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Beyond the "Sinew of War": The Political Economy of Security as a Subfield

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Abstract

Since at least Cicero, we have known that "money is the sinew of war." Is it possible for a political economy of security (PES) subfield to contribute knowledge beyond Cicero's claim? This article aims to delineate the boundaries of a PES subfield by using the classic "guns versus butter" trade-off to define the existing literature within the subfield. Thinking seriously about this trade-off, including conditions under which a trade-off may not exist, raises a host of questions. The two most direct questions are: How does consuming "guns" influence the consumption of "butter"? And how does using "guns" influence the consumption of "butter"?

INTRODUCTION

Money is power. This phrase lies at the heart of work applying an economic perspective to international politics. As Susan Strange (1994, p. 23) remarked, "It is impossible to study political economy and especially international political economy without giving close attention to the role of power in economic life." Although power can take many forms, military power is central to international politics. This is why an economy–security link is an idea common to key works of international relations theory. Waltz (1979, p. 94) observes that "economic capabilities cannot be separated from the other capabilities of states…. States use economic means for military and political ends; and military and political means for the achievement of economic interests." Mearsheimer (2001, pp. 60–61) asserts that "the size of a state's population and its wealth are the two most important components for generating military might." Even Bull (1977, pp. 45–46) writes of the economy–security link: "The armed forces of states, by providing security against external attack and internal disorder, establish the conditions under which economic improvements may take place within their borders."

These quotations raise a dilemma for those hoping to establish a distinct political economy of security (PES) subfield within international relations. Since at least Cicero, we have known that "money is the sinew of war," and the above quotations make clear that Cicero's claim is already well recognized within the international relations discipline.[1] Although scholars should work against siloing economic issues from security issues (Lipson 1984, Mastanduno 1998, Ripsman et al. 2018, Strange 1970),[2] how can a PES subfield contribute to our knowledge beyond Cicero's claim? Can it do more than make what Tufte (1978, p. xiii) called the "banal point" that "the polity and economy have something to do with one another"?

The goal of this article is to delineate the boundaries of a PES subfield.[3] I will explain how scholarship within this subfield offers knowledge that goes beyond showing the existence of an economy–security link. Make no mistake, some of this research does focus on highlighting a link between the economy and security. For instance, some work on the "commercial peace" aims only at establishing that international trade is associated with less war. But other work, perhaps the majority of it, seeks to identify the mechanisms underpinning the economy–security link. Continuing with the commercial peace example, such work includes research pitting an opportunity cost mechanism against a signaling mechanism. In other words, much of the PES research is interested in showing *how* the economy relates to security, not solely *that* the economy relates to security.

The next section discusses the conceptual foundation for a political-economic approach to international security: the classic guns-versus-butter trade-off. Thinking seriously about this trade-off, including conditions under which a trade-off may not exist, raises a host of questions. The two most direct questions are: How does *consuming* "guns" influence the consumption of "butter"? And how does *using* "guns" influence the consumption of "butter"? Both questions take scholars beyond pointing out that the economy and military "have something to do with one another." After discussing what we presently know about each of these questions, I conclude by discussing how to identify future work that falls within the PES subfield.

[1] A former colleague in an economics department once remarked to me, "Well, economic history is really just military history." This perhaps explains the large body of work on the role of war in the development of markets and the state (Dincecco & Onorato 2017, Queralt 2018, Skocpol 1979, Tilly 1990).

[2] Readers are also referred to the 1983 *International Studies Quarterly* special issue on "The Economic Foundations of War" (for example, Russett 1983).

[3] A 2015 report of an International Studies Association workshop acknowledged how the participants had key disagreements over the content of the field (Cappella Zielinski 2015).

CONCEPTUAL FOUNDATION: GUNS VERSUS BUTTER

In a 1953 speech, former Supreme Allied Commander and then US President Dwight D. Eisenhower starkly articulated the perceived societal costs of acquiring arms:

> The cost of one modern heavy bomber is this: a modern brick school in more than 30 cities. It is two electric power plants, each serving a town of 60,000 population. It is two fine, fully equipped hospitals. It is some 50 miles of concrete highway. We pay for a single fighter plane with a half million bushels of wheat. We pay for a single destroyer with new homes that could have housed more than 8,000 people. (Eisenhower 1953)

Eisenhower's remarks partially explain why economists James Tobin and William Nordhaus famously referred to arms spending as a "regrettable expense" (Nordhaus & Tobin 1972, p. 8). Though they considered it necessary due to the risk of war, Tobin and Nordhaus viewed the purchase of arms as not directly enhancing economic productivity to the same extent as, for instance, a massive public infrastructure project.

