FROM DEFENCE TO OFFENCE: THE ETHICS OF PRIVATE CYBERSECURITY

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ABSTRACT: The cyber realm is increasingly vital to national security, but much of cybersecurity is provided privately. Private firms provide a range of roles, from purely defensive operations to more controversial ones, such as active-cyber defense (ACD) and 'hacking back'. As with the outsourcing of traditional military and security services to private military and security companies (PMSCs), the reliance on private firms raises the ethical question of to what extent the private sector should be involved in providing security services. In this article, I consider this question. I argue that a moderately restrictive approach should be adopted, which holds that private firms can justifiably launch some cybersecurity services—defensive measures—but are not permitted to perform others—offensive measures.

KEYWORDS: Cyber-security, Just War Theory, private cyber firms, private security and military companies, the ethics of cybersecurity

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I. Introduction

The cyber realm is increasingly vital to national security, but much of cybersecurity is provided privately. Private cybersecurity firms perform a range of roles, from purely defensive operations to several more controversial ones, where firms engage in offensive operations to infiltrate, disrupt, and destroy the systems of actual or potential aggressors. As with the outsourcing of traditional military and security services to private military and security companies (PMSCs), the reliance on private firms (including PMSCs) to provide cybersecurity raises the ethical question of to what extent the private sector should be involved in providing security services.

This article considers this question. As we will see, there are various responses. On the one hand, it might seem that many of the ethical problems of relying on PMSCs to provide traditional security and military services, such as those experienced in Iraq and Afghanistan, also apply to the cybersecurity sector. Accordingly, private firms, including PMSCs, should be precluded from engaging in cybersecurity. I will call this the 'Highly Restrictive Approach': private firms should not be tasked with ensuring *any* cybersecurity services. On the other hand, it might seem that private firms are morally permitted to protect their own assets and so can hire PMSCs and other cybersecurity firms to assist them in doing so. I will call this the 'Permissive Approach': firms are allowed to engage in *all* cybersecurity operations. There is also a *via media* between these two positions, which I defend, at least at the nonideal level. I call this the 'Moderately Restrictive Approach'. This holds that private firms can justifiably launch *some* cybersecurity services—

defensive measures—but are not permitted to perform others—*offensive* measures.

The article will proceed as follows. Section II delineates in more detail private cybersecurity. Section III considers the ethical case for cybersecurity firms engaging in defensive operations, which are often seen as unproblematic. I argue that private defensive cybersecurity raises a series of ethical challenges but is currently permissible given the infeasibility of a public monopoly. This repudiates the Highly Restrictive Approach. I then consider (in section III) whether it is morally permissible for private cybersecurity firms to engage in offensive operations, which would be mandated by the Permissive Approach. I argue that they should not be and, in doing so, defend the Moderately Restrictive Approach.

With regard to methodology, to clarify and evaluate the central issues for the ethics of private cybersecurity, and to develop its central claims, this article will use reflective equilibrium. This is the predominant meta-ethical method in contemporary analytic political philosophy (De Maagt 2017: 463). It works by attempting to achieve coherence between our general moral principles and considered moral convictions about particular instances (Daniels 2016; Rawls 1999), in this case about private cybersecurity. In doing so, the article will consider accounts of the ethics of private cyber operations that are idealised (i.e. the Permissive Approach), and therefore more akin to what John Rawls (1999) calls 'Ideal Theory', as well as accounts of the ethics of private cybersecurity operations that are more 'nonideal' (i.e. the Moderately Restrictive Approach), and are very clearly part of what Rawls calls 'Nonideal Theory'. Whereas Ideal Theory focuses on theorising on the assumptions that there is compliance with the ideal moral principles and that there are favourable circumstances, Nonideal Theory is relevant for when the world is messier, including when there is significant noncompliance and highly unfavourable circumstances.[1] By also considering more nonideal approaches, this article is similar in approach to Jonathan Wolff's (2018) recent model of 'engaged' normative theorising and Joseph Carens' (1996) account of ideal and non-ideal theorising about migration. It also accords with Chris Brown's (2018) call for normative International Relations (IR) to be more attuned to and engaged with empirical realities, rather than being overly idealised.

