial if they exist at all, based on the inability of the military to function as a total institution. However, there are some studies that counter this position. Guimond and Palmer (1990) note significant differences in individual and system blame ideologies present in students across time. Using a battery of surveys implemented annually, students in social sciences tended to favor system blame ideologies while individuals in business degrees favored an individual blame framework. Interestingly, the students with the least exposure to social issues in this area, namely science and engineering students, remained constant across time in relation to these positions. This position shows that even in non-total institutions there is clear evidence of value change over time in particular worldviews. This does not account for selection effects, but does show that these issues are likely to intensify over time.

Additional work by Guimond (2000) provides some support for Krebs' (2004) argument that socialization might not be uniform. This research focuses on the impacts of group norms at a Canadian military college with a base sample of 250 students. The results indicated that group norms are established by membership not only in the military, but also in a particular ethnic group as well. Francophone students did not adopt the same structural beliefs that their dominant Anglophone students did, namely blaming the French and other minorities for many of society's problems. This work clearly shows that the impact of socialization is a function of the degree of

identification with a particular role and that a wide degree of variation can occur in the adoption of group norms.

Similarly, the work of Stevens and Rosa (1994) shows that self-selection into life at the United States Coast Guard Academy is to be expected, but that the work of the Coast Guard decreases many of the negative implications of this perspective, particularly an emphasis on conformity. These results are similar to Backman et al. (2000) in that they highlight the importance of a well defined military training program in producing optimal outcomes. Franke (2000) provides another interesting caveat in the socialization debate. Based on a survey of 594 West Point cadets, Franke notes that students developed new characteristics based on the social experience of a military academy. These new characteristics are operationalized collectively into a warriorism scale. What is even more important is the fact that this new personality characteristic does not supplant or diminish existing traits, but provides a new dimension that cadets previously did not have. The nature of the socialization process may also differ based on the type and goals of the military. Franke and Heinecken (2001) compared attitudes of West Point Cadets to those of South African Military Academy and noted that the South Africans tended to have higher degrees of support for multilateral operations based on the experience of their military and the orientation at the academy.

Several scholars have consistently noted the role of selection effects in who joins the military (Backman et al. 2000; Franke 2000; 2001; Stevens and Rosa 1994). These impacts are were explicitly explored in Franke's (2001) article in which he compared 594 West Point cadets to a sample of 372 Syracuse University students. Results indicated that the academy cadets were significantly more conservative and patriotic. Similarly, the military students possessed less affinity for an individualistic orientation. It should be noted that the impacts of the socialization

process are not always positive. Levison (2004) notes the massive problems facing the Russian military due to brutalization of conscripts during indoctrination and the lack of senior non-commissioned officers to instill discipline. The implications for the military include high rates of draft evasion and a strong opposition to any form of service amongst the general populace. This is also part of a broader critique of military organizations and training regiments.

The classical political behavior literature also adds to the role and impacts of military service. Jennings and Markus (1977) provide mixed findings based on a panel study of 391 high schools students sampled in 1965 and then resurveyed in 1973. They note that the key to any socializing institution is based on several key factors including duration of the socializing effect, the intensity of the socialization, the recency of the event, the affect of the individual and the salience of the socializing event. They note that the contact hypothesis does not have much support as others might have predicted. However, tolerance of individuals from other racial and ethnic backgrounds did increase after separation from service. The authors note that many of the impacts in their work were not strong and disappeared when controls were added. They conclude that the impacts of socialization are mitigated by early life experience, competing influences such as education, and the lack of efficacy faced by the Vietnam era veterans.

Teigan (2006) notes that military service has positive rates of voter turnout for veterans serving in World War II, Korea, and in the post conscription period in the United States. He develops his model using data from the Current Population Study from 1972 to 2004. Findings indicate that the Vietnam era veterans consistently vote at lower levels than other veterans even controlling for age, education, race, and wealth. Mettler and Welch (2004) discovered that the use of G.I. Bill benefits significantly increased the political participation of veterans over a lifetime.

Educational attainment has also been a major area of emphasis in the literature associated with implications of service. Work by Teachman and Vaugh (1996) note that military service has negative impacts for educational and income attainment for Vietnam era veterans. The authors use three different panel studies to evaluate time dependent characteristics from Vietnam and the shift to the all volunteer force. They note that Caucasian males tend to be recruited from the lower education strata while African American males tended to have higher levels of skill compared to non-service colleagues. Teachman (2005) also notes that veterans serving in Vietnam tended to have lower levels of educational attainment compared to peers who did not serve. Teachman used data from the National Longitudinal Study of Young Men. This study was carried out on a representative sample of youth and provided the highest level of education completed and draft status. It is important to note that use of educational benefits played a positive impact in veterans' educational attainment, though not all veterans opted into this program. Similarly, work by MacLean (2005) found that individuals serving between the Korean War and the Vietnam War, between the years of 1955 and 1965, had a negative impact on soldiers' educational attainment. This impact exists because Congress did not appropriate funds for G.I. Bill programs during this period, though they did apply retroactive funding when this program was reinstated during Vietnam. This study was conducted using data from the Wisconsin Longitudinal Study which consisted of a panel study 4992 individuals. Maclean's works supports the notion that military service can be a disruptive influence in a young person's life, thus causing lower levels of attainment. However, it is important to note that classical predictors of educational attainment such as parental education and individual factors such as motivation and talent play key roles.

An interesting aspect of these studies is that they do not reflect the issue of changing socio-economic conditions. Young men may be less likely to go to achieve higher education because of the ability to earn wages using technical or vocational training in skilled trades. Maclean's work found that veterans did tend to achieve higher rates at the associates degree level. Similarly, treating military service as a pure economic decision is limited for other reasons as well. First, the ability to select into a position of relative stability reduces uncertainty and insulates the individual from market pressures. Second, these studies assume that lower gross income is inherently a lesser outcome without comparing comparable costs associated with achieving other outcomes. This literature suffers from a lack of a clear and explicit discussion of what policy options are necessary to mitigate any negative impacts of service in society.

Additional work into the latent benefits of military service includes work by Avrahami and Lerner (2003) associated with entrepreneurial behavior of masters of business administration students who had served in the Israeli military. They note that soldiers who had served in combat were much more likely to engage in risk taking activities. These scholars used panel data from surveys issued between 1975 and 1991 to explore their conclusions based on 166 respondents. They root their argument in the fact that soldiers develop networks within society and build life skills in the course of service. Similarly, research into the impacts of military service and crime has yielded mixed comparative results (Sun et al. 2007; Sun 2006). Existing research has shown a negative relationship between military participation ratio and murder rates, though these findings were taken from cross-sectional data. Sun and colleagues (2007) showed that as military participation ratio increased, homicide rates declined. However, the same research showed that systems employing conscription yielded higher rates. These studies are

anecdotal in nature largely due to the inability to find reliable sources of data on many of these key issues.

The military training soldiers receive can also have some negative repercussions as well. Work focusing on issues of homelessness among veterans has found that soldiers can be particularly vulnerable because of their training (Tessler et al. 2003; Higate 2001). The key problems here relate to the physical toughness soldiers acquire during training and the self reliance that is instilled during early training. The process of fulfilling the role of an ideal soldier clearly works against the process of seeking help. Similarly, development of mental illness or substance abuse while in service also serves to contribute to the perpetuation of homelessness.

