Mind The Gaps!
Clustered Obstacles to Mobility in the Core/Periphery Hierarchy

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Abstract: The primary concern of this chapter is with global structural inequality, which we address by examining the shape and distributions of global economic and military power from 1960 through 2015. We find that despite several changes in the distributions that occurred in the first decade of the new millennium, there has been a tendency for the convergence of countries into groups or clusters with empirical gaps between the clusters. Both the economic and military distributions are trimodal, displaying a —core-semiperiphery-periphery structure. These findings are consistent with the world-system perspective and the economic clustering confirms what economists have called "convergence clubs". Regarding the military distribution we also found, in addition to the trimodal distribution, a military superpower – the United States at the top of the hierarchy. This is the main difference between the economic and military distributions. Economic power is more evenly shared among core states than is military power. We seek to explain why the distributions of economic and military power are lumpy rather than continuous. What is the nature of economic development and military competition in the modern world-system that causes countries to group together in three clusters? What causes these gaps?

Arguments have been made by scholars in economics, political science and sociology that variables such as economic exploitation, political domination, corruption, illiteracy and average low educational attainment, ethno-linguistic fractionalization and dependence on foreign financing constrain the abilities of countries to move up or down in the global hierarchy. We extend this research tradition by adding the study of the shape of the distribution of military power and comparing that with the shape of the distribution of economic power.

Introduction

The modern capitalist world-system is structurally unequal and undergirded by a stable hierarchy in the international division of labor. A major characteristic of this hierarchy is a lack of substantive mobility for countries within this system. World-system scholars have different ways in which they empirically determine where countries fall in this hierarchy. Some use network links between countries (e.g. Snyder and Kick (1979), Nemeth and Smith(1985), Mahutga and Smith (2011) while others rely on attributes of countries that are deemed to be consequences of or indicators of global power-

dependence relations (e.g. (Bornschier and Chase-Dunn 1985; Arrighi and Drangel 1986); Grimes 1996; Babones 2005; Karatasli 2017; Grell-Brisk,2017. [1]

Yet, no matter the method, the findings all show a substantial degree of clustering of countries into core, semiperiphery, and periphery zones with real empirical gaps [2] between the zones. Still, the argument has been made that terms like core, semiperiphery, and periphery are only heuristic labels that facilitate discussion of different levels of what is really a continuous multidimensional hierarchy without gaps (Chase-Dunn 1989) [3] In his most recent publication on this issue, David Smith (2018) contends that Chase-Dunn's notion of a continuous multidimensional core-periphery hierarchy is most likely correct (see also Mahutga and Smith 2011)

Most world-system scholars, though, have found that countries indeed do cluster into separate groups that constitute zones in the core-periphery hierarchy. Karatasli (2017) notes that GNP per capita is itself an artifact of how decolonization and population settlement have produced national containers. But using the same GNP per capita data as Arrighi and Drangel (1986), Taylor (1988) removed the national containers by disaggregating the population data into equal sized cells (bins) (a method developed by political geographer, John Cole (1981) and also employed Salvatore Babones (2005). Taylor found that, despite severe spatial reorganizations of the data, the results were

[1] Relational network measures use formal network analysis with direct measures of interactions among nodes (countries) such as trade whereas attributional measures use attributes of countries, such as GNP per capita, to infer positions in a larger hierarchy.

[2] The use of the term "gap" has most often been applied to the core/periphery hierarchy as a whole. The idea of a "widening gap" implies that the magnitude of global inequality is increasing. Here we are investigating a different problem – the existence of gaps between the core and the semiperiphery and between the semiperiphery and the periphery. Rather than seeking to explain why the whole hierarchy is reproduced or why global inequality is increasing or decreasing, we are asking why the distributions of economic and military power are "lumpy" -- not a smooth continuous distribution from low to high but rather a discontinuous distribution with gaps between groups of countries.

[3] Chase-Dunn (1989:166–98) said that the core/periphery structure is "a nested hierarchy of multilevel and overlapping regional and organizational boundaries." He proposed that the empirical core/periphery hierarchy was probably a multidimensional set of continuous distributions but the evidence provided in this paper supports the existence of gaps in this hierarchy.

quite similar to Arrighi and Drangel's, including the gaps between the periphery and semiperiphery and semiperiphery and core.

Other non-world-system scholars have found similar results (Bianchi 1997; Henderson, Parmeter, and Russell 2008; Paap and van Dijk 1998; Romer 1986). Not only do countries clearly cluster into separate core, semiperipheral and peripheral zones, but the difficulties of upward mobility have been shown empirically (Pittau, Zelli, and Johnson 2010; Quah 1996). Immanuel Wallerstein (1974a) and other world-system theorists contend that the core/periphery hierarchy and the existence of a semiperiphery are structural characteristics of the modern capitalist world-system.

The mechanisms that are claimed to reproduce this hierarchy explain the existence of reproduced structural inequality, but do not explain why the hierarchy is not continuous. The real existence of gaps requires examination and theorizing about the mechanisms which impede upward and downward mobility in the world-system. The research reported here uses the method developed and used by Giovanni Arrighi and Jessica Drangel (1986) in their study of the long-term shape of the core/periphery hierarchy.

Method and Data

In this chapter, we calculate both the world distribution of wealth and world distribution of military power using the Arrighi and Drangel (1986) approach. The logic for the Arrighi and Drangel (1986) method is based on the idea that world-system positionality is not determined by any one particular mix of "peripheral-type"/"core-type activities" (Wallerstein 1974b) since what is "core-like" today may change tomorrow (Arrighi 1990; Arrighi and Drangel 1986). Rather, it is the result of the systemic outcome of creative and not-so-creative destruction (see Joseph Schumpeter's (1942) concept of creative destruction) brought on by the struggle over the benefits of the world division of labor (Arrighi 1990; Arrighi and Drangel 1986). Therefore, "core activities command aggregate

rewards that incorporate most, if not all, the overall benefits of the world division of labor, whereas peripheral activities command aggregate rewards that incorporate few, if any, of those benefits… The differences in the command over total benefits of the world division of labor must necessarily be reflected in commensurate differences in the GNP per capita of the states in question " (Arrighi and Drangel 1986:31). This approach allows us to largely determine the world distribution of economic power based on the benefits reaped from the world division of labor.

Arrighi demonstrates that the reproduction of global inequality is more complicated than simple exploitation of peripheral countries by core countries and that the spatial unevenness of Schumpetarian techno-organizational changes (brought on by unilateral transfers of capital, labor, unequal exchange, and unequal rewards at different nodes in the commodity production chain) plays a key role (Arrighi 1990). Our initial theory was that, based on the existing literature, the persistent convergence of countries into core, semiperipheral and peripheral groupings and the resulting gaps in the distributions might be due to the use of GNP per capita as an indicator. We supposed that examination of a different dimension of global power – military capability-- might produce demonstrable differences in the world-system hierarchy. For consistency, we calculated the military distributions using the Arrighi and Drangel method.

The Arrighi and Drangel method involves plotting each country's population as a percentage of total world population by its log GNP per capita in intervals of one-tenth. The (population) distribution is then smoothed by a three-interval moving average. We adhere to this method but we use several variations such as GNI, ~~and~~ GNI per capita rather than GNP, military expenditure by country, and smoothed and unsmoothed distributions for comparison, each producing similar, yet interestingly different results.