In developing its account of the ethics of private cybersecurity, the article will draw upon literatures on the ethics of privatisation in general, the ethical challenges posed by PMSCs, and the ethics of cyber operations, and the normative considerations highlighted by these literatures. It will also, to some extent, draw on Just War Theory, but do so only *indirectly*. To explicate, one approach to the ethics of cyber operations would be to apply the standard list of Just War criteria (e.g. the six principles of *jus ad bellum*) to cyber operations. I do not do this since it is debatable whether, in general, cyber operations should be subject to the same ethical restrictions as regular warfare (see Allhoff *et al.* 2016; Dipert 2016; Floridi and Taddeo 2014; Lin *et al.* 2016; compare Lee 2014; Sleat 2017). Much depends on the magnitude of the likely harms of cyber conflict (such as whether cyber-attacks and responses to them might lead to several civilian deaths), but it seems

[1] All of the ethics of cybersecurity might be viewed as part of Nonideal Theory, to the extent that it is concerned with potential circumstances of noncompliance (e.g. cyber-attacks by hackers) which prompt the need for cybersecurity in the first place. Notwithstanding, there are, in general, different degrees of 'ideality'—how much a nonideal theory reflects the lack of compliance and of favourable circumstances. More idealised accounts of the ethics of private cybersecurity largely assume compliance and favourable circumstances (apart from the need for cybersecurity in the first place), whereas more nonidealised accounts focus on significant noncompliance and unfavourable circumstances. See, further, Pattison (2018*b*)

unlikely that they will be as harmful as warfare (Dipert 2016). Thus, the straightforward application of the Just War Theory framework, developed to govern war where the harms are typically very grave, seems questionable. Instead, the article will draw upon *underlying notions* that are central to 'revisionist' Just War Theory (e.g. McMahan 2009), especially the notions of liability, necessity, and proportionality. Revisionist accounts of Just War Theory hold that the principles that should govern warfare are not *sui generis*, but instead are congruent with the rest of moral and political philosophy including, we can add here, the ethics of cyber operations. There is nothing special, on revisionist accounts, about the fact that these principles govern warfare; they also govern other domains. This article uses notions from revisionist accounts because they are some of the most philosophically developed concepts that we currently possess for thinking about ethical questions in international politics. Thus, to avoid misunderstanding, this article uses Just War Theory (and particularly revisionist Just War Theory) because it offers a sophisticated account of ethical questions in international politics, not because I claim that cyber operations are akin to war.

I focus on both the 'deeper' and 'contingent' ethical problems raised by private cybersecurity. In the context of private security, there are three types of more fundamental or 'deeper' normative objections. First, an objection may be deeper in the sense that it is *unique* to private actors. That is, it applies to private actors but not to public ones. Second, an objection may be deeper in the sense that it is *necessary* since it applies to all *private* actors (and perhaps to some public ones as well). Third, an objection may be deeper in the sense that it applies even *if firms were effectively regulated by a feasible system of national or international regulation*. In the security sector, it is difficult—and often impossible—to find unique or necessary features of private actors, given the range of private and public actors, and the fact that certain public actors can somewhat—and increasingly—resemble private ones (see, more generally, Gardner 2014; Pattison 2014; Satz 2019). I focus instead predominantly on the third sense of a deeper problem, that is, issues that would apply even if private cybersecurity firms were effectively regulated. I also consider the contingent problems raised by private cybersecurity.[2]

All told, the main contribution that this article provides is a systematic assessment of the ethics of private cybersecurity. As far as I am aware, this article offers the first detailed account of this issue. Although there has been a burgeoning literature on the ethics of cyber warfare, this has been largely statist in focus, often drawing heavily on the state-centric frameworks of Just War Theory (e.g. Eberle 2013; Lee 2014; Orend 2014). As such, it has overlooked in large part the hugely significant—and indeed *central*—role of the private sector in cybersecurity. For instance, Matt Sleat (2017) argues that just cause for responding to a cyber-attack comprises attacks on critical infrastructure. This immediately raises questions about the private sector, given that (as I discuss below) most of the critical infrastructure of major Western powers is in the hands of the private sector, and the private sector has been largely entrusted with defending it. Should the private sector therefore engage in defensive and even offensive measures to defend critical infrastructure? Similarly, although there is an extensive literature on the ethics of private firms

[2] It is also worth noting that the public/private distinction is used in myriad ways (Weintraub 1997). It can be socially constructed by powerful actors (Owens 2008) and blur (Avant and Haufler 2018). Indeed, it may be more judicious for work on private security to focus on commercial security actors (e.g. as in Leander 2013) rather than purely the public/private distinction. Notwithstanding, I will use 'public' and 'private' in this article in order to be congruent with the widespread use of these terms in the literature on cybersecurity and on PMSCs.

performing traditional security functions (i.e. PMSCs and mercenaries) (e.g. Baker 2011; Feldman 2016; Pattison 2014), this has not yet been extended to the cyber sector. This is despite the huge and growing importance of cybersecurity globally. The conclusion of this article will draw out the broader significance of the analysis for the ethics of the privatisation of force and Just War Theory.