The fact that acquiring arms comes at a cost to society is captured by a foundational concept in political economy work: the so-called guns-versus-butter trade-off (Powell 1993). The trade-off holds that a national economy has a set endowment of resources for producing all goods at a given moment in time. The government can draw upon these resources to produce one of two types of goods: "guns" or "butter." "Butter" generally refers to the government's provision of nonsecurity goods aimed at enhancing societal welfare. These include hospitals, schools, roads, and parks. "Guns" refers to the arms needed by the government to fulfill its core function of providing security. These include personnel (soldiers, sailors, pilots, support personnel) and equipment (rifles, tanks, aircraft, warships, missiles, submarines, etc.).

The logic of the guns-versus-butter trade-off is captured by a tool common to economic analysis: the production possibilities frontier (PPF). A PPF illustrates all maximum output possibilities for a given set of inputs, namely labor, land, and capital (with human capital commonly included as a fourth factor of production). The PPF in **Figure 1** shows that if all inputs are directed toward the production of butter, the economy will be capable of producing butter at level b_0. If all inputs are instead directed toward the production of guns, the economy will be capable of producing guns at level g_0. The curved line connecting point b_0 and point g_0 captures all combinations of guns and butter than can be produced by this economy. The PPF curves outward due to the increasing opportunity costs of production: As an economy allocates more and more resources toward the production of a particular output, those resources are less and less efficient at producing the given output. As the economy allocates more resources to gun production, eventually the best butter producers (and those producers least efficient at making guns) are drawn into gun production.

This happened to the US economy during World War II. The US government did not initially turn to the Ford Motor Company for aircraft production. When eventually Ford was asked to produce aircraft, "the difficulties of transferring automotive industry practice to aircraft manufacture proved much greater than Ford had envisaged" (Zeitlin 1995, p. 57). For example, pressing techniques required for aluminum airframes were very different from those used for steel auto bodies.

Using the guns-versus-butter trade-off as a conceptual starting point compels one to rethink seemingly fixed ideas about the nature of international politics. Consider two examples. First, the realist intellectual tradition holds that states face a security dilemma: They view the arming actions of other states as a potential threat and therefore respond by increasing their own arms levels (Jervis 1978). But the existence of a guns-versus-butter trade-off means that states, even those with expansionist ambitions, have an incentive to limit (though not eliminate) arms acquisition (Fearon 2018). Failure to place a limit on guns production will dramatically reduce

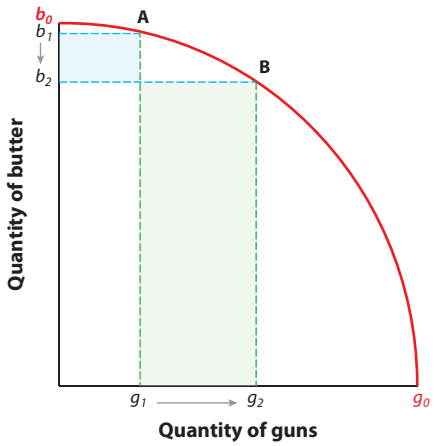

Figure 1

Guns-versus-butter production possibilities frontier, where b is the level of the production of butter, and g is the level of the production of guns. The curved line connecting point b_0 and point g_0 captures all combinations of guns and butter that can be produced by this economy. If an economy is producing at point A, and then guns production is increased to point B, the first factors allocated to guns production are likely those least productive at making butter. The result is a notable increase in guns production (*green shaded area*; note the distance from g_1 to g_2) but a very small decline in butter production (*blue shaded area*; note the distance from b_1 to b_2). However, as the economy allocates more resources to gun production, the best butter producers (and those producers least efficient at making guns) are drawn into gun production.

butter consumption, lowering societal well-being even in the absence of war. Second, economic growth can enable governments to produce the butter needed to eliminate the pain and drudgery of poverty or correct the consequences of inequality. However, because economic growth expands the entire PPF, it also underpins a state's ability to project military power (Brawley 2009, Brooks & Wohlforth 2016, Markowitz & Fariss 2013, Narizny 2007, Zakaria 1999) and enables states to have the weapons required to fight a major war (Goldstein 1988, Rasler & Thompson 1983, Scheidel 2017). Put differently, economic growth, the very factor that can improve societal well-being, can also bring about means of inflicting death and destruction. This is why Gilpin (1981, p. 55) claims that "economic growth and demographic change are among the most important forces underlying international political change."