Next, Katz (1990) notes the impacts of group socialization amongst drill sergeants in the U.S. military. A key finding here is that the norms and commitment to the service become so strong that they frequently have adverse impacts on the sergeants' personal life and physical well being. This shows that the development of a normative structure in the military can be a powerful motivating device, but that this device may have severe impacts, particularly upon separation from the military.

The role of the military as a socializing tool for minorities in society has been extensively debated. Several scholars have questioned the role of the military in this functional role (Krebs 2005; 2006, Leander 2004; 2005). These scholars typically use the experience of advanced industrial states to generalize to a broader universe of states. Other scholars have argued that inclusion of minorities includes the development of basic skills (Gill 1997; Yanikdag 2004; Weede 1986) and the increased levels of political participation (Leal 2003,1999; Ellison 1992). The lack of quality comparative research in this area has led to anecdotal findings which are frequently overstated.

Krebs (2005) notes that the inclusion of minorities in the military is not caused by three classic explanations including external threat, increased tolerance, or the level of professionalism in the armed forces. Krebs (2006) claims that the military does not form a national identity based on limited exposure of soldiers to the socializing impacts of the military and the lack of long term impacts of service. Leander (2004) notes that the justification of conscription in European states is increasingly under scrutiny, particularly as the process of selection becomes less egalitarian. These positions critique the role of the military in terms of integrating and socializing groups in society via service. This is a crucial role of conscription that has been heavily critiqued theoretically and empirically.

There is a small body of research that shows that minority soldiers gain a great deal from service. David Leal (1999) explores the impacts of military service on Latino political participation using data from the Latino National Political Survey conducted in 1989 and 1990 using a sample of Mexican, Puerto Rican, and Cuban respondents. The sample of veterans produced over 2000 respondents with 247 veterans. The results indicated that draft era veterans were significantly more likely to engage in low level political activities such as writing a letter, wearing a button, or donating to a political campaign. Ellison (1992) notes that military service supports higher levels of political participation among African Americans. Using data from the National Survey of Black Americans, Ellison notes that veterans were more likely to participate in campaign activities or contacting an elected official. Ellison also reports that African American males reported lower levels of racial identification than do nonveterans. Finally, Ellison recognizes that the military is a valuable form of social mobility

Similarly, Leal (2003) notes that military service also aides in the acculturation process for Latinos serving in the U.S. military. Acculturation was operationalized as having more

Anglo friends and speaking English in the home. These findings show that the military provides a valuable tool for socialization and acculturation amongst minority population. Leal's work (2003) also noted that Anglo veterans serving with Latinos during the period also seemed to have higher levels of knowledge about Latinos than did non-veteran Anglos. These results are similar to studies conducted on military cadets in the United States and Canada which shows that service provides new aspects of identity. These collective works should be seen as evidence that service may not produce a nation as per Krebs (2005), but it certainly has more than a trivial impact on the lives of individual lives serving in the armed forces.

Conscription has been a key factor in the international conflict literature. The linkage between the domestic and the international produces major conflicting interests between domestic political concerns and the foreign policy objectives of state. Dolman (2000) notes that war time mobilization frequently has many latent benefits for the expansion of citizenship and political rights. However, he notes that military systems are able to perform this function best when they are left out of the parochial interests associated with domestic politics. Biddle and Long (2004) note that civil military relations are a key part of military effectiveness for democratic states. This might imply that reducing tensions in society based on recruitment policy would increase effectiveness based on a broader base of support which is less politically volatile. Work by Lai (2004) notes that democratic accountability in states can produce diffuse levels of electoral accountability relating to geographic division in states and in terms of the number of parties in the state system. This finding points to the ability of politicians to effectively insulate the impacts of war to certain subsets of the population, thus limiting the electoral impacts of conflict. Lai based his work on a sample of 25 democracies using the International Crisis Behavior data. Additionally, he notes that conscript states are also more

likely to initiate conflict. The literature linking international relations to domestic politics is not fully developed. Initial findings make clear linkages pertaining to politically viable solutions in order to maintain legitimacy.

Conclusions

The literatures associated with the development of military manpower systems are diverse and provide a wealth of contending arguments. The lack of consensus about many of the key arguments in the literature provides for a wealth of scholarly debate. However, little systemic evidence exists to support bolster a particular manpower policy. Perhaps the only universal conclusion that exists in the literature is that there is no manpower policy for the entire international system.

Several key trends can be taken from the broader discussion of military manpower policy. First, the absence of a strong empirical literature greatly hinders patterns and trends in the international system. A great deal of the research presented in this review is based largely on normative arguments based in theoretical positions. This research is particularly valuable in terms of orienting the societal debate and engaging in the broader social arguments associated with military manpower systems, but it does little to isolate the key factors associated with policy choice.

Next, the dominance of research in the developed states of the world, particularly those in Europe greatly limits existing understandings of the range of cases that policies are developed around the world. Existing research into conscription has shown some support for the “Families of Nations” hypothesis (Castles 1993, Obinger and Castles 2008, Mulligan and Scheifer 2005). This indicates that lesson drawing may be occurring, but no established literature explores potential similarities or divergences in terms of military manpower systems. Some research into

strategic culture encompasses parts of this question as has some of the development literature (Janowitz 1977), but they still fail to provide key factors that differentiate systems.

Third, a strong connection between force structure and geopolitics has remained a core element in the literature (Mearsheimer 2001). Indeed, the premise of Strategic Vulnerability has shown that physical geography and environmental conditions are key determinants in conflict duration in militarized interstate disputes. This directly relates to the need for staying power in the most common forms of interstate conflict. Similarly, the classical literature on war is replete with examples of states being forced into full scale mobilization (Cohen 1998; Winters et al. 1998). Additional factors that have not been tested, but which are replete in the literature on geopolitics relate directly to the enduring issue of regionalism.

The literature clearly points to the need for a sustained empirical investigation into the nature of force structure in the international system. Clear trends supporting the need for a nuanced approach to the study of manpower require substantive empirical results in order to focus the broader research agenda in this key area of public policy.

Chapter 5

The Influence of the Strategic Vulnerability on Military Manpower Policy.

Introduction

The impacts of geographic and environmental factors on strategy have been discussed in the literatures on the history of war and strategic culture. These literatures assume direct impacts from geography to the nature of defense planning and foreign policy. However, the linkages between environmental factors and military manpower policy have never been empirically tested. Similarly, no substantial qualitative literature explains this assumption. This chapter explores the assumed linkages between the selection of a military manpower policy and the geographic and environmental factors of states.

This chapter explores several key variables associated with geographic and environmental factors, domestic political institutions, political culture, and the institutional characteristics of the military on military manpower policy. The diversity of the literatures associated with military manpower policy means that any attempt to empirically evaluate competing claims is difficult. The breadth of key topics present in the existing literatures dealing with the conduct of war, defense economics, comparative public policy, military sociology, and international relations all must be addressed to provide proper context. Collectively, these literatures provide a variety of competing assumptions regarding military manpower but little comparative work has been done to empirically evaluate competing claims.