The gross national income (GNI) per capita (10/13/2016 download), gross national income (GNI) (1/19/2018 download), and population (10/13/2016 download) data are

from the World Bank (WB) (World Bank 2016).[4] According to the WB's formal definition, the current GNI per capita indicator, is its old GNP indicator (2016), which was an estimate of the monetary value of all domestic economic transactions that occurred within a nation over a period of one year.[5] Both the GNI and GNI per capita are converted from the country currency into U.S. dollars using the WB's Atlas Method. The Atlas Conversion Factor is a three-year average of exchange rates used to smooth the effects of transitory exchange rate fluctuations, adjusted for the difference between the rate of inflation in the country and that of several developed countries (also using a weighted average of those countries' GDP deflators) (World Bank 2014). This measure is good for comparing the relative sizes of national economies. For per capita calculations, the GNI in US dollars is divided by the country's midyear population. In this study we use GNI per capita as a proxy for the level of national economic power derived from the world division of labor.

The estimates of total military expenditure by country are from the Stockholm International Peace Research Institute (SIPRI 2017) and are in constant 2015 US dollars (12/23/2017 download). We do not use the per capita military expenditures because this is a measure of the capital-intensity of a country's military. We are interested in the global distribution of the military capability of nation-states and this is best estimated by knowing the amount of money that each state spends on the military in each year. We acknowledge that the figure for the United States includes expenditures on non-arms related acquisitions but, despite the inclusion of a lot of non-military items under the category of military expenditures, relative military capacity is well captured by this variable.

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[4] The data we used for this study and additional tables and figures are in the Appendix at http://www.irows.ucr.edu/cd/appendices/irows128/gapapp.htm

[5] The difference between GNP and GDP is net factor income from abroad, which is included in GNP but not in GDP. Net factor income from abroad includes debits and credits from foreign investments and other payments to flow in and out of the national economy.

Results

The most important and novel result in our study is our finding of clustering/convergence of countries in the global distribution of military power across states and the resulting gaps between the clusters. Unlike the zones in the "economic" power distributions, which were trimodal (except in 2000) with 2 gaps (see Figure 1b), there are usually three or four gaps in the military distributions (see Figure 1a). This could imply that mobility within the world military hierarchy is even more of a challenge than in the economic hierarchy. We also found, as was expected, that the bulk of global military power is concentrated within the core (see Figure 1a.), but with each new iteration, the percentage of total world population with significant military capacity is increasing. This is primarily because of the rise of China and India, two populous countries that are acquiring substantial military capabilities.