States seek ways to avoid trading off between guns and butter. For instance, it has long been acknowledged that alliances might ease the burden of internal guns production (Barnett & Levy 1991, Morrow 1993). Allies could offer protection from an external threat, thereby enabling a state's government to reduce internal guns production and redirect resources toward butter production, all while maintaining the same perceived level of security (DiGiuseppe & Allan 2013, Kimball 2010). But allies are imperfect substitutes for internal arms (Diehl 1994), for three reasons. First, an ally may not be willing to tolerate the perceived free-riding by the other state. This is the motivation underlying the massive literature on burden sharing within alliances (Olson & Zeckhauser 1966, Plümper & Neumayer 2015, Sandler & Hartley 2001). Second, the ally may not be reliable. A state knows that its own arms will be available in a time of need, but an ally might abandon it when called upon (Snyder 1984). This is why states might look for allies with characteristics indicative of reliability, such as the presence of a democratic regime, before deciding to reduce internal arms production (DiGiuseppe & Poast 2018, Mattes 2012a). Third, acquiring an ally may also require making a trade-off. This trade-off can take the form of granting

policy concessions (Johnson 2015, Mattes 2012b, Morrow 1991), allowing the basing of foreign troops (Morrow 1994), the holding of a particular reserve currency (Eichengreen et al. 2017), or a promise to engage in economic exchange (Fordham 2010; Henke 2017; Kinne & Bunte 2018; Long & Leeds 2006; Poast 2012, 2013).[4]

By highlighting the dual desires of providing public welfare and possessing the means of warfare, the guns-versus-butter trade-off draws out fundamental insights about the behavior of governments. The remainder of this article explores such insights by considering two broad questions directly tied to the guns-versus-butter trade-off: How does the consumption of guns influence the consumption of butter? And how does the use of guns influence the consumption of butter?

HOW CONSUMING GUNS INFLUENCES CONSUMPTION OF BUTTER

Waging war—or, more precisely, equipping a military capable of waging war—is expensive. For this reason, wealthier countries are better positioned to execute war. The goal of this section is to explore the economic foundations of war in a manner that goes beyond Cicero's "sinew of war" remark. This requires showing exactly how economic wealth translates into military armaments.

Economic wealth is linked to military armaments through a three-step process. A government (*a*) determines the size of a defense budget, (*b*) identifies methods for acquiring funds to fill the budget, and (*c*) chooses weapon systems to be purchased with the budget. Extensive bodies of literature offer insights into each stage and how the three stages are linked to one another.

In the first stage, the government must decide how much it will spend on the military. This means setting a defense budget (Adams & Williams 2010, Fordham 2002, Mintz 1992, Nincic & Cusak 1979, Ostrom & Marra 1986, Thorpe 2014).[5] The factors influencing defense budgets are manifold, including the international threat environment (Nordhaus et al. 2012, Ward & Davis 1992),[6] domestic economic performance (Dunne 2013, Cappella Zielinski et al. 2017), regime type (Töngür et al. 2015), and domestic electoral incentives in democracies (Rundquist et al. 1996, Zuk & Woodbury 1986). Because defense expenditures require funds extracted from the populace that could have gone toward butter consumption, scholars have explored how defense spending influences the domestic economy (Mintz & Stevenson 1995, Oatley 2015, Pollin & Garrett-Peltier 2009). But understanding exactly how a defense budget influences the domestic economy requires exploring the method of acquiring defense funds. This leads directly to the second stage in the process linking economic wealth to military power.

In the second stage, the government must choose from a host of means by which to pay for arms (Cappella Zielinski 2016, p. 4). Governments can use forced labor, extract reparation payments from a defeated nation, or even print money. Governments can also draw on the revenue from "free resources" (McDonald 2011), such as minerals (Hurst 2010), oil (Colgan 2013, Hendrix 2017), or publicly owned property (McDonald 2009). However, the two most widely used means of paying for defense expenditures are taxes and debt.