Two clarifications are necessary. First, I will adopt a broad definition of cybersecurity. I follow Myriam Dunn Cavelty in viewing it as a ‘multifaceted set of technologies, processes and practices designed to protect networks, computers, programs, and data from attack, damage or unauthorized access, in accordance with the common information security goals: the protection of confidentiality, integrity and availability of information’ (2015: 39).[3]

Second, I will draw on the ethical issues raised by PMSCs providing kinetic services to help inform the analysis. This is because there are certain similarities between the PMSC sector and private cybersecurity. According to Jesse McMurdo, private cybersecurity firms ‘are the PMCs of cyberspace’ (2016: 67). As he notes, ‘[i]nstead of deploying armed guards and armored vehicles, [they] deploy sophisticated programs and capable cybersecurity specialists’ (2016: 68). More specifically, it seems appropriate to draw *some* insights from PMSCs providing kinetic services since both private cybersecurity firms and PMSCs are (1) private firms offering (2) security services, (3) often operating across state borders, (4) sometimes in semi-governed or ungoverned spaces, and (5) sometimes with specialised needs of clients (Hoffman and Nyikos 2018: 32). It is important here to highlight that PMSCs provide services beyond armed security protection, including outside of the war context, such as the maintenance of equipment, training, and logistics, in a seemingly similar manner to the variety of services offered by private cybersecurity firms (which help, for instance, to fix technical errors and to manage software updates). That said, we should be very cautious in drawing strong analogies between the ethics of private cybersecurity and the ethics of private military force. In general, the heavy reliance on analogies between the physical and cyber realms (e.g. about deterrence) can be misleading, given the differences between the two realms (Taddeo 2016). Indeed, as we will see, there are significant differences between private cybersecurity and the private military and security sector, which leads to somewhat different ethical challenges, even if *some* insights for the ethics of private cybersecurity can be obtained by looking to the ethical issues raised by PMSCs.

II. Private Cybersecurity Explicated

The role of the private sector in cybersecurity is widely seen as necessary. In 2015, Barack Obama remarked that ‘[t]here’s only one way to defend America from these cyber threats, and that is through government and industry working together’ (2015). Likewise, the EU has emphasised the

[3] I define a cyber-attack as an attempt to harm or infiltrate another computer network. Sometimes a distinction is drawn between a cyberattack (said to be undertaken for political purposes) and cybercrime (undertaken for criminal purposes) (Hathaway *et al.* 2012: 830–3), but this requires identifying the attacker and their goals, which can be very tricky given the notorious difficulties of attribution. It can also be misleading since attackers can have multiple and complex objectives. Also note that cyberattacks can be undertaken by both states and nonstate actors and that there is not a sharp distinction between a cyberattack and cyberespionage (the latter is one form of cyberattack).

vital role played by the private sector in providing cybersecurity (Christensen and Peterson 2017: 1438). In its national cybersecurity strategy, the UK states that it 'will draw on its capabilities and those of industry to develop and apply active cyber defence measures to significantly enhance the levels of cybersecurity across UK networks' (2016: 10).

Important to understanding cybersecurity is the distinction between *defensive* and *offensive* cybersecurity. In his seminal discussion, Robert Jervis (1978: 203) notes that '[t]he essence of defense is keeping the other side out of your territory. A *purely* defensive weapon is one that can do this without being able to penetrate the enemy's land' (1978: 203; emphasis added). Likewise, Johan Galtung argues that the offensive/defensive distinction turns on whether the measure can be used abroad: 'If it can be used abroad, then it is offensive', but '[i]f it can only be used at home then the system is defensive' (1984: 128). In similar vein, in the cyber realm, whether measures are defensive or offensive depends on their effects beyond the defender's own network.