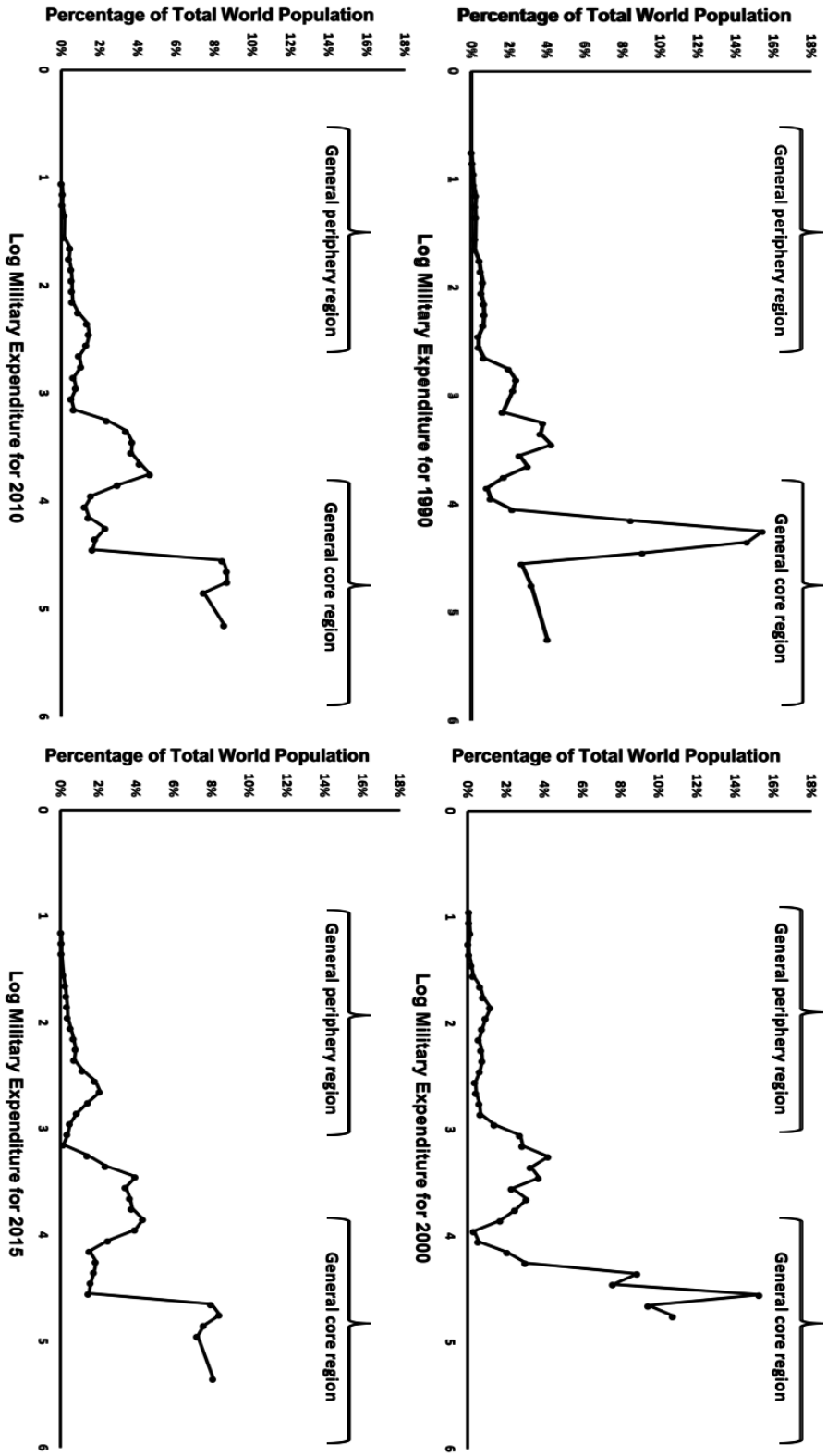

Figure 1a: Distribution of global military power, 1990-2015

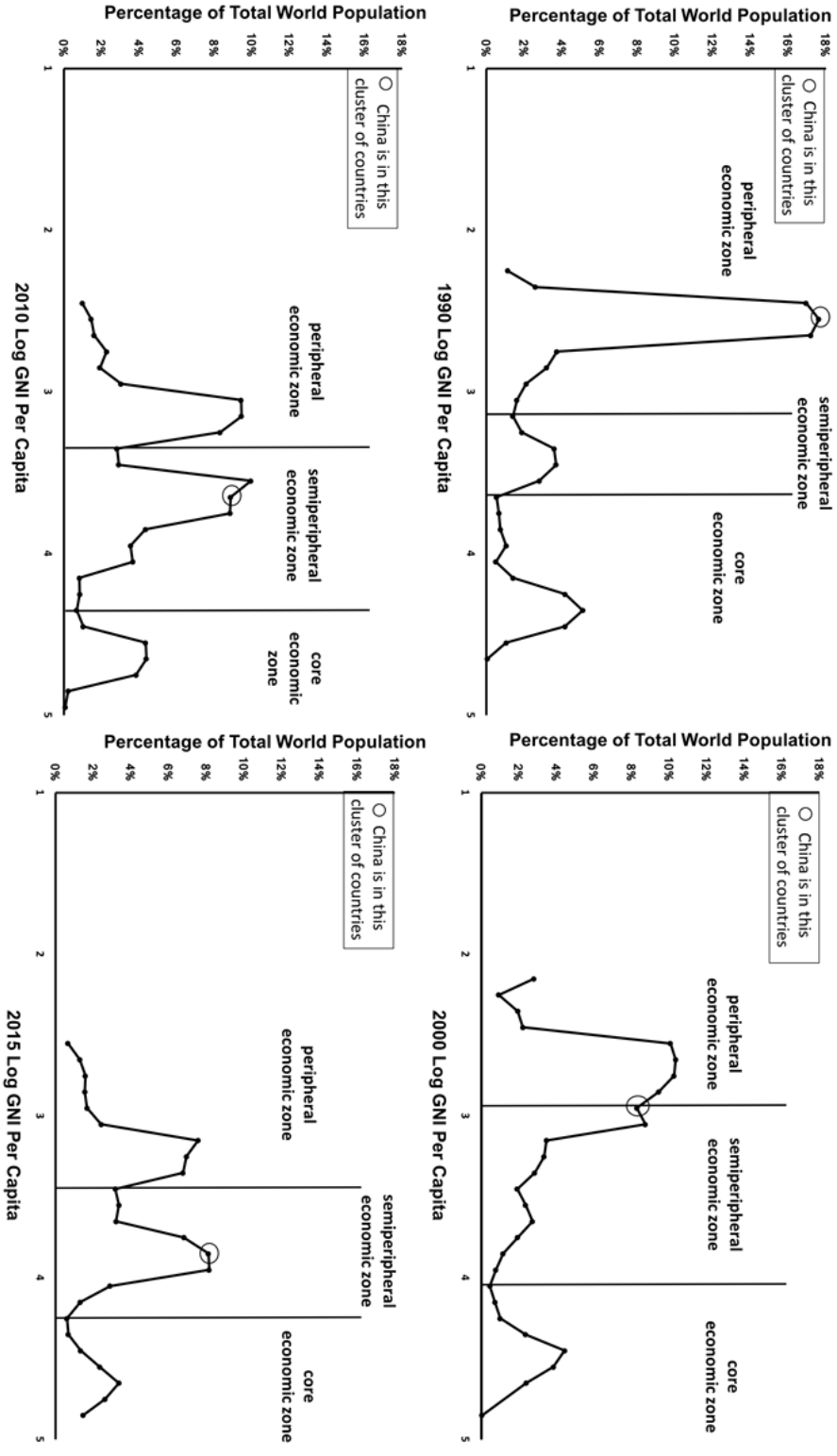

Figure 1b. Trimodal world-economic distribution of wealth, 1990-2015. *Source: Grell-Brisk (2017).*

As can be seen in Figure 2, the economic and military distributions are, for the most part, the inverse of each other. Most of the world's poor are found in the peripheral region and majority of the world's military power is in the core. Furthermore, there is a substantive entanglement between military power/capacity and its economic counterpart in the hierarchical world-system. This intricate tie is shown in Figure 2. While some might argue that it is obvious that the more economically advanced a country might be, the better its military capacity, based on world-system positionality determined by the Arrighi and Drangel approach, this is not altogether true. There are certain countries which rank high based on the GNI proxy, such as Sweden or Norway, commanding significant benefits from the global division of labor, but hold relatively minimal military power. This is not due to deficiencies in the measurement per se. For example, Samuel Cohn and his coauthors have demonstrated that Norway managed to be in the core by commanding significant benefits from the global division of labor, not through exploitative means but through "un-exploitative development" (Cohn and Blumberg 2015; Cohn and Upchurch 2017). Luck may have played a significant role in terms of the country's geographic location. Having access to a valuable fishery and the ability to use a low-capital-intensive technology (canning) allowed the middle-class to use its own capital to fund technological advances.

Still, semiperipheral and peripheral states understand the implicit power dynamic and dominance that can be exerted by those core states wielding military strength. Further, any challenge to the existing world-system structure must be backed by some show of military capability. This is not lost on China and Russia today. In the case of China, the expansion of military bases to Djibouti on the African continent and its aggressive stance in the South China Sea dispute with the Philippines (Batongbacal 2016;

Bodeen 2016; Xu 2014) show that the leadership of the PRC understands that global power is both economic and military.

The basic assumption would be that there is a strong correlation between economic power position and military capacity. Obviously, one must have some economic power to spend on the military. However, there are many countries (such as Finland or Norway) with strong economic power positions that do not spend significant amounts on their military. In Table 1., we document our findings on cross-national correlations between military and economic power. There is not a particularly strong correlation between the two. The correlation coefficient improves after removing China and India from the calculations, but only early on when there is a significant difference between their economic and military power position (see Table 1. and Table 2.).