Taxes range from levies on income to extraction of inherited wealth (Scheve & Stasavage 2012). The advantage of taxation is directness: The budgetary costs of current defense are not defrayed to a later time period, and hence the state avoids the interest payments associated with borrowing.

[4]At other times, the directionality can be reversed; states can expand economic cooperation regimes to include security cooperation (Haftel & Hofmann 2017; Powers 2004, 2006).

[5]Intriligator (1990) wrote an important piece laying out the field of defense economics, published as the lead article in the first issue of the journal *Defense and Peace Economics*.

[6]The role of international threats on military expenditures is the reason why the study of arms races falls within the PES field, provided the study explores how economic resources enable such a race (Collier & Hoeffler 2007, Ward 1984, Wolfson & Shabahang 1991).

Also, when the state draws from current revenues, taxation can be implemented with perceived fairness (e.g., if the military personnel are not taxed as heavily as citizens not in the military). The disadvantage of taxation is its potential to heighten citizen discontent with an ongoing war effort (Flores-Macias & Kreps 2013, Kriner et al. 2018). Stated simply, if a government is at war, then extracting personal income to fund that war can predictably undermine support for the war. In this circumstance, debt becomes an attractive alternative means of defense financing.

Debt enables a government to delay incurring the budgetary costs of acquiring military power. A government might be able to put off the cost indefinitely by issuing new debt to pay maturing debt. This can mitigate the perceived financial burden of defense spending on a populace, thereby enabling the government to maintain public support (or even indifference) to an ongoing war effort (Carter & Palmer 2015, DiGiuseppe 2015, Kreps 2018). This is in addition to the simple fact that borrowing accords a government access to a substantially larger pool of funds than taxes do (Flandreau & Flores 2012, Slantchev 2012). But just as taxes require a base from which to draw the tax revenue, borrowing requires a pool of lenders willing to grant funds. To attract lenders, governments must possess a sufficient level of economic and financial wherewithal to equip a capable military (Shea & Poast 2017).[7] While extensive domestic financial markets are a source of such wherewithal, there are also key political characteristics that can attract lenders. These include democratic regimes (Schultz & Weingast 2003, Shea 2014) and the presence of a central bank (Broz 1998, Poast 2015).

The third stage in the process linking economic wealth to military power is the choice of weapon systems. The size of a defense budget cannot be separated from the choice of military capacity purchased with the budgeted funds. This is because the choice of weapon can have a profound influence on the amount budgeted toward defense. Consider the 1983 observation by Norman Augustine, then Chairman of the Defense Science Board (and eventual CEO of defense contractor Lockheed Martin). Drawing from data on the cost of fighter aircraft used by the US government since the early twentieth century, Augustine observed how the per-unit cost had risen by a factor of four every ten years, but the defense budget had grown at a much lower rate. This led him to make the following projection (only partly in jest):

> In the year 2054, the entire defense budget will purchase just one aircraft. This aircraft will have to be shared by the Air Force and Navy 3-1/2 days each per week except for leap year, when it will be made available to the Marines for the extra day. (Augustine 1983, pp. 105–7)

Numerous questions arise when choosing a weapon to purchase. Should a military allocate funds toward tanks and armored vehicles or must it rely on troops (Gartzke 2001, Sechser & Saunders 2010)? If the military relies on troops, should they be volunteer troops, conscripted soldiers, or private contractors (Avant 2005, Horowitz et al. 2011, Krebs 2005, Singer 2001)? If a military becomes more mechanized, what type of machinery should be purchased? Should the government purchase battleships and aircraft carriers (Gilady 2018, Horowitz 2010), nuclear weapons (Bailey 1994), border fortifications (Carter & Poast 2017), or robotics (Hall & Coyne 2014, Kaag & Kreps 2014)? Once a weapon system is chosen, should it be purchased domestically or abroad (Brooks 2007, Dombrowski & Gholz 2006, Schilde 2017)? If produced domestically, should it be sold to other nations (Caverley 2007, Erickson 2015, Pearson 1994, Pierre 1982)? There are no easy answers to these questions. Indeed, addressing these questions consumes much PES research and

[7] To an extent, this claim stands in contrast to the notion of diversionary war, whereby a poorly performing economy initiates a war because the leader uses the foreign conflict to divert attention away from domestic conditions (Downs & Rocke 1994, Enterline 2010, Haynes 2017, Jung 2014, Levy 1989, Richards et al. 1993, Tokdemir & Mark 2018).

helps scholars to better understand exactly how the economy serves as the sinew of military power. In other words, these questions help take PES research beyond simply showing that the economy and the military have something to do with one another.