Therefore, this chapter seeks to provide an initial empirical analysis to address the competing claims made by the literatures outlined in previous chapters. First, this chapter provides a discussion of research design relating to comparative military manpower systems. This section is based upon the existing research concerning geographic and environmental

factors which make up Strategic Vulnerability. Second, several pooled logistic regression models are estimated to explore competing hypotheses regarding the adoption of a particular force structure. Finally, results are presented along with potential implications for public policy debates.

Research Design

In order to test the fundamental linkages between geography, the environment, and force structure it is necessary to provide an analysis that moves beyond normative research based on a single case study, collection of cases or broad based theoretical arguments. There are several major problems that are presented by this task. First, the lack of reliable comparative datasets in a number of areas severely limits any research. Data regarding military manpower policies and force structures are available, but of limited quality in many developing areas of the world. This greatly limits any attempt for comparative analysis. Similarly, time series climate datasets for the entire world are also somewhat rare and typically of poor quality. This prevents scholars from fully exploring the range of environmental factors impacting conflict and thus requires them to utilize proxy variables if they are present at all. However, the lack of available data and sufficient methods has not precluded scholars from developing various theoretical arguments.

Second, the dominant literatures tend to provide little differentiation across military manpower policies. This results in the development of heuristics that functionally treat military organizations as if they are the same based on overly broad classifications. Scholars (Leander 2005; 2004; Cohen 1985; Janowitz 1977) note that military organizations can vary widely between types of conscripted, mixed, or all volunteer systems. Similarly, these authors note that there is tremendous variation in the orientation and application of these force structures.

However, the literature has consistently treated the use of conscription as a dichotomous measure without controlling for any potential organizational factors.

Data limitations related to military manpower systems and climate data are non-trivial obstacles. However, the goal of conducting some initial work to evaluate competing claims provides the rationale for a preliminary empirical test regardless of these claims. The time period for this analysis is 1992 to 2001 due to data limitations for the geographic and environmental sources. Future research will seek to expand this limited time series as new data sources become available. Data coverage consists of a minimum of 131 cases in the international system depending upon data quality and availability of covariates.

The limited availability of time series data is a severe limitation on this study. However, the scope of the research question and the lack of any empirical inquiry into this set of factors warrant this initial investigation. Beyond the lack of empirical inquiry regarding geographic and environmental sources, this study also incorporates a variety of institutional variables into the analysis, thus providing another valuable contribution to the literature.

Dependent Variable

The dependent variable in the model consists of a dichotomous measure of conscription. States were coded one if they practiced conscription and zero in all other cases. These data were taken from the War Resisters International (1998) and the Quaker Council on European Affairs (2005). A dichotomous measure was used because of the lack of available ratio level data on troop structure in the developing world.

Conscription forms an excellent measure of force structure. Short of total war, modern conscripted forces typically represent a defensive force structure for most states. This is related

to the high political costs associated with deploying forces. Similarly, the cost of deploying larger forces provides a significant burden on large conscript forces, thus constraining policymakers (Boulding 1962). Recent trends in the international system have caused many states to move toward all volunteer forces. These trends include many smaller, but more frequent conflicts around the globe and the need for modern militaries to operate increasingly complex equipment. It should be noted that many advanced states have developed hybrid systems prior to a complete move to an all volunteer force (Williams 2005; Haltiner 1998).

Recent trends in the international system regarding presence of conscription, legal basis, and alternative measures are presented below.

Table 3					
Conscription Factors					
Variable	Conscription	Legal Basis	Alternative Service	Exemptions	Conscientious Objection
Presence	100	111	34	95	46
Absence	63	54	129	70	117

Table 1 clearly shows that conscription is still widely used in the international system. This recruitment structure is typically associated with less effective military performance (Williams 2005). Similarly, the use of conscript forces often provokes substantial domestic political consequences for actions in the international system. The presence of conscription does have several interesting factors. First, the basis for conscription is typically found in either statute or in constitutional provisions. This shows the foundation for military manpower policy is really rooted in the necessity of the state for territorial defense. This trend supports the Families of Nations thesis (Castles 1993; Castles and Obinger 2008; Goetz 2008) which is based in the legal traditions passed from colonial powers to their overseas possessions. Additional factors associated with manpower policy that should be recognized are presence of alternative service, exemption from service, and recognition of conscientious objection. These types of

policies greatly diminish the legitimacy of conscript service because they are used by those individuals with higher resources to avoid costly forms of service, thus undermining any egalitarian arguments in favor of conscription. It should be noted that military manpower policies must be carefully tailored to avoid depleting personnel from valuable economic activity during conflict as well (Cohen 1985). Some form of exemption exists in more than half of all states, including those that do not actively employ conscript service. However, alternative service and legal recognition of conscientious objection exist in less than half of all states.

The dependent variable, the use of conscription, provides a great deal of variation. The trend that is present in the international system is that states typically provide some form of legal basis, regardless of whether or not the system of conscription is actually used. Similarly, some form of exemption from service is also present in most cases, thus undermining classical notions of equality in favor of state interests. Finally, we see that about a quarter of all states provide soldiers with some form of alternative service. These data provide a great deal of diversity and thus provides an excellent starting point to see how states are organizing their militaries.

Independent Variables

The covariates in the models are designed to explore a series of dynamics in the international system. First, the Family of Nations hypothesis is explored using a dichotomous variable to denote British legal tradition. The logic behind the inclusion of such a variable has to do with diffusion of policy specific information and path dependence associated with standing legal traditions (Castles 1993; Castles and Obinger 2005; Mulligan and Schleifer 2005). These data were taken from the CIA World Factbook (2008) and War Resisters International World Survey of Conscription and Conscientious Objection (1998). A clear examination of the

relationship between British heritage and conscription is presented in Table 4. There is a clear association between use of volunteer forces and presence of common law tradition.

Table 4		
British Heritage and Conscription		
British Heritage		
Conscription	Not Present	Present
Not Present	33	30
	27%	73%
Present	89	11
	73%	27%
	122	41
Pearson chi2(1) = 268.7627 Pr = 0.000		

A second variable that explores diffusion effects is membership in the North Atlantic Treaty Organization (hereafter NATO). This variable was taken from NATO (2009) and is coded dichotomously with 1 representing membership in the alliance and 0 for all other cases. Membership in NATO provides a strong link to many advanced industrial states with modern forces that are prepared for rapid deployment. Many scholars have noted that NATO increasingly stressed the use of all volunteer forces, with many members adopting these patterns (Williams 2005; Haltiner 1998). The trends within NATO membership have not been uniform, but the overwhelming majority of states in the alliance can be said to be moving toward an all volunteer force structure. Together, these diffusion variables explore elements of path dependence and policy transfer among states.

Another key set of variables are domestic political structures. The first of these domestic political variables is a state's Polity score. The Polity score is a measure ranging from completely authoritarian, scored -10, to completely democratic, scored 10 (Marshall and Jaggers 2008). Existing research in the Democratic Peace literature suggests that states with higher

levels of democracy will be less likely to conscript based on political costs and the openness of democratic institutions (Levi 1997 and Doyle 1983).