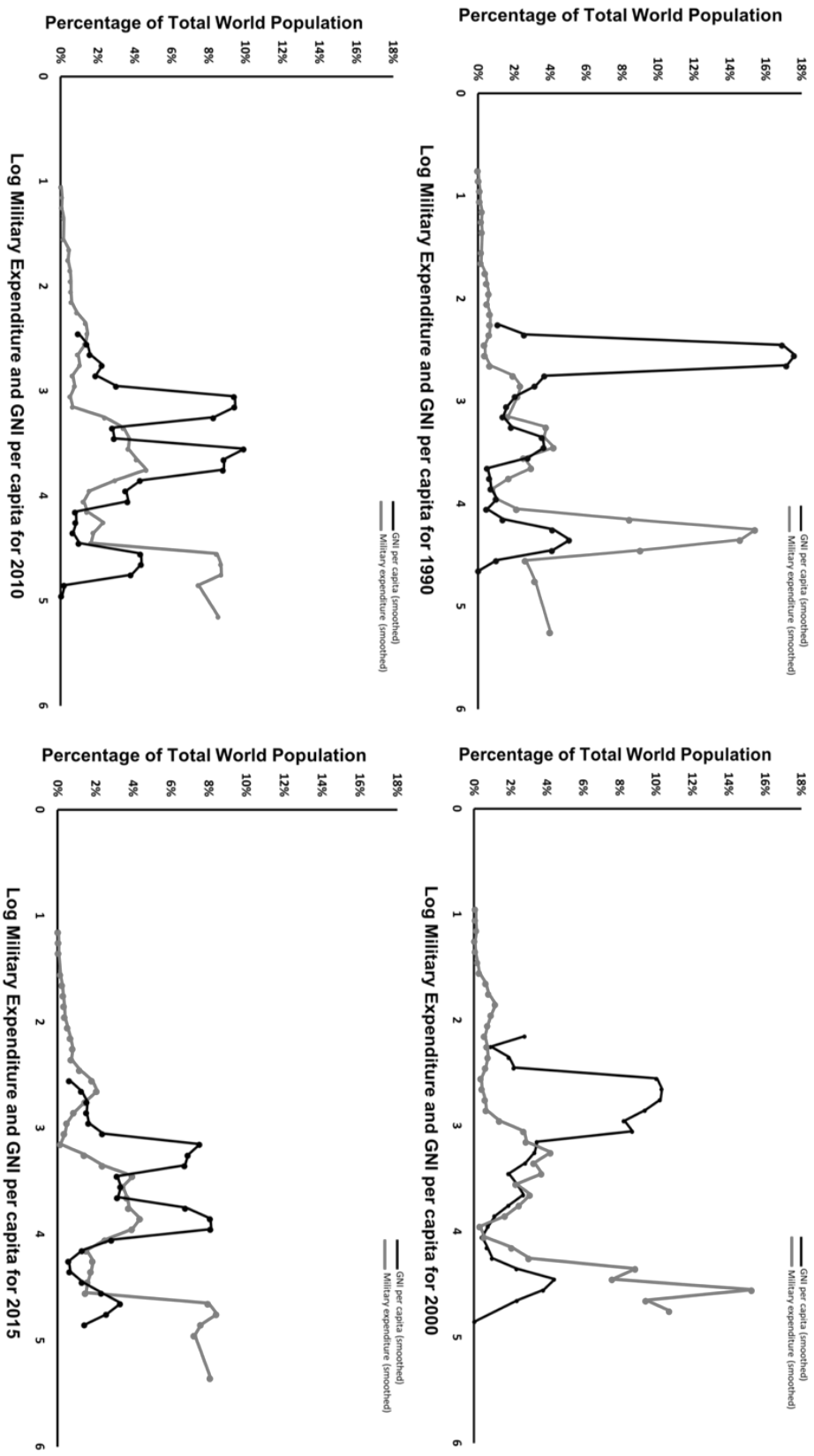

Figure 2: Distributions of economic and military power, 1990-2015

Table 1. Cross-National Correlations between Military Power Position and Economic Power Position

Year	N	Correlation Coefficient	Correlation Coefficient w/out China and India
1990	105	0.604161288	0.65769541
1995	131	0.629595265	0.66477545
2000	138	0.60094603	0.63168494
2005	148	0.601599216	0.62850597
2010	147	0.566997698	0.59182792
2015	136	0.570314666	0.59096467

If we apply the same cut-off points for core positionality[6] determined by Grell-Brisk (2017) to the military distribution, key semiperipheral countries (Brazil (except in 2010), Russia, India, China) are included in the military core (see Figure 1a. and Table 2 for the list of countries). This again demonstrates the impact of China and India, on the shape of the distribution of global power, with both countries initially in the periphery and eventually making it into the semiperiphery. Grell-Brisk (2017) has argued that a greater proportion of the world population has been moving toward the center of the world-economic distribution and this is also reflected in the military distribution in 2010 and 2015 compared with 1990 and 2000 (Figure 2.). Additionally, the military distributions are somewhat irregular and spasmodic after 2000, similar to what Grell-Brisk (2017) found for the distribution of economic power after 2000. This may be one of

[6] In Grell-Brisk (2017), for each year's economic power distribution, a determination is made as to the cutting points between the core, semiperiphery, and periphery. This is done by first determining the median point (or median cluster of countries) in the distribution of that year. The cutting points for the semiperiphery for that year is based on the local *minima* in the immediate right and left of that median point. So, for example, in 1990, the median cluster was 3.45 and the semiperipheral economic zone would be countries falling within the 3.15 to 3.65 cluster; to the right of that would be the general core zone and to the left of that the general periphery zone.

the consequences of the global economic and political crisis and the declining hegemony of the United States (Chase-Dunn, Kwon, Lawrence and Inoue 2011).

In Table 2, we indicate which countries fall into the military core based on Grell-Brisk (2017) method used to determine a country's position in the global economic hierarchy. We observe a shrinking military and economic core, as both become concentrated to a few countries. There is a large fall off between 1990 and 1995 after which there is further concentration in 2010. There is most likely a strong correlation between this trend and global political instability (such as the fall of the Soviet Union) and nationalist movements or internal political turmoil (such as the breakup of Yugoslavia or China's continued efforts to isolate Taiwan). There was significant military spending in the nineties but that tapered off as some of these issues resolved themselves. Semiperipheral economic countries that find themselves in the military core are most likely to still dealing with internal nationalist or separationist issues.

The Arrighi and Drangel study (1986) and the Grell-Brisk article (2017) employed a three-point moving average, which smoothed the data.[7] This made sense because the focus was on the overall shape of the distributions. But for military power smoothing obfuscates a very important factor – the mammoth that is the United States' military capacity. Figure 3 shows both the smoothed and the unsmoothed distributions of military power. The United States is all on its own to the extreme right of the rest of the country clusters in the unsmoothed distribution. The United States consistently spends three times as much as the second country in the hierarchy, China (2016 data is found in Figure 4.). This produces a colossal gap between the rest of the core and the United States in terms of military capability. Some call this "global 911" and others call it a *de facto* global empire. But the literature on modern hegemony, especially that part of it that is

[7] The use of a moving average is a way to smooth time-series data. It smooths out short term fluctuations and makes longer-term trends easier to see. The first element of the moving average is obtained by taking the average of the initial subset of three data points. The next value is calculated by shifting forward one time-period (year) and recalculating the average. The result shows the changes in these three-year averages.

influenced by Antonio Gramsci's (1971) analysis of ideological hegemony, notes that much more than military power and economic power are involved in the form of global governance produced by the hegemon. Coercive power by itself is too expensive and ineffective. It must be paid for and it must be supplemented by the consent of at least some of the governed. Thus, the modern hegemons have all purveyed visions of universal values that they claim are in the interests of all humanity and that they purport to uphold. For the United States this has taken the form of "leader of the free world." The vast and expensive U.S. military capability, with 782 military bases distributed across the globe, was legitimated by the Cold War with the Soviet Union until its collapse. Since then it purports to keep the global peace against terrorists and rogue states. This military predominance is unstable in part because it contradicts its own ideology of legitimation. The commander in chief (the U.S. president) is not elected by the people of the world.

Table 2. Comparing core military power to Grell-Brisk's (2017) calculation of world-economic position.

1990		1995		2000		2005		2010		2015	
Military Core	Corresponding Economic Rank	Military Core	Corresponding Economic Rank	Military Core	Corresponding Economic Rank	Military Core	Corresponding Economic Rank	Military Core	Corresponding Economic Rank	Military Core	Corresponding Economic Rank
US	Core	US	Core	US	Core	US	Core	US	Core	US	Core
USSR	*	France	Core	France	Core	China	Semiperiphery	China	Semiperiphery	China	Semiperiphery
Germany	Core	UK	Core	UK	Core	UK	Core	UK	Core	Saudi Arabia	Core
UK	Core	Germany	Core	China	Semiperiphery	France	Core	France	Core	Russia	Semiperiphery
France	Core	Japan	Core	Germany	Core	Japan	Core	Saudi Arabia	Semiperiphery	France	Core
Japan	Core	Italy	Core	Japan	Core	Germany	Core	India	Periphery	UK	Core
Italy	Core	China	Periphery	Italy	Core	Saudi Arabia	Semiperiphery	Russia	Semiperiphery	India	Semiperiphery
Saudi Arabia	Core	Russia	Semiperiphery	Saudi Arabia	Semiperiphery	India	Periphery	Germany	Core	Japan	Core
China	Periphery	Saudi Arabia	Semiperiphery	India	Periphery	Italy	Core	Japan	Core	Germany	Core
India	Periphery	S. Korea	Core	Russia	Semiperiphery	Russia	Semiperiphery	Italy	Core	S. Korea	Core
Kuwait	*	India	Periphery	S. Korea	Semiperiphery	S. Korea	Core	S. Korea	Semiperiphery	Italy	Core
Canada	Core	Spain	Core	Turkey	Semiperiphery	Brazil	Semiperiphery			Brazil	Semiperiphery
Spain	Core	Brazil	Semiperiphery	Spain	Core	Spain	Core			Australia	Core
S. Korea	Core	Canada	Core	Brazil	Semiperiphery	Australia	Core				
Brazil	Semiperiphery	Turkey	Semiperiphery	Australia	Core	Israel	Core				
Israel	Core	Australia	Core	Israel	Core	Canada	Core				
Australia	Core	Israel	Core	Canada	Core	Venezuela	Semiperiphery				
Netherlands	Core	Venezuela	Semiperiphery			Turkey	Semiperiphery				
Turkey	Semiperiphery	Netherlands	Core								
Venezuela	Semiperiphery										
Czechoslavakia	*										
Switzerland	Core										
Belgium	Core										
Sweden	Core										
Poland	*										
Greece	Core										
Argentina	Semiperiphery										