To elaborate, defensive measures vary in how 'passive' or 'active' they are, depending on the activity beyond the defender's own network.[4] *Passive* measures are akin to what Jervis calls 'purely' defensive weapons, that is, with no activity beyond the defender's own network. They include firewalls, patch management procedures, antivirus software, and limits to administrative authority (Center for Cyber & Homeland Security 2016: 9). *Active* measures involve some activity beyond the defenders' own network but, importantly, lead to little or no disruption of this network. Such measures are therefore still defensive. They include 'honeypots', which attract intruders and log their behaviour, 'tarpits', which slow down malicious traffic to disincentivise attackers from connecting to the network (Hoffman and Nyikos 2018: 19), 'beaconing' to alert the owner of unauthorised entry attempts and to provide the victim with information about the IP addresses and network configuration of the attackers, and intelligence gathering on the Dark Net (Center for Cyber & Homeland Security 2016: 10–11).[5]

'Active-cyber defence' (ACD) comprises measures that go beyond the defender's network. It includes several of these active defensive measures, which are not disruptive, as well as some offensive measures that are disruptive or significantly intrusive. Offensive ACD measures include 'botnet takedowns' (the disabling of the systems of infected attackers), entering into an attacker's network to obtain information about them (such as capturing an image through their webcam), and the (admittedly more speculative) possibility of white-hat ransomware (malware to encrypt files on third parties' systems that require them to return stolen information to regain access) and rescue missions to recover stolen information (Center for Cyber & Homeland Security 2016: 10–12; Hoffman and Levite 2017: 8). More offensive still—and beyond ACD—is hacking back. This involves the intention to disrupt or destroy the defender's network, rather than simply to defend against the attack or to retrieve stolen data (Center for Cyber & Homeland Security 2016: 12).[6]

[4] I largely follow here the definitions provided by the Center for Cyber & Homeland Security (2016), which offers a detailed and plausible account.

[5] Honeypots are sometimes viewed as active, depending on the degree of interaction with the attacker and whether they actively search out malicious servers. They also sometimes contain weaponised files that cause significant disruption once exfiltrated, although they may still technically be 'defensive', as the attacker is the one who transfers the infected file into their own network (Tallinn Manual 2017: 174).

[6] There are differences in how the precise boundaries of ACD and hacking back are drawn in the various accounts of them. Indeed, some offensive ACD measures (e.g. botnet takedowns) might be deemed to be hacking back if the intent is to disrupt. Not much turns on this definitional issue

Thus, to recap, there are (1) passive measures which are strictly limited to the defender's network, (2) defensive measures of ACD which do not disrupt the defenders' network, (3) offensive measures of ACD which do involve notable disruption or intrusion into the defender's network in order to redress the attack, and (4) hacking back.

A range of private actors are involved in cybersecurity. Private firms are both the *objects* and *agents* of cybersecurity. In other words, they both need protection and provide protection—and sometimes do both. In terms of being the *objects* of cybersecurity, firms have been subject to notable attacks, with several high-profile cyber incidents for firms such as Equifax, FedEx, Google, Maersk, and Sony.[7] Important here is that the private sector is now responsible for much of the maintenance of some states' critical infrastructure—it owns much of it—and so is a key object in need of protection.[8] Inadequate cybersecurity of critical infrastructure has become a major concern. In addition to affecting critical public services, inadequate private cybersecurity also affects national defence and internal security. This is in part because civilian infrastructure is used to transmit military data, such as cables and satellites (McMurdo 2016: 42). It is also due to the heavy reliance on defence firms by several states, most notably in the US. As Amitai Etzioni notes, 'General Dynamics, Boeing, Lockheed Martin, Raytheon, and Northrop Grumman—the United States' leading defense contractors—have all fallen victim to hackers' (2014: 75).

In terms of being the *agents* of security, several private firms provide *in-house* cybersecurity to protect themselves. There are also cybersecurity firms such as Novetta, Cloudfare, Crowdstrike, Trend Micro, and FireEye that are *hired* by other firms, governments, and other actors to provide cybersecurity. For instance, in the run up to the 2019 UK election, the protection offered by the US-based firm Cloudfare helped the British Labour Party to survive a Distributed Denial-of-Service (DDoS) attack (BBC 2019). Some firms are 'pure plays', which focus on a single market—often government clients—and get most of their revenue from that (Maurer 2018: 73).[9] There are other cybersecurity firms that have a broader customer base beyond government agencies. These include many smaller firms and start-ups that have emerged, with some becoming established contractors and others being bought by larger firms (e.g. Raytheon purchased Blackbird Technologies Inc for $420 million in 2014) (Maurer 2018: 74). An example of a smaller firm is Hacking Team, which allegedly sold offensive cyber tools to countries worldwide (Maurer 2018: 18–19). Other firms, such as HackerOne, act as brokers connecting 'white-hat' hackers (i.e. those who find vulnerabilities and sell them to the developers) to venders (Sales 2018: 635). Other firms, such as ReVuln and Zerodium (formed by the founders of Vupen), and defence firms, such as Lockheed Martin and Raytheon, connect 'grey-hat' hackers (i.e. those who find vulnerabilities and sell them to other parties, such as governments, who are judged to be legitimate purchasers)