HOW USING GUNS INFLUENCES CONSUMPTION OF BUTTER

Once a gun is acquired, what comes next? If the state is able to avoid entering a war, then the guns are simply held and can become a deadweight loss: Society misses out on the economic benefits that could have been acquired with the resources allocated toward defense (Brück et al. 2012, Smith 1980). But suppose a country goes to war and the guns are put to use. The use of guns in war should influence the very economy that enabled their production. Just as concerns over the consequences of producing guns (i.e., losing butter) can incentivize states to limit gun acquisition, can concerns over the consequences of using guns incentivize states to limit their application?

On the one hand, using military power could actually bolster economic activity. Military force can be used to acquire and retain valuable territory or natural resources, which will enable more butter consumption. This is the logic underlying the idea that "conquest pays" (Liberman 1998). Waging war can also be used to mobilize underutilized resources (Milward 1977)—underutilized meaning the economy was not producing at a point on the PPF curve (**Figure 1**). For Poast (2006, p. 3), the "Iron Law of War" is that when resources are underutilized, "war is good for the economy."

Additionally, military violence (or the threat of military violence) is frequently required to facilitate trade and maintain the global economy (Gilpin 1975, Krasner 1976, McKeown 1983). Major powers may use sea power to protect shipping lanes and maintain open markets.[8] Indeed, Fordham (2007) shows how efforts to protect trade with allies contributed to the US intervention into World War I. Silver & Arrighi (2003, p. 340) extend this argument to the Cold War, arguing that the United States used "its unchallengeable military primacy vis-à-vis its allies" to "mobilize its allies and vassals into bilateral and multilateral agreements that overtime have liberalized international trade and investment more effectively than British free trade imperialism ever did."

On the other hand, war can wreak havoc on an economy. War can reduce the population and destroy physical infrastructure, thereby shrinking a country's PPF. War also carries a host of hidden costs, such as future medical care for veterans (Stiglitz & Blimes 2008). The expense of blood and treasure, along with the potential destruction to physical infrastructure, is the reason Waltz (1959, p. 1) once remarked, "To ask who won a war is to ask who won the San Francisco earthquake." This is likely why asset markets are highly sensitive to international conflict (Guidolin & La Ferrara 2010, Jha & Shayo 2018, Schneider & Troeger 2006). The macroeconomic disruption associated with war will lead the financial industry to push leaders to avoid war (Kirshner 2007). Market participants, wanting to ensure that they are "healthy and wealthy rather than dead and poor," will pressure governments to avoid policies that heighten the risk of war (Mousseau et al. 2013, p. 81).

The idea that war can put butter consumption at risk by wreaking havoc on an economy and shrinking the PPF underpins a venerable idea associated with a PES perspective: the commercial peace. The concept of the commercial peace is the claim that economic interdependence contributes to peace (Polachek 1980). It is widely acknowledged that commercial pursuits foster peace within states and that economic incentives can be used to end civil wars (see Abadie & Gardeazabal 2003; Anderton & Brauer 2016; Appel & Loyle 2012; Berman et al. 2011; Blattman & Miguel 2010; Braithwaite et al. 2014; Collier & Hoeffler 1998, 2004; Fearon & Laitin 2003; Gates 2002; Jensen & Young 2008; Justino 2016; Ross 2006; Tir & Karreth 2018; Walter 2009;

[8]However, Tomz (2007) questions the widespread use of so-called gunboat diplomacy.

Weinstein 2005). These same dynamics have long been seen in the interactions between states, via both trade (the subject of most of the research) and financial interdependence (Dafoe 2011, Gartzke 2007, Lee & Mitchell 2012).[9]

Although it is useful to show that trade is associated with peace between states, one could argue that such work does not go beyond the Tufte critique of simply showing that the economy and the military have something to do with one another. To go further, it is useful to instead consider work that unpacks the mechanisms linking commerce with peace. Several logics have been put forward. Some scholars, for instance, claim that international commerce enhances deterrence by providing incentives for third-party states to intervene in a dispute (Aydin 2008, Papayoanou 1999). The two most prominent mechanisms found in the literature are opportunity costs and signaling.