***World-economic position unavailable.**

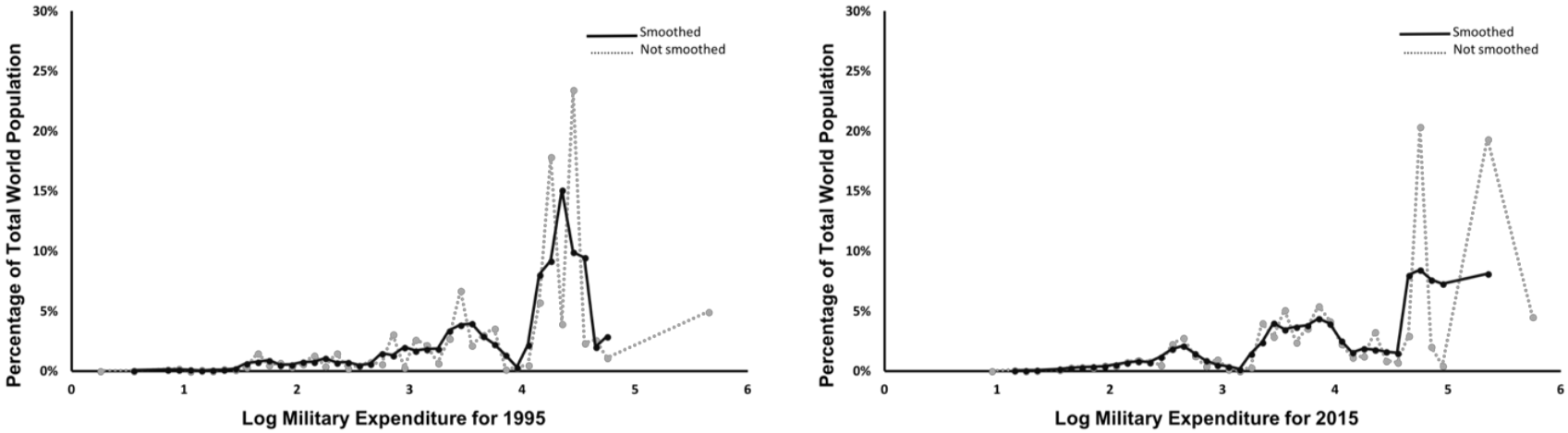

Figure 3. Unsmoothed military power distribution.

The smoothing issue for military power raises the issue of what the distribution of GNI per capita would look like if it were not smoothed. Our examination of this unsmoothed distribution shows that it does not reveal a large gap between the economic power of U.S. and rest of the core as indicated by GNI per capita.[8] This is an important difference between the distributions of the two kinds of power. Military power is expensive. During the long period after World War II in which U.S. had a substantial comparative advantage over competitors its military predominance was paid for by taxes on profits from the domestic economy and on sales of goods abroad. The decline of U.S hegemony in manufacturing production and the rise of competitors abroad has produced this mismatch of economic and military power. The U.S. has been able to afford huge military expenditures without raising taxes because of financialization: it prints world money and sells bonds and real estate to governments and investors abroad. This is the fruit of having been at the top of the capitalist world economy since World War II, but these advantages cannot be relied on forever (Chase-Dunn and Inoue 2017).

Arrighi and Silver argue that it is the bifurcation of military and financial power under the US hegemony that is preventing the current crisis from further deterioration – "the present [system-level] crisis has no inherent tendency to escalate into a war among the system's most powerful units…" (Arrighi and Silver 1999). It would seem then that the system, is currently in suspended semi-controlled chaos. In terms of the military capacity of states in the distribution, the gap between the US and the rest appears too vast to overcome.

[8] See Figure A1 in Appendix at http://www.irows.ucr.edu/cd/appendices/irows128/gapapp.htm

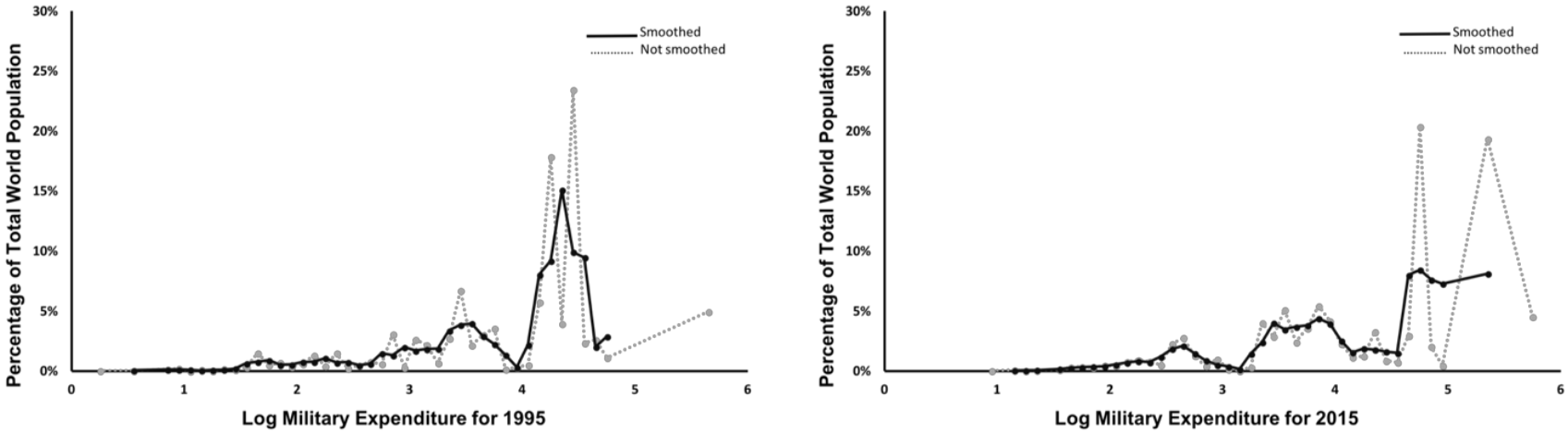

Figure 3. Unsmoothed military power distribution.