here since I will argue that both offensive ACD and hacking back should be precluded. Some use ACD rather differently; for instance, the UK uses ACD to denote purely defensive measures rather than offensive ones (Stevens *et al.* 2019).

[7] For instance, NotPetya cost Maersk and FedEx $300 million each, with a total cost estimated at US$10 billion (Borghard and Lonergan 2019: 132–3).

[8] The notion of critical infrastructure has expanded, to include agricultural food systems, energy systems, health facilities, banking and finance, commercial and shipping services, with it being estimated that 85% of the critical infrastructure in most Western states is in private hands (Bures and Carrapico 2018: 4).

[9] Interestingly, traditional pure-play defence contractors such as ManTech, CACI, BAE systems, and Northrop Grumman have been increasing their activities to include cyber (Maurer 2018: 73).

to vendors (Sales 2018: 641, 642). The most notorious vulnerabilities are ‘zero-day exploits’, which are unknown to the vendor and other parties using the software, and are sold to (or shared with) various governments (McMurdo 2016: 43–4). Moreover, private firms that provide military and security services—traditional PMSCs—now also provide cybersecurity. PMSCs have either expanded into cybersecurity or have purchased firms that do so. For instance, in 2016, G4S added a ‘Cyber Consulting and Security Operation Centre’ to its portfolio.

The range and number of private cybersecurity actors has expanded as states have been unwilling and unable to protect fully citizens and firms against cyber-attacks. In the UK, the chances of being subject to a victim of a cyber-crime or cyber fraud are reportedly greater than for any other offence (Stevens *et al.* 2019: 5). The US has seen the development of a ‘Home Depot’ model, whereby private companies are responsible for the defence of their own network—including that of critical infrastructure—with the government responsible for prosecuting cybercrime, applying diplomatic pressure, sanctions, providing cyber threat information to companies, and defending the US from significant events (Eichensehr 2017: 496). Within this model, private actors are increasingly partnering passive cyber practices with more assertive forms of ACD (Hoffman and Levite 2017: 1).

Why have private firms selling cybersecurity become so important? There are two key elements to the emergence of the cybersecurity market. First, several states, especially the UK and US, have internalised much of the neoliberal logic, whereby governments should rely on private actors, given supposed market efficiencies and the encouragement of free enterprise (Krahmann 2010).[10] By the time that cybersecurity services became highly important, the free market philosophy stemming from the Reagan and Thatcher eras had been entrenched for several years. It seems almost natural in these states that private actors would be given a key role in providing security services, given that they have large roles in providing traditional military and security services, as well as a host of other public services.

Second, the development of the cyber domain has happened to a considerable extent in private hands. Unlike traditional military and security services, which have been outsourced, cybersecurity was not in public hands in the first place. To be sure, some states now possess some of the largest and most sophisticated cybersecurity capabilities. However, private firms have been integral to the development of the cybersecurity domain, rather than states significantly outsourcing cybersecurity. The Internet was largely developed by private firms and private firms have, in the Internet’s relatively brief history, been central to much of cybersecurity. This differs from other areas of privatisation (Eichensehr 2017: 471), including private security (Dunn Cavelty 2015). Thus, cybersecurity, unlike traditional military and security services, is not being privatised since it was private to start with. As we will see in the next section, this has important normative implications.

III. Private Defensive Cybersecurity

Let us consider the case for private defensive cybersecurity, that is, passive measures and defensive forms of ACD. Although I will argue that private defensive cybersecurity is somewhat morally

[10] Note here that, in large part, the article focuses mainly on the North American and European contexts of cybersecurity, although it will consider some issues for the Global South and for states in general.

problematic, and so the Highly Restrictive Approach has some initial plausibility, I will also argue that these problems are largely intractable, and so we are left with the Moderately Restrictive or the Permissive Approaches.