The second measure included in the models is a dichotomous measure for the presence of a leftist party as the dominant party in the legislative branch of a given government. The presence of dominant left leaning party is coded dichotomously with 1 indicating presence of a leftist party and 0 for all others. These data are taken from the World Bank's Database of Political Indicators (2005). Dominance on the part of the left is hypothesized to have a negative relationship with the use of conscription. This hypothesis is based on several factors. First, the historical emphasis on individual rights associated with left leaning parties makes coercive recruitment policies unpopular and politically costly. Second, military planners typically desire the most expeditious means of recruitment to meet force structure requirements at the lowest possible cost. Use of volunteer forces allows for this while retaining talented personnel and alleviating the high manpower turnover associated with conscription.

Development of manpower does not occur in a domestic political vacuum. Scholars typically provide limited coverage of domestic political factors, instead preferring to incorporate simple measures of regime structure. The variables included in this analysis provide an excellent coverage of the political characteristics of states across the international system. These factors are particularly important because the use of conscripts for unpopular or illegitimate conflicts may illicit widespread political unrest.

Next, a set of independent variables in the models are comprised of institutional factors associated with the military. These factors are important because they are empirical measures of a broader organizational culture. Examining recruitment policy without including these factors would greatly limit any discussion of the policy making process.

The first measure to be included in the model is the size of the military. A key problem for modern military planners is that of recruitment. If a state intends to maintain a large army then it is more likely to use conscription to quickly and easily muster these resources. This is due to the fact that it becomes increasingly expensive to do so using market driven mechanisms associated with volunteer militaries. Data for military size are taken from the annual editions of the *Military Balance* (International Institute for Strategic Studies 1992-2001)

Next, the level of spending associated with each military is included in the model. Conscripted soldiers are typically used for labor intensive forms of service because of low cost. It is logical to assume that as a government spends more resources on the military, it will be more likely to use professional soldiers due to high levels of technical skill that are needed for many of technologically sophisticated weapons systems. Militaries that have modernized equipment also prefer professional soldiers because it reduces the recruiting demands on the military.. These trends have been noted consistently in the military sociology literature (Moskos 2005; 1977; Sørensen 1994). Similarly, military planners wish to avoid turnover among highly skilled troops that occurs with a conscripted force structure. Data for military spending are taken from the annual editions of the *Military Balance* (International Institute for Strategic Studies 1992-2001). These data were also normalized to the number of soldiers in a given military to allow for comparison across armies of differing institutional size.

Two similar measures of troop capacity are also included in the analysis. First, a measure of the ratio of army personnel to total military personnel is presented. The logic of this variable is that largest use of manpower typically comes from the armies of the world. Air Force and Naval units tend to be limited by the nature of their operational parameters and infrastructure which typically require fewer, but more highly skilled soldiers. This leads to the logical

conclusion that military organizations that are heavily dependent upon the army will be more likely to adopt conscription. Data for this variable are taken from annual editions of the *Military Balance* (International Institute for Strategic Studies 1992-2001).

A second key indicator of military capacity is the ratio of reserves to the total military size. This variable was calculated by taking reserves and dividing by total military size. The historical presence of conscription produces a large pool of individuals that are eligible for service for some time. States basing defense on large pools of reserves may be more apt to maintain conscription in order to maintain this defensive balance. These data are taken from the annual editions of the *Military Balance* (1992-2001).

Another set of important variables associated with the selection of military manpower policy are geographic and environmental variables. These factors are being tested to determine if the operational constraints present in the proposed Strategic Vulnerability Framework transcend military operations and play a key role in the development of manpower policies. Research associated with the geopolitics tradition implies that a force structure should be a function of geographic conditions (Spykman 1939a; 1939b; Mearsheimer 2001) or specific natural endowments (Mahan 1904; Mackinder 1918). These factors are also bolstered by renewed empirical research on geopolitics, though little attention has been paid to the classical linkage between force structure and geographic or environmental factors.

The first two measures incorporated in the measure are annual measures of precipitation and temperature. These measures are taken from the Climate Research Unit at the University of East Anglia (Mitchell and Jones 2005). Annual mean temperature, measured in degrees Celsius, and annual mean precipitation, measured in millimeters, are the incorporated. The literature surrounding the environmental variables argues for increased force structure given the presence

of more rigorous operational environments (Winters et al. 1998; Collins 1998, Mearsheimer 2001; Mackinder 1904).

Two geographic factors also comprise the Strategic Vulnerability measure. First, a measure of area is taken from the Digital Chart of the World (ESRI 2005) which is operationalized in square kilometers. The geopolitics literature would imply that larger states or land powers should support larger military forces, thus supporting the use of conscription (Mearsheimer 2001; Mackinder 1904). Second, a state's mean level of elevation is taken from a global 30 meter digital elevation model (USGS 1996). The presence of higher mean levels of elevation should require higher levels of manpower to defend all else being equal.

These hypotheses will be tested using a pooled logistic regression model to examine the impacts of these covariates. This is the preferred model specification based on the available data for the dependent variable and presence of covariates (Beck et al. 1998). This method was selected in order to explore a broader cross-section of states in the international system.

Hypotheses

H1: Presence of British legal heritage will significantly decrease the likelihood that a state will employ conscription.

H2: Membership in NATO will significantly decrease the likelihood that a state will employ conscription.

H3: As a state's Polity score increases the likelihood that it will use conscript decreases.

H4: The presence of a left of center party as the dominant party in the government will decrease the likelihood that a state will use conscription.

H5: As the size of the military increases the likelihood that a state will employ conscription increases.

H6: As the level of per soldier spending increases the likelihood that a state will use conscription decreases.

H7: As the ratio of the army to the size of the entire military increases the likelihood that a state will use conscription increases.

H8: As the ratio of reserve forces to active duty military personnel increases the likelihood that a state will use conscription increases.

H9: As the level of Strategic Vulnerability increases the likelihood that a state will use conscription increases.

H10: As a state's annual mean level of precipitation increases the likelihood a state will use conscription increases.

H11: As a state's annual mean temperature increases the likelihood that conscription will be used increases.

H12: As a state's mean elevation increases the likelihood that a state will employ conscription increases.

H13: As a state's geographic area increases the likelihood that a state employs conscription increases.