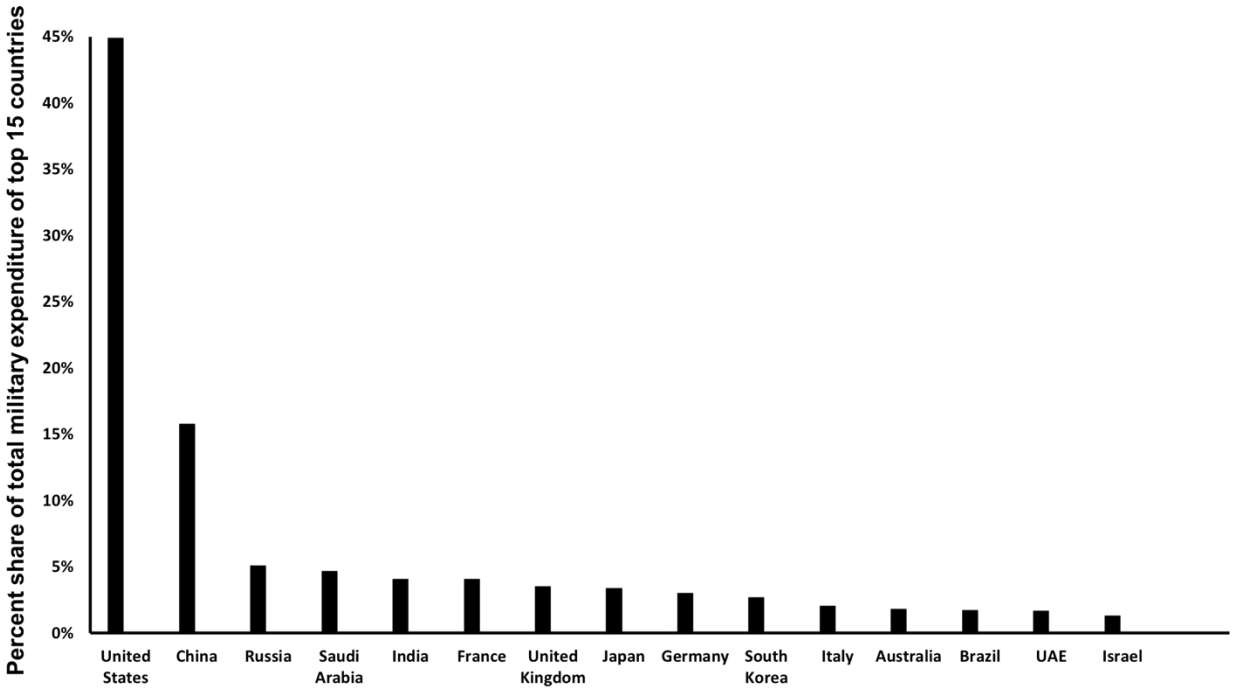

Figure 4. Top 15 countries ranked by military expenditure in 2016.
Source: Stockholm International Peace Research Institute.

Another finding of this study is that the United States' military predominance was even greater prior to the great recession of 2008, but even then, China was already second in the hierarchy (Figure 5a.) as it also was in 2010 and 2015 (Figure 5b). China has been persistently outspending countries that have been in the "economic core" since the start of this study's time-frame. And we can see in Figure 5b., that it is whittling away at the size of the U.S.'s lead; however, there is still a significant difference between the U.S. and China in military capacity (Figure 4).

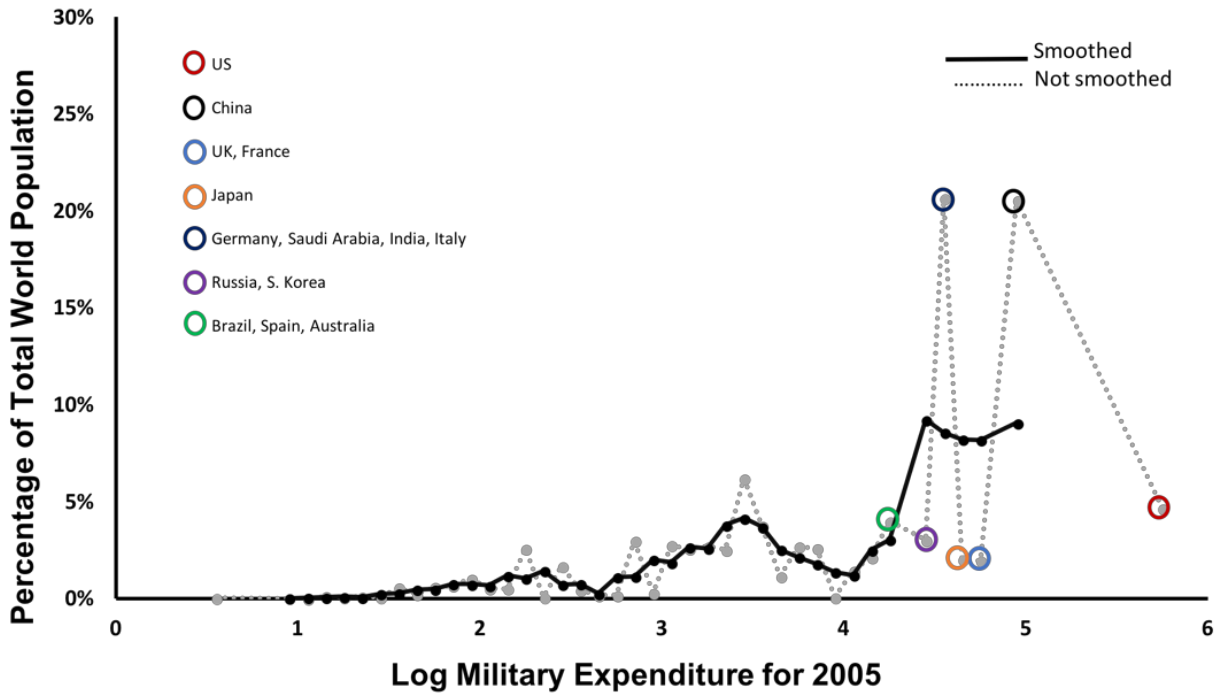

Figure 5a. Pre-2008 recession global military power distribution.

The size of the gap between the United States and the rest of the world has remained huge even after the global economy began to recover from the crash of 2008 (Figures 5a. and 5b.).