In the opportunity costs mechanism, trade enables a country to consume beyond what is possible with only its internal endowment of resources. War with a trade partner is therefore bad, because war will eliminate these additional consumption possibilities (Polachek & Xiang 2010). A variant of the opportunity cost argument is that of "trade expectations" (Copeland 2014). According to this argument, current levels of trade are not relevant for determining the prospects of violence; instead, states calculate the future prospects of trading with a particular nation. Expectations of strong future trade will incentivize both nations to avoid bellicose foreign policies toward one another. But expectations of a reduction in future trade means that both sides expect to have less to lose from a future war. Unconstrained by fears of losing gains from trade, the states can now be belligerent toward one another (if circumstances require).

Signaling offers an alternative mechanism for the link between commerce and peace. The signaling argument maintains that trade provides governments a means of demonstrating resolve without resorting to military violence. Because a government's economy will be harmed by stopping trade with another state, the government can demonstrate its willingness to incur pain by cutting off (or at least substantially reducing) trade with that state. Indeed, the government may only need to *threaten* to cut off trade to demonstrate its resolve. This signal of resolve should encourage states to back down during a crisis, thereby reducing the incidence of high-level conflict and increasing overall cooperation (Dafoe & Kelsey 2014, Gartzke et al. 2001, Morrow 2003). Because this argument is essentially making the claim that economic coercion can substitute for military coercion, it draws on the massive literature exploring economic sanctions (Drezner 2011, Hufbauer et al. 2008, Martin 1994). Governments, primarily democratic governments (Cox & Drury 2006, Lektzian & Souva 2003), turn to sanctions to coerce other states to change their behavior, such as to deter the acquisition of nuclear weapons (Solingen 2012), short of military force. But are sanctions effective in inducing policy change? This would seem necessary for the signaling mechanism to have validity, and sanctions have achieved, at best, mixed results as instruments of coercion. Their effectiveness depends on factors such as regime type (Allen 2008), the ability of the target regime to repress its population (Peksen 2009, Wood 2008), and the power of import-competing firms (Pond 2017). While it appears that the actual imposition of sanctions is largely ineffective for inducing policy changes in a target state (Pape 1997), other evidence suggests that threats of sanctions can induce policy changes (Drezner 2003).[10] Such evidence might be enough to lend credence to the signaling mechanism.

The search for a mechanism to explain the commercial peace raises questions about the entire notion that commerce fosters peace (see Keshk et al. 2004). Some states continue to trade

[9]Several authors summarize the literature on the commercial peace between nations, including Mansfield & Pollins (2001), Rosecrance & Thompson (2003), and Schultz (2015).

[10]Because of this "imposed" versus "threatened" distinction, some research focuses on identifying when imposed sanctions work (Hovi et al. 2005, Morgan et al. 2009). This also explains why a leading data set on sanctions is titled "Threat and Imposition of Economic Sanctions" (Morgan et al. 2014).

despite being military rivals (Liberman 1996) or despite directly fighting one another (Levy & Barbieri 2004). Economic globalization does not prevent states from increasing military spending (Ripsman & Paul 2010). Indeed, trade may actually generate excess wealth that can then be spent on the military (Baldwin 1985, p. 216; Gowa & Mansfield 1993; Schelling 1958, pp. 498–504).[11] Moreover, winning a war could enable the victor to set the trade policies of the loser, thereby capturing all gains from trade for itself (Fearon 2018, p. 549).

This says nothing of the favorite counterexample of the commercial peace critics: World War I. World War I occurred at the end of the first golden age of economic globalization, when the major powers of Europe, notably Britain and Germany, were economically intertwined. The dependence of nations on global commerce was so extensive that Norman Angell (1910, p. 216) famously labeled major war an illusion. (Angell 1910, p. 216). And yet, strong economic ties were not enough to prevent these powers from waging war against one another. Scholars have puzzled over this conspicuous "outlier" and tried to reconcile it with the commercial peace (McDonald & Sweeney 2007, Rosecrance 1985) For example, Gartzke & Lupu (2012) claim that World War I is not, in fact, a negative case for the commercial peace. They argue that World War I began among states that were less well integrated into the global economy, notably Serbia and Austria-Hungary. Once these states began fighting, tight alliance ties drew in the major European powers.