Table 5					
Military Manpower Logistic Regression Models I					
Variables	Model 1	Model 2	Model 3	Model 4	Model 5
British Origin	-6.99***	-5.91***	-5.82***	-6.40***	-6.63***
	0.69	0.60***	0.60***	0.67**	0.71
Military Size		7.08E-07***	6.97E-07***	6.86E-07**	4.48E-07
		2.53E-07	2.55E-07	3.25E-07	3.28E-07
NATO Membership			0.09	1.17	0.65
			0.73	1.11	0.98
Polity Score				-0.02	0.00
				0.04	0.04
Per Soldier Spending					-5.60E-07*
					3.22E-07
X2	103.40	96.14	93.65	93.58	90.38
Probability X2	0.00	0.00	0.00	0.00	0.00
Log Likelihood	-199.21	-215.57	-216.33	-190.02	-164.21
Number of Observations	1613.00	1582.00	1582.00	1456.00	1206.00
*p<.05, **p<.05, ***p<.01					

Table 6					
Military Manpower Logistic Regression Models II					
Variables	Model 6	Model 7	Model 8	Model 9	Model 10
British Origin	-6.21***	-6.28***	-6.23***	-6.81***	-7.34***
	0.93	0.85	0.83	0.81	1.00
Military Size	5.32E-07*	6.03E-07**	5.98E-07	5.78E-07*	5.23E-07*
	2.92E-07	2.95E-07	2.95E-07	3.56E-07	3.16E-07
NATO Membership	-0.76	-0.74	0.22	-0.50	-1.59
	0.99	1.04	1.17	1.40	1.18
Polity Score	-0.08*	-0.06	-0.13	-0.10*	-0.05
	0.05	0.05	0.05	0.05	0.06
Per Soldier Spending	0.00	0.00	0.00	0.00*	0.00
	0.00	0.00	0.00	0.00	0.00
Reserve Ratio	0.01***	0.01***	0.01***	0.01***	0.01***
	0.00	0.00	0.00	0.00	0.00
Army Ratio		1.60E-03	1.54E-03	1.88E-03	1.97E-03
		1.18E-03	1.18E-03	1.17E-03	1.35E-03
Government Status			1.30	0.91	0.45
			1.09	1.20	0.95
Strategic Vulnerability				0.47**	
				0.24	
Temperature					-0.02
					0.07
Precipitation					-0.02***
					0.01
Area					1.07**
					0.53
Elevation					0.14
					0.35
X2	84.57	91.99	95.13	100.09	106.47
Probability X2	0	0	0	0	0
Log Likelihood	-152.02	-152.15	-143.21	-139.96	-134.32
Number of Observations	1206	1206	1139	1129	1129
*p<.05, **p<.05, ***p<01					

Findings

The findings from the various models provide a sampling of the diversity of the international system. Geographic and environmental variables play a key role, though these patterns are not uniform when disaggregated from the Strategic Vulnerability Index. Other key factors that are noteworthy include the strength of legal traditions and the impact of institutional factors. Collectively, these models provide a more complete understanding of the key factors associated with the selection of military manpower policy.

Domestic political variables seem to hold little sway over the selection of military manpower systems. The Polity score of a state has no significant impact in the final model. This variable did achieve conventional levels of significance in other models, thus indicating that this is a factor worthy of further exploration. The sign of this variable does become positively signed in model five, but otherwise remains negatively signed and in the hypothesized direction in all other models. This finding goes against predictions that increases in political freedoms would limit the ability of the government to use coercive methods of recruitment.

The presence of left of center governments in power also has no significant impact on the presence or absence of conscription. This provides little support that leftist governments are any less inclined to adopt policies deemed essential for national security. However, this variable does not encompass the nature and character of the policies which are crafted under these governments. Further research is needed to determine if the type of government has any substantive impact on the nature of policy, as previously literature indicates (Kier 1995).

The presence of British or common law tradition is associated with a negative and significant move away from conscription. This variable is consistent with several aspects of the

literature which focus on the individual rights in these systems based on the political and cultural factors which have led to path dependent outcomes. (Castles 1993; Castles and Obinger 2008; Tilly 1997; Levi 1997; Williams 2005; Mulligan and Schleifer 2005).

Collectively, the domestic political variables regarding government composition and Polity score yielded unexpected weak results, based on the literature (Tilly 1997; Levi 1997). However, the common law legal tradition variable may point to an interesting institutional aspect of system structure which is pervasive in some systems and not in others. This also serves as interesting proxy for cultural differences within democratic systems that deserves further study.

Key organizational characteristics have significant impacts on the adoption of military manpower policy. First, the ratio of the army to other branches of the military provides for a key role in the adoption of conscript policy. This variable remained positively signed but failed to achieve traditional levels of significance. The outcome seems rather surprising because the easiest way to provide more manpower for the army is to use a coercive recruiting method. However, other key institutional factors play a significant role as well.

The ratio of reserves to the total size of the military proved to be a significant determinant of the use of conscription. The reserve ratio was positively signed in each model and significant in every test except for model six. This variable provides some interesting outcomes for the models in that states employing large reserve forces for a system of “total defense” are much more likely to do so via the use of conscription. These systems rely almost entirely on a defensive posture to maintain security. Examples in the international system include Switzerland and Norway. This also shows that the development and use of such systems may engender some level of bureaucratic inertia in which key defense officials become accustomed to a particular force structure and thus stand by such a system. Similarly, the costs of moving away from an

established system of conscription may be non trivial as indicated by Williams (2005) in reference to persistence of conscription in Europe.

Third, the use of per soldier spending based on defense budgets provides support for a move away from conscription as militaries incorporate more advanced technologies. This finding remains negative and significant in the first three models it is used but, loses significance with the inclusion of the reserve ratio. This variable becomes significant in the hypothesized direction and retains the sign across a variety of specifications, though issues of variable interaction often plague exploratory research. In practice, the use of higher levels of spending typically indicates a military with increasing levels of technological sophistication. This is problematic for purely conscripted systems for several reasons. First, conscripts typically serve for a limited period of time. Technological complexity associated with advanced weapons systems requires more of that limited period for training. This diminishes the utility of each soldier and places a higher demand upon the recruiting apparatus. Second, in order for conscription to remain legitimate within society the recruitment and use of said forces must retain the appearance of equality. The presence of generous exemptions and forms of alternative service make conscription into the military a process that perpetuates social inequalities. The use of large cohorts makes the costs of recruiting, training, and maintaining a force with high turnover unattractive to military planners, policy makers, and defense contractors as well.

Finally, the raw size of the military is positively signed and significant for most of the tests. This variable only loses significance in models five and nine, and remains significant in all other tests. This makes perfect sense given the existing needs of states to provide for manpower needs via the least costly method of recruitment, all else being equal.

The next variables included in the models are associated with the concept of Strategic Vulnerability. Several key literatures dealing with areas of high politics make reference to geographic and environmental factors pertaining to the development of military force structure. Two models are used as the key tests of the composite Strategic Vulnerability Index and the disaggregated index. The aggregate measure of Strategic Vulnerability suggests that the overall impact of increasingly difficult terrain and climate results in an increasing need for conscripted troops. This conforms to the traditional mindset that the more difficult the terrain a state finds itself dealing with the more inclined it might be to use a larger force to patrol that territory.

However, the disaggregated model presents some interesting factors. First, the only covariates that are significant relate to the area and annual precipitation. These factors do not retain the same sign, with increased area being associated with conscription, while increased levels of precipitation are associated with moves away from conscripted units. These trends also mirror the other two elements in the index, with mean elevation remaining positively signed with average temperature being negatively signed. Extreme environmental factors lend themselves toward the use of technology to help mitigate these factors, while geographic factors such as size and elevation seem to favor the use of larger conscripted forces. These findings provide fertile ground for new research into the tremendous variation in force structure based on differing operational environments.

Conclusions

The current results show that many of the institutional characteristics associated with militaries around the world have powerful impact on the selection and use of military manpower systems. The most robust set of results are tied to the institutional characteristics of militaries. This finding is supported by the findings that as manpower needs grow via increased size of the

army, increased reserve size, or overall military size the chance of using conscription significantly increases. The practical significance for these variables can take several policy specific functions.