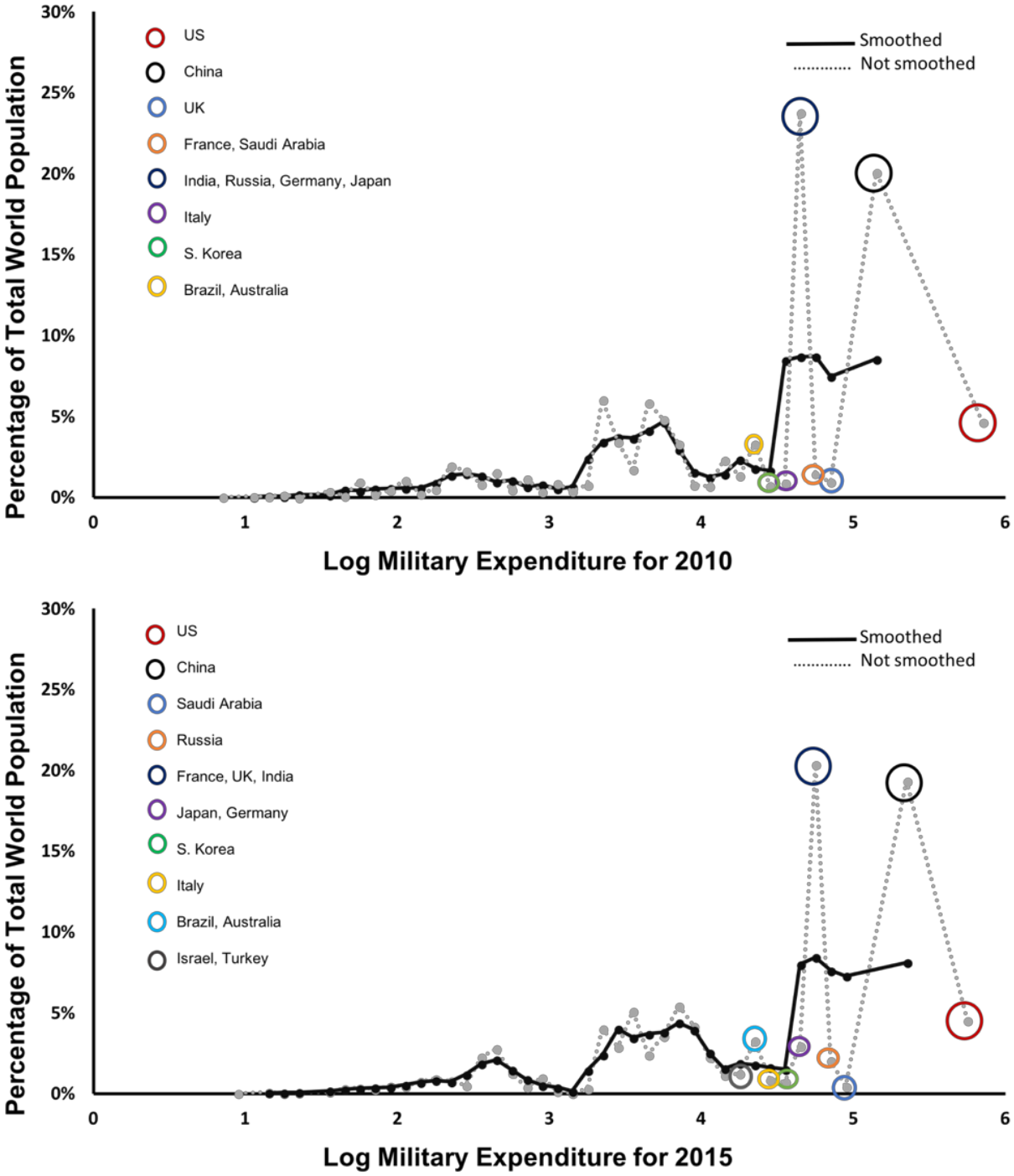

Figure 5b. Post-2008 global military power distribution.

Discussion

Thus, gaps[9] exist within the distributions of both global economic and global military power. Claiming that the gaps are a necessary feature of the world capitalist system is fine as a theoretical axiom but does not explain the actual causal mechanisms that produce the gaps. Immanuel Wallerstein and other world-system scholars have long argued that the modern capitalist world-system is inherently unequal (Wallerstein 1974a) and that mobility from one zone to the next has been very difficult. He writes, "it is not possible… for all states to 'develop' simultaneously. The so-called 'widening gap' is not an anomaly but a continuing basic mechanism of the operation of the world-economy… the some [countries] that rise are at the expense of others that decline" (Wallerstein 1974a). The global hierarchy that emerged with the rise of the West is seen as a zero-sum game with a relatively stable and reproduced structure of inequality.

Giovanni Arrighi (1990) argued that unequal exchange within the world-system was only part of what reproduced global inequality. According to Arghiri Emmanuel (1972) the unequal exchange by which the core extracts economic surplus from the non-core hinges on wage levels that are larger than differences in productivity. Arrighi (1990) contended that core/non-core exploitation has been based on a "lack of mobility of labor resources and high mobility of capital resources between trading partners." The core trading partner with the higher average level of wages receives most of the benefits of trade. The other causes of the reproduction of inequality have included transfers of labor (forced-slavery; and unforced-migration); transfers of capital (capital flight; and financialization).

The structure of transfers is backed up by violence or the credible threat of violence. Here, it is important to understand the role of military power in this dynamic.

[9] The gaps in a world-system trimodal distribution are the spaces between the core zone and the semiperiphery and between the semiperiphery and the periphery. space between the periphery and semiperiphery. The existence of empirical gaps demonstrates that the distribution is not a smooth and continuous hierarchy.

At the height of the U.S.'s economic hegemony, it [the US] simply had to threaten to use its military strength and often it used its military power to manipulate and shape entire world regions. Arrighi argued that transfers were far more effective at creating, reproducing, and deepening inequality than unequal exchange. Still, pointing to the U.S., Japan, Taiwan, and South Korea, Arrighi noted that unequal exchange, and transfers of labor and capital were only contingent attributes of the capitalist world-economy. For Arrighi, the ability of a country to appropriate benefits from the global division of labor is mainly based on its position in the hierarchy of wealth. The higher up a state is in this hierarchy, the better it can deflect the negative effects of technological-organizational change initiated and controlled by competitors. While these are good explanations of why there is a global hierarchy of economic and military power, they do not explain why there are gaps between core and the semiperiphery and between the semiperiphery and the periphery.

Lumpy (discontinuous) distributions also exist in other realms. Ecologists study the physical sizes of plants and animals in ecosystems and they know why big fierce animals are rare. The upper levels of a food chain are dependent on the lower levels for energy and so the number of big fierce animals at the top is limited by the availability of smaller things to eat and by the inefficiencies of energy transfer as one goes up the hierarchy. This is called the Eltonian pyramid in honor of Charles Elton who first discovered it by observing artic foxes who ate birds some of whom ate insects and worms. This pyramid is not a continuous distribution of sizes. There are size-jumps, discrete sizes, which are caused by "the mechanics of eating and being eaten" (Colinvaux 1978:20). The gaps in the size distribution of animals have a cause that stems from the processes of distributing food energy. Of course, there are exceptions, as when very large whales live on very small plankton. But the average lumpiness of the size distributions of animals is a well-known feature of ecosystems. This analogy suggests that it may be

something about the nature of interactions among competing nation-states that causes the gaps.

Our study shows that military power tends to be concentrated within the economic core with a few major exceptions (a few strong semiperipheral and peripheral states). The difficulties of countries moving from one economic zone to another, such as from the semiperiphery to core or from the periphery to the semiperiphery, are tied to a country's difficulties in jumping the gaps in military power.

The economic growth literature provides some insights into the kinds of obstacles to national economic advancement that are suggestive regarding the issue of explaining the gaps. Barro (1991) demonstrated empirically that the gross domestic product (GDP) per capita of countries tended to converge over time. This clustering in the distribution of per capita income amongst countries occurred regardless of a country's initial GDP per capita. Barro confirmed that human capital (Becker, Murphy, and Tamura 1990; Nelson and Phelps 1966; Romer 1990) played a significant role in the ability of countries, particularly poor countries, to grow. Human capital (skills and education) is important in the research sector, producing new products and ideas that drive technological progress and economic growth. Economists contend that technological progress is a way to augment movement toward an equilibrium between production growth and economic growth (Galor 1997). World-system scholars have also argued for the importance of technology as it relates to development and mobility in the global economy. Human capital also facilitates the absorption of new products and ideas. Barro and Lee (1994) and Barro (1996) found that, in addition to human capital related variables (such as schooling and life expectancy), political freedom had only a weak effect on growth rates. Expanding low-level political rights stimulated growth, but once a moderate amount of democracy[10] is achieved, the further expansion of rights was associated with reduced growth.

[10] This is based on an index of political rights developed by Raymond Gastil (1991).

Other researchers have found that convergence of countries with similar levels of GDP per capita has resulted in clustering. Persistent poverty and polarization make it extremely difficult to move from one cluster to another (Bianchi 1997; Durlauf and Johnson 1995; Gadzala and Hanusch 2010; Galor 1997; Pittau *et al*. 2010). Alesina and Rodrik (1994) found that countries with within-country inequality in land and home ownership experienced negative effects on economic growth. Pitau *et al*.'s (2010) finding of "convergence clubs" are the closest to the findings of our study and that of other world-system scholars. These authors argue the clustering of countries around similar GDP per capita levels is not sufficient to imply convergence clubs. They contend that true "club-ness" implies complete immobility from one cluster to another in the global distribution of per capita income levels. While some scholars like Henderson *et al*. (2008), and Bianchi (1997) find little mobility between clusters, Pittau *et al*.'s (2010) study is the only one that examines cross-country distributions across time (the period from 1960 to 2000). They found that there was a tendency for countries to cluster into three clubs (what world-system scholars call "zones"). This clustering and the shape of the distributions found were also like that of traditional world-system formulations – a large periphery, a medium-sized semiperiphery, and a large core. The authors labeled their clubs "poor, middle and rich." During the study's time period there was very little cross-cluster mobility. What these economic growth scholars have demonstrated is that the current global hierarchy and distribution of income/wealth is stable, rigid, and the gaps between the core and semiperiphery and between the semiperiphery and the periphery are entrenched and difficult to overcome. However, the alleged causes in this literature of the inability to jump across the gaps all point to factors within countries. Structures and relationships that are international or transnational or global are not considered.