Of course, it could be that neither extreme—commerce prevents war or commerce does not prevent war—is correct. Instead, commerce could have a highly complex and nuanced relationship with the use of force. Research has found that the commerce–peace relationship depends on whether a trade partner is an ally (Chang 2005), the way a conflict affects export and import prices (Li & Reuveny 2011), the type of trade between the nations (Chatagnier & Kavaklı 2017, Peterson & Thies 2012), the relative economic dependence of the states on one another (Barbieri 2002), trade network centrality (Kinne 2012), membership in trade communities (Lupu & Traag 2013), and other spatial factors (Corbetta & Dixon 2005). It could also be the case that commerce constrains the highest forms of violence (which have the greatest potential to generate lasting economic devastation) but does not dissuade lower levels of militarized violence (Morrow 2003). Work identifying such nuances in the commerce-peace relationship is ongoing.

CONCLUSION

Research within the PES subfield can do more than simply show that military power and economic power "have something to do with one another" (Tufte 1978, p. xiii). This research is indeed building knowledge that goes beyond Cicero's "money is the sinew of war" dictum. The contributions of this research become clear when viewed through the classic guns-versus-butter trade-off. Thanks to PES research, we know more about how both consuming and using guns influence butter consumption.

Moving forward, how should scholars go about identifying if a certain line of research should be classified as PES research? Consider, for example, work investigating the economics of groups that use terrorist tactics. Does this work belong in the PES subfield? On the one hand, it shares similarities with work investigating the economics of civil war and rebel groups (after all, terrorist tactics can be applied by rebel groups). This research investigates the sources of terrorist financing (Acharya 2009, Baradaran et al. 2014, Clunan 2006), the economic incentives of individuals to join terrorist groups (Choi & Luo 2013, Krueger & Malečková 2003, Piazza 2006), the economic consequences of terrorist attacks (Bloomberg et al. 2004, Brück & Wickström 2004, Johnston &

[11] his idea underlines the reason for which trade in a host of civilian goods can be restricted on national security grounds (Pelc 2016, pp. 93–122). Morrow (1999) offers a critique of the security externalities thesis.

Nedelescu 2006), or all of the above (Enders & Sandler 2012). On the other hand, one could claim that this research simply shows that the economic and the political (i.e., terrorism) have something to do with one another. An argument could be made that for this work to truly be classified as PES research, it must explicitly explore guns-versus-butter trade-offs. For example, PES research on the economics of terrorism would examine how allocations toward (or away from) butter production can induce groups to resort to terrorist activities, or how the use of terrorist tactics can compromise the ability of the citizens to consume butter.

Given the potentially wide range of materials that can fit within PES, where should the subfield direct its energy going forward? None of the literatures mentioned above is established; much work remains to be done on the political economy of war finance, the commercial peace, economic sanctions, and so forth. Meanwhile, other areas are in need of a PES perspective. Work on the international politics of climate change could consider how climate change–induced alterations in resource availability could trigger conflict (see Meierding 2013). Another area in need of a PES perspective is the international politics of artificial intelligence and robotics. This research includes exploration of the use of automated weapons on the battlefield, e.g., examining its ethical dimensions (Roff 2014) and whether the public it (Carpenter 2016, Horowitz 2016). More can be done to investigate the economic costs and benefits of such weapons. Stated simply, research on artificial intelligence and climate change should consider how either issue influences the PPF of countries and, relatedly, a country's ability to acquire both guns and butter. This will lead to important new research questions. These include: Does climate change generate new competition for resources that requires greater guns production while simultaneously shrinking a country's production possibilities? Does artificial intelligence enable a country to massively expand its PPF, thereby granting it the ability to acquire guns with little perceived cost in forgone butter?

I have not offered an exhaustive cataloging of all work that can plausibly fall into a PES subfield. I have emphasized how such work must interrogate the guns-versus-butter trade-off. Doing so offers a framework for conceptualizing the PES subfield, for identifying whether a particular work should be included in this subfield, and for determining whether such work goes beyond simply highlighting the sinew of war.

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