First, states with large standing militaries are obviously more likely to conscript based on simple manpower needs. The ability to recruit and retain large cohorts of draftees requires a substantial commitment of resources which is greatly reduced by the coercive power of the state. Interestingly, this result was not bolstered by the presence of a large ratio of the army to the other branches within a given military. Air forces and navies require smaller but more highly skilled soldiers. However, there is no evidence that as force ratios within a military becomes more balanced, that a state likely to move away from conscription.

Military organizations that are dependent upon the use of advanced technologies are also less likely to use conscription. Higher levels of per soldier spending consistently produced significant negative results. This finding is indicative of a broad trend among industrialized states that need adaptable forces to respond to a variety of small scale engagements around the world. Interestingly, higher levels of spending may constrain states from moving toward conscription simply due to cost and the presence of entrenched domestic defense interests. This factor may lead to a reliance on military contractors or overuse of existing forces as a shift back to forms of conscription may be seen as too politically costly for all but the most serious conflicts (Leander 2005; Mjøset and Van Holde 2002; Kagan 2006; Moskos 2005).

Another interesting finding comes from the ratio of reserves to the entire military. This variable remained positive and significant in all but one of its tests. This factor indicates the presence of some bureaucratic inertia. Reserve soldiers have at a minimum completed basic training and at a maximum may have completed an entire tour and are thus eligible for call up,

frequently to age sixty. This makes a rapid move away from conscription difficult to implement because the nature of the shift requires retraining or retooling of the reserve force to reflect the operational roles or capacity of the desired force structure.

Domestic political variables also had little impact on the selection of military manpower policy. The presence of left leaning parties in the government has no significant impact and was actually signed in a positive direction. This may be indicative of the fact that the need to select a recruitment policy and relationship with defense needs trumps ideology. Further investigation may need to take place with regard to the role of parties in the development and implementation of manpower policy. Research by Kier (1997) suggests that the nature of policies produced may in fact differ based on the ideological leaning of a given party.

An increasing level of democracy was associated with negative and significant impacts on use of conscription. This outcome supports the work of Levi (1997), though the robustness of the finding is somewhat suspect. The impact of increased electoral participation and presence of political rights in the populace provides for a serious check on the role of the governing body. The use of a volunteer or mixed system may isolate the impacts of service on society and thus redistribute the most costly aspects of war, namely the loss of a loved one, onto a politically marginalized set of the population. Similarly, the presence of such an volunteer system greatly undermines any broad based critique brought about by civil society as the soldiers in a volunteer system has taken on occupational rather than institutional character (Sørensen 1994; Moskos 1977; Huntington 1957). Soldiers have effectively self-selected into service, which does not to elicit the same level of sweeping public criticism that large scales conscription does.

The presence of long standing British or common law heritage is negatively and significantly associated with the use of conscription. This is consistent with liberal political

thought that has seen a balance shift from obligations to rights and freedoms in society (Tilly 1997; Flynn 1998; Janowitz 1980). Interestingly, all British systems have used conscription during periods of mass war, but the majority of these systems quickly move back toward mixed or volunteer systems shortly thereafter. This may reflect the needs of the service, but the lack of sustained conscription in the modern period by these states shows a clear and convincing trend.

Next, membership in NATO is not significant in any of the models, though it does seem to be positively signed. This is likely a function of the time period of the analysis. Many of the members of NATO were transitioning toward volunteer or mixed forces, but significant conscripted forces still exist within the alliance (Williams 2005; Haltiner 1998; Leander 2004; Van der Muelen and Manigart 1997). Increases in the available data over time should clarify this trend.

The geographic and environmental variables also provided a set of conflicting outcomes. The presence of a large territory was significantly and positively associated with conscription. Increased levels of elevation seemingly supported this role. These results support the notion presented by Winters and his coauthors (1998) using case analysis of historical impacts of impacts of geography and climate on war. These points are also supported from an operational logic concerning the number of troops necessary to secure a given geographic area (Collins 1998). However, it is also important to note that a purely deterministic approach would be misleading. Key operational aspects and military culture regarding how policy makers react to their environments will also play a pivotal role in the use and adaptation of manpower policy (Collins 1998, Kier 1997, Leander 2004). This initial test shows that the tyranny of distance (Boulding 1962) is also applicable to domestic manpower considerations concerning state size.

The climatic or environmental variables tested were negatively signed. This shows that the presence of these key factors is far less than the uniform character they were given in the classical literature. The classical cases and practical literature regarding military geography seem to support the use of conscription to develop larger manpower needs to overcome the difficulties of environment (Winters et al. 1998; Collins 1998). However, much of this research is based on the historical case experience. Recent trends regarding the diffusion of defense technologies and evolution of military thinking may be root causes as well (Williams 2005; Owens 2006). This argument indicates that shifting norms in defense circles are perpetuated and disseminated across alliance structures through the development and distribution of defense technology.

Collectively, the findings concerning the links between military manpower and geography are present, but far more complex than previously specified. Further investigation will be necessary to explore the range of behavior. Similarly, the Strategic Vulnerability Framework is far from a complete or uniform explanation despite strong and significant findings to support the presence of conscription based on geographic and environmental factors. This ultimately relates to the need to analyze specific cases for a proper discussion of policy implementation and adaptation, given a states' domestic operational environment. Similarly, this framework is also biased toward the presence of a domestic operational environment, though many planners might be more inclined to focus on areas of operations outside of the state, particularly as state interests become increasingly focused on international politics. Future research will need to explore these particular caveats issues at length.

This study provides limited support for the role of geography and the environment in the development of a core pillar of defense policy, namely military manpower policy. The mixed results tend to support the existing literature regarding geographic factors, but environmental

variables produced results that ran contrary to the existing record. Future research will need to explore the linkages between these divergences using more detailed case analysis. Similarly, research into regional variation will be essential to provide an accurate portrayal of geographic and environmental politics on defense policy. In sum, this study moves the scholarly literature one step closer to effectively understanding the linkages between geography and force structure.

Chapter 6

Strategic Vulnerability Revisited

The development of Strategic Vulnerability is a process for testing and exploring key assumptions in the international relations and geography literatures. This project explores one aspect of this question, namely the linkages between the operational environments that states find themselves and the fundamental need to provide adequate defense for this defined territorial unit. A wide variety of research has explored elements of this topic. These topics range from modern research focused on great power politics (Mearsheimer 2001, Kupchan 1994) to classical works (Spykman 1939a; 1939b; 1938a; 1938b; Mahan 1918; Mackiner 1904). Many of these approaches are both overly general and limited when dealing with the true range of force structures in the international system (Leadner 2004; Cohen 1985).

Another key point in relation to this literature is the failure of the geography and politics literature to explore these linkages in rigorous comparative study. Many of the previously cited studies make explicit recommendations about force structure or military composition with minimal supporting evidence to validate these claims. This is a serious shortcoming which greatly limits theoretical development and perpetuates poor planning.