In a sweeping cross-disciplinary research project, Alesina *et al*. (2003), examined fractionalization and different levels of diversity to determine their impacts on development and growth for 90 countries. Prior studies had shown an inverse

relationship between ethnolinguistic fractionalization and economic growth, as was the case for much of Africa (Easterly and Levine 1997). However, some of these measures of ethnolinguistic diversity relied heavily on the linguistic aspect of fractionalization. Alesina *et al*. (2003) developed three new indices to better measure ethnolinguistic fractionalization. These authors confirmed the findings of Easterly and Levine (1997) and found that ethnic fractionalization is higher in poorer countries that are closer to the equator, which may contribute to the study of geographic causes of development.[11] Their findings have interesting implications for regional aspects of immobility within the world-system. Impediments to economic growth and development as suggested by Alesina *et al.* (2003) or Easterly and Levine (1997) could prevent countries from moving up in the world hierarchy of wealth. Still, whether it does or does not function as an obstacle to "jumps" depends on its distribution across cases. If it is concentrated within either the peripheral or the semiperipheral zone it could be an obstacle that causes the gaps. For there to be gaps, countries below and above the gaps must be constrained in their abilities to cross them.

The discourse on the political determinants of economic growth and the ability of countries to cross the great divides between zones has also tended to revolve around endogenous factors such as particular systems of government or mixes of interactions between political and economic institutions. Bilson (1982) and Weede (1983) found no correlation between political systems and economic growth despite Adelman and Morris's (1967) finding that a government's commitment to economic growth significantly impacted a country's ability to grow economically. A number of studies since then, have found quite the opposite including Barro (1991) and Alesina *et al*. (1996). Using a sample of 169 countries, over a five year period, Aisen and Veiga (2011) found a correlation between political instability and low economic growth rates; and between low

[11] See Mary Gillmartin (2009) for an excellent discussion of why such results persist, or Andrew Sluyter's (2003) article in which he discusses the implications of using results like this to devise sweeping socio-economic theories.

ethnic fractionalization, high economic freedom and economic growth. Feng and Chen (1996), also found that regime instability, policy polarization between contending parties, and severe government repression, negatively influenced economic growth. These findings are on par with the economic growth literature and again, look to issues internal to the state to explain why they are unable to grow and, catch up or cross the gap between the country-clusters. Such factors might explain why countries converge into core, peripheral and semiperipheral clusters if they are concentrated in the clusters. But if they are distributed across the clusters they can still explain why global inequality is reproduced but not why the distributions of global power are lumpy (discontinuous).

Exogenous factors such as dependence on foreign direct investment (FDI) and foreign aid have also been shown to affect economic growth. Bornschier and Chase-Dunn (1985) showed that the dependence of a national economy on FDI had a long-term negative effect on economic growth and was associated with greater within-country income inequality. Subsequent research claimed to show that this finding was a methodological mistake stemming from the relatively less growth-causing effect of FDI compared with domestic investment (Firebaugh 1992).

This means that interventions from abroad can impact growth. Eastern European countries made a quick transition from industrialized economies without foreign direct investment to involvement in the capitalist world economy and foreign investment after the fall of the Soviet Union. Curwin and Mahutga (2014) tested the link between foreign direct investment and economic growth in Eastern Europe and found that dependence on FDI (which they call "penetration") reduced economic growth both in the long term and in the short term. Furthermore, they found that domestic investment was a much more important cause of economic growth. Grell-Brisk (2018) found that, compared to Sub-Saharan African countries that remained within the peripheral zone, post-communist countries entered and rose relatively quickly in the semiperipheral economic zone. This was explained in part by Sub-Saharan Africa's

colonial past, implying that the legacies of colonialism continue to have consequences for development in the contemporary world.

For Kentor and Boswell (2003) foreign investment concentration (being dependent on a single other country for foreign investment) was shown to have a significant negative effect on economic growth. When the foreign investment comes from only one other country, the effects are extremely negative. The authors claim that this "inhibits an LDC's [less developed country's] ability to construct and implement economic policies that are in its own long-term interest. A lack of autonomy affects the bargaining power of states in dealing with the transnational corporations they host and in markets…" (Kentor and Boswell 2003:310). However, when there [werre=were] investors from more than one other country the negative effects on economic growth diminished. Regarding the effect of foreign aid on growth and mobility, early studies showed that aid dependence had a positive effect (Tsikata 1998). According to Dollar and Burnside (2000) foreign aid mostly grew the recipient country's economy but that, for aid to remain effective, good quality state institutions were of the utmost necessity. McGillivray (2006) found similar results but contended that good policy regimes were needed in order for foreign aid to have a positive impact on economic growth. Once again, we have findings that demonstrate a mix of endogenous and exogenous variables that impact economic growth within states, which in turn impact their ability to move up or down a global military-economic hierarchy.

Michael Beckley (2010) argues that factors such as differences in political systems, levels of human capital, civil-military relations, or other such 'non-material ' factors are not satisfactory for explaining differences in military power. He found that in battles fought between 1898 and 1987, the most compelling reason for military success was economic development. He writes, "a conception of military power that considers both the quantity of a state's resources and its level of economic development provides a sound basis for defense planning." Beckley found that in Western democracies, where

there are high levels of human capital and low levels of civil-military conflict, the links between political and social factors and military effectiveness are spurious. Economic growth has been empirically shown (as indicated by the literature mentioned above) to be positively influenced by factors such as high levels of human capital. Yet, according to Beckley, "conventional military dominance of Western democracies stems primarily from superior levels of economic development, not societal pathologies or political institutions"(Beckley 2010).

The findings of our study align with Beckley's only in the sense that position in the world-economic hierarchy is related to position in the world military hierarchy. Still, this is not sufficient to explain the gaps in the distributions of military and economic power. Although the literature partly explains why some of the countries converge into clubs and demonstrates empirically that gaps exist between the clubs, it does not explain why the gaps exist.

There are a number of internal and external causes that may impede upward and downward mobility out of zones: corruption, the resource curse, International Monetary Fund structural adjustment programs, covert intervention from core countries, legacies of colonialism, internal inequality, global racism, kleptocracy versus developmental states, strong states versus weak states, democracy, literacy, education, demography, age distribution, within-country inequality, size of middle class, natural resources, dependence on foreign investment, concentration of foreign investment from a single investor country, dependence on foreign aid, trade dependence, and trade concentration. [are there enough data for multiple correlation analysis to sort out some of these possible correlations?) All these are known to reproduce between-country inequality by their negative effects on development. But what is not known is whether these conditions are themselves discontinuously distributed. Logically the causes of between-zone gaps, whether within-country characteristics or global relationships, must be themselves gapped in order to cause the gaps between zones. And it is also possible that the causes

of the gap between the periphery and the semiperiphery are different from the causes of the gap between the semiperiphery and the core. Further research that examines the distributions of these variables is needed to answer the question of causes.

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