This chapter provides a discussion of the findings of this research endeavor. First, an overview of the conclusions concerning the operational significance of geographic and environmental factors to conflict is presented. These findings promote the operational significance of this research, though additional work must be completed in order to bolster these results. Similarly, additional questions based on this research are also relevant to the development of an ongoing research agenda. Second, the relationship between geography and

force structure is discussed at length. This area of the project yields significant findings for the political and social ramifications of a particular force structure, but limited linkages to the operational environment or geopolitics. This project has explored this linkage with preliminary analyses that have raised more questions than they have resolved. Finally, this chapter provides a brief sketch of future research based on the initial findings.

Implications for Geopolitics

The findings of this study have minimal impacts on the broader role of geopolitics in general policy debates. This is largely based on the fact that geopolitical thought is typically normative in nature and is ultimately subjective. Therefore, these findings are not likely to refute any of the normative aspects of this research. Instead, they serve as an initial test which might inform a general scholarly debate.

Early empirical research has shown that distance is a key factor regarding power projection (Boulding 1962). Work by others has shown the importance of borders, rivers, or other vital infrastructure (Starr and Most 1976, Most and Starr 1980; Starr 2006; 2005; 2002 Diehl 1985; Diehl and Geertz 1988; Vasquez 1995; Tir and Diehl 2002; Ruggie 1993; Senese 2005; Rasler and Thompson 2006; 2000; Wollenbaek et al. 2000). Similarly, the importance of regionalism and nuanced discussions of policy have also shown to be important factors in international politics (Vayrynen 2003; 1984; Goetz 2006; Castles 1993; Castles and Obinger 2008; Lemke 2003; 2003b). This collective body of research has made great strides to inform our debates about the intersection of geography, politics, and defense.

However, classical geopolitical thinking has survived. The appeal of classical geopolitics is rooted in a number of factors. First, the process serves a fundamental political objective for a group, an institution, or a state. Similarly, work in geopolitics tends to be

exceedingly deterministic. Examples and discussions of geopolitical scholarship have been discussed widely in the literature (Frenkel 1992; Lewthwaite 1966; Peet 1985; Spykman 1938a;1938b;1939a;1939b; Mahan 1918; Mahan 1904). Similarly, the nature of geopolitical thinking is fundamentally situational. This allows advocates to approach situations without providing any analytical rigor to the topic at hand. This approach produces policy positions which are not clearly specified and which seek to overgeneralize.

This study provides notable information regarding geopolitical assumptions. First, this project shows that there are clear relationships between environmental factors and conflict duration. This is novel in several key areas. It provides an empirical test more from accurate data sources than previous attempts, albeit over a limited period of time. The results of this analysis show that that environmental factors do have a strong role in the nature of conflict in the international system. However, these results are not uniform across elements in the Strategic Vulnerability Framework, thus inviting a range of new research questions. Future research in this area will make important contributions to the applied military planning literature and to the academic work in areas of conflict.

Second, the results of this study raise a series of questions regarding impacts of environmental factors across a range of conflicts. Militarized Interstate Disputes are common events, but similar questions could be raised by focusing on enduring rivalries, interstate wars, or civil wars. Similarly, there could be significant issues of selection bias in the initiation of conflicts which could also be explored. Finally, this research also opens the door for a sustained exploration of policy adaptations to a wide variety of environmental circumstances.

The next issue to arise concerns the development of appropriate methods to use and perpetuate geographic data in regards to defense planning. There is no clear consensus in the

literature as key scholars seek to avoid contextual explanations (King 1996) in light of discovering the appropriate parsimonious explanation. Others seek to move away from any attempts at empiricism (Taylor 1991; Dalby 2007) in favor of contextual understanding. The balance inherently lies somewhere between the two camps methodologically and substantively.

Another relevant point relates to the nature of the audience for these works. The great strides that have taken place in the political science and geography literatures regarding the role of key factors in conflict have had little if any applied or policy specific recommendations. This is particularly true for any potential linkages relating to military manpower policy or defense policy. Applied research (Collins 1998) has also failed to provide much reference to approach any of these broader assumptions (Fettweis 2006). A result of this project is the development of new methods to explore the linkages between environmental factors and defense policy. This analysis shows that there are trends of empirical support between force structure and military manpower systems. These results are preliminary in nature, but provide a new basis for a sustained conversation about classical geopolitical assumptions about force structure.

The key question arises regarding how to appropriately test the classical assumptions of geopolitics and defense policy. This is a particularly complex process given the intersection of multiple disciplines and variety of theoretical and methodological concerns which must be addressed. Katzenstein (1996) provides the best example by providing a forum for scholars from competing theoretical perspectives. The problem relating to the assumptions of geopolitics also reflects the bifurcation in security studies. This takes place between the heavily empirical works and the more qualitative works in the field. This method of creative interplay with a specific focus on understanding a broader topic is perhaps the best way of approaching any topic in the social sciences. This approach also provides clearly falsifiable research from other methods in a

book format, thus allowing for a more encompassing discussion of the questions at hand (Popper 1963; Ricci 1984).

Similarly, the use of theoretical models that allow for the most appropriate nature of interaction is of utmost importance for future work. The work of the Sprouts (1971) regarding the role of an ecological perspective is an example of a model in which agency is preserved in light of natural structures which are typically deemed as being deterministic. Sociological models presented by Giddens (1984) and more recent work in political science by Wendt (1995; 1987) are prime examples of approaches that provide explicit recognition of agency and ideas in the international system while remaining open to existing structures and institutions. This should also serve as the basis for subsequent research in this field of study, namely because of the lack of substantive research into the very basic assumptions proposed and perpetuated by scholars of geopolitical thought.

Most modern statistical methods account for this determinism with a tacit understanding that the methods being incorporated are probabilistic and that the underlying distribution of covariates represents the best possible fit for the given data. However, this tacit assumption is rarely reiterated in any substantive fashion. This also happens to be the dominant form of analysis in the political science literature. Linking this research to broader issues in public policy debates rarely occurs. This project is rooted in this approach, but recognizes the importance of diverse methodological approaches.

Future work associated with this process will therefore seek to retain a structured empirical basis, but will also seek to provide policy relevant case examples. The lack of case materials in this research greatly limits the applicability, though explicit concerns about agency and the appropriate interpretations have been made throughout the research process. Similarly,

the use of a mixed methods approach will also contextualize the findings to the unique country and regional specific factors, some of which have vaguely been controlled for in the empirical process. This will promote a useful and vibrant research agenda while removing the focus on technical expertise needed to approach the topic in its current format. Similarly, this will open a wide variety of regional and case specific studies based on the data and methods that are present in the Strategic Vulnerability Framework.

Geography and Manpower Policy

Tests between the linkages of geography and force structure provided some mixed, but valuable results. The classical assumptions regarding force structure typically assume some typology is appropriate for the functional discussion of military manpower needs (Mjoset and van Holde 2002; Cohen 1985; Jannowitz 1977). Similarly, scholars making geopolitical arguments also assume a broad heuristics to represent sweeping categories of manpower policies and foreign policy postures. These theoretical arguments fails to provide useful analysis that can inform policy debates.

The results from the analysis in chapter 5 presented some interesting outcomes. First, the presence of key domestic and institutional variables plays a central role in shaping the domestic military manpower policies of states. This is important because previous studies have associated force structure as a function of foreign policy objectives. This approach fails to recognize the importance of key institutional factors that play a pivotal role regarding the selection of a military manpower system. In addition, the pure reliance on force structure from a broad based foreign policy position invariably limits the discussion to the current objectives of states, while failing to recognize the entrenched societal interests associated with these policies. Key

variables such as the presence of common law legal traditions show that deep seated cultural norms also cannot be excluded in determining how states organize their militaries.

The findings in relation to the geographic and environmental factors did not produce the same level of uniformity associated with the geopolitics literature. First, the presence of increasing area is associated with a use of conscription. This is a logical outcome given the nature of previous theoretical positions. Similarly, the presence of increasing levels of elevation was positively signed, but failed to achieve conventional levels of significance. The more rigorous the operational environment the more likely a state will be to use conscripted forces.

The climatic variables produced unexpected results. First, the presence of increased levels of precipitation was positively and significantly associated with the use of volunteer forces. This is exactly the opposite of the predicted model of behavior for states in the international system given the classical literature. The classical literature assumes that more difficult environments should require larger forces. Similarly, the presence of more extreme temperatures was similarly signed, though this variable did not achieve traditional level of significance. These findings indicate that a tremendous amount of variation in the international system deserves additional attention based on the operational environment of states and the nature of key institutional characteristics.

Perhaps the one area that this analysis failed in regard to modeling the development of manpower policy effectively was the nature of foreign policy objectives. This assumption is extremely difficult to code as states typically do not claim to be “status quo” or “revisionist”. Indeed, the presence of such a title or category is subjective. However, attempts to explore the level or change in state interest would provide a useful tool in future research into this core assumption associated with geopolitics.

Another key issue with the handling of data has to do with poor quality data for the majority of the geographic and environmental data. First, the digital elevation model used is a poor measure of elevation for states. Future studies will explore superior operationalizations for this key factor. Second, the quality of all the environmental factors suffered greatly as it moved into the developing world. These data were interpolated from point data that are increasingly sparse in the developing world (Mitchell and Jones 2005). Finally, several scholars note that the structure of states may not be a pure function of raw area, but of vulnerability based upon the unique geographic shape or the presence of key infrastructure within a bordering region (Collins 1998; Starr and Most 1976; Siverson and Starr 1990; Diehl 1986). These findings provide key linkages that were not explored and which raise interesting concerns for future projects.

Another area of concern is the role of regionalism on the impact of geography and force structure. Chapter 3 provided clear evidence that militarized interstate disputes are not normally distributed in the international system. This would support the works of other scholars that many behaviors cluster in both space and time (Gleditsch and Ward 2000; Diehl 1991). This would also serve as a linkage to other key areas of the international relations such as enduring rivalries or other conflict processes. Further modeling of this process will be an essential portion of moving forward with this research.

Finally, the theoretical premise that Strategic Vulnerability operates upon is the basis of uniform limitations of technology over nature. This premise holds well in formal models (Boulding 1962), though the notion that this would eliminate other political factors is also trivial. Future research is needed to explore how states with different geopolitical conditions approach applications of technology. This would also provide stronger links to the security studies and strategic culture literatures.

The initial findings from this project have expanded the research options into the interplay among geography, the environment, and national security. First, this project presents the first broadly based empirical approach to exploring the impacts of geographic and environmental factors on conflict. Second, the classical linkages between environmental factors and force structure were also explored empirically. Results from these two empirical models provide the basis for expanded empirical investigations of these relationships. These empirical observations in this project are part of a broader goal of developing a new framework for evaluation in Strategic Vulnerability. Building upon the diversity of the environmental conditions in the international system, this theoretical framework seeks to provide a structure for the material and ideational aspects of security. This provides an essential portion of any investigation that seeks a fuller understanding of the linkage between the environment and defense policy by providing a clearly defined structure from which to proceed.

A Future Research Agenda

The ultimate goal of a dissertation is to produce a document which provides an area of fruitful research for subsequent years. This project achieves that end. This research provides a wealth of new questions that have been produced as a result of a desire to test a basic assumption in the geopolitics literature. The results of this project have produced several new questions regarding the role of geography in conflict, geopolitics, and force structure that will prove fruitful for some time.

First, the role of geographic and environmental factors needs to be explored in depth across a range of conflicts. This was greatly limited by the lack of geocoded conflict data. Militarized interstate disputes provide the most abundant form of international conflict but fall

short of a complete discussion of the range of behaviors in the system. Similarly, exploring civil wars and other conflicts would provide a more complete understanding of the way in which defense planners across a range of cases view manpower policy in light of different threats.

Key limitations in this area are being overcome. Recent work by Braithwaite (2006) is providing better and more accurate data for future projects incorporating geographic elements of conflict. Another key limitation is the inability of GIS applications to model time series processes due to issues of topology (Yuan 2008). This will invariably be resolved in time and will allow expanded time series with high resolution data, thus improving our understanding of a variety of conflict processes.

Second, the application of the measures from the Strategic Vulnerability Framework can also be used to explore conflict initiation. This seems like an obvious question, but no empirical efforts exist to explain under what range of phenomena states engage in conflict (Winters et al. 1998). Exploring this question would provide useful information for defense planners and academics. The results would also be useful in examining any potential selection bias for the models in Chapter 3. Presence of selection bias based on the optimal climatic conditions would only further the importance of geographic and environmental factors.

Third, future work needs to explore the relationship between the defense community and the geographic and environmental conditions that states are facing. This would be best suited to provide a fuller understanding of the linkages between state defense and broader strategy as it relates to geography and the environment. This would also help explore the policy literature regarding path dependence (Wilensky 2002; Castles 1993; Castles and Obinger 2008) and policy learning (Rose 2004). Ultimately, these types of studies served as the initial basis for the design

of this project. After empirical investigation, this research has ended up being part of a necessary step for future research.

The military manpower literature also gains a great deal from this project. First, the ability to explore the classical linkages and evaluate the broad trends in the system are extremely important. Further theoretical development is necessary between institutional, historical, and political factors. Similarly, the role of geographic factors of states and the political characteristics of the regions they find themselves are essential for tackling these questions.

A second area of future research is to link the development of force structure and geography using cluster analysis. Exploring what types of clusters develop based on existing patterns and shifts over time in the international system would provide useful information about policy diffusion, particularly if states with wildly different geographic conditions are adopting similar types of force structures. This might also help capture the dynamics of the Families of Nations arguments similar to Castles and Obinger (2008).

The process of exploring the linkages between geographic factors and force structure is a challenging process. This project has explored these key factors across a wide range of states in the international system. First, this study has shown that geographic and environmental factors matter in the most frequent types of international conflict. This provides empirical support to operational linkages between geography and the conduct of war (Collins 1998; Winters et al. 1998, Geuvara 1961, Sun Tzu 1963; Clausewitz 2008; 1832). However, this strong tie between geographic and environmental factors does not carry over into the development of force structure. The results of this process have shown that simple assumptions are not insufficient tools for producing a clear understanding of force structure development. Key factors impacting this process include the role of path dependence, institutional characteristics of the military, and

geographic and environmental factors. These findings place call into question simple linkages between geography and force structure found in the classical geopolitics literature by noting that a more nuanced perspective is necessary. In sum, this project has succeeded in exploring the some of the linkages between geography and force structure while developing new questions for future research.

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