It will help to start by considering the prima facie case for defensive cybersecurity, which I think has some intuitive force and explains why, in the end, private defensive cybersecurity is permissible. This case runs as follows. The right to self-defence is a fundamental human right. If, for instance, an individual is facing an attack from a mugger, they can use (proportionate and necessary) measures to defend themselves and their property. They can also obtain assistance from someone to help defend them. Likewise, it seems that individuals can use (proportionate and necessary) defensive measures to protect themselves and their legitimate interests from cyber-attack. They can, it seems, engage in passive measures such as authentication, encryption, firewalls, honeypots that set up a decoy to expose attackers, and tarpits that slow down attackers to ensure that their property—and sometimes livelihood—is protected, and hire others to do so. Private firms can also, it seems, use (proportionate and necessary) measures to defend their legitimate interests. Like individuals, they can, for instance, use authentication, encryption, firewalls, and set up honeypots and tarpits, and hire others to assist them with this.

Important here is that if the state is not protecting its citizens or their interests (potentially invested in firms), the state is not fulfilling the terms of the social contract, whereby citizens accept the authority of the state in return for its protection.[11] It follows that individuals (and firms) are permitted to protect their own interests and to use private firms to help them do this (Lin *et al.* 2014: 50; Lin 2016: 8, 10–11). For instance, if a weak state fails to protect citizens in a particular town, meaning that they are subject to violent attack from rebel groups, the townsfolk could hire PMSCs to assist with their protection. Likewise, if a state fails to ensure cybersecurity, citizens and firms can hire private actors to assist with their defence, subject to the constraints of proportionality and necessity. Paul Rosenzweig puts this most forcibly, ‘in the absence of an effective system of cybersecurity provided by the U.S. government, it is, in some sense, almost immoral to prohibit private sector actors from taking steps to protect themselves’ (2014: 117).

This prima facie, idealised case has some force, but it does not establish by itself that private defensive cybersecurity is permissible. The issue is that, in practice, private defensive cybersecurity faces some negative externalities, even if seemingly innocuous, particularly in relation to its effects on (1) inequality and (2) democratic accountability.[12] I will consider these in turn, before arguing that, notwithstanding these problems, private defensive cybersecurity is permissible (and required) because of a lack of feasible alternatives.

Inequality

[11] I assume here that the social contract applies to all major security threats, including those in the cybersphere.

[12] These are documented extensively in the literature on the ethical problems posed by PMSCs. See Pattison (2014) and, more generally, Knight and Schwartzberg (2019) on privatisation and especially Satz (2019). Even if some of these effects are not apparent yet for private cybersecurity, they might still materialise. As Kristen Eichensehr argues, although the private cyber sector may have started out ‘publicised’ to the extent that it currently plays a helpful role in protecting public values, ‘the private sector is a fickle guardian of public values, and business imperatives will not always align with public values’ (2017: 537–8).

The first set of ethical issues concerns the issue of inequality in access to cybersecurity provision. One concern in this context is *exclusion*, where those who cannot afford to purchase security are left unprotected. With PMSCs, the reliance on the market to provide security services creates what Anna Leander (2005*a*) calls a 'Swiss Cheese' model, where there are significant lacunae in protection. The poor and disadvantaged lack protection because they cannot afford it. Similarly, in the cyber context, those who cannot afford to purchase cybersecurity are vulnerable to cyber-attack. As Kristoffer Kjærgaard Christensen and Tobias Liebetrau argue about cybersecurity, 'if we accept the centrality of private companies as providers of security, it is also a matter of who has the economic resources to retain the services of the "right" companies' (2019: 404). This is manifest in the Global South, where the public and private sectors lack resources and so 'more easily become infected with viruses and malware' (Schia 2018: 826). For instance, some banks in the Global South lack the resources to invest in cybersecurity. There have been notable thefts from the Banco del Austro in Ecuador, and from banks in the Philippines and in Vietnam (Schia 2018: 829). Likewise, developing countries lack the resources to buy the latest software and so are more vulnerable to attacks such as the WannaCry ransomware, which targeted a vulnerability in the Microsoft operating system that was patched months earlier for supported versions (Schia 2018: 831–2).

A second, related issue is *deflection*. When individuals or private firms purchase even private defensive cybersecurity, it can lead to insecurity being deflected onto those who cannot afford to top up their protection, meaning that they do not have a sufficient level of security. This is apparent in the physical world in gated communities, which can result in an increase in crime in surrounding areas (Claassen 2011: 143). In the cyber realm, the purchase of robust private defence systems can mean that attackers instead target those who cannot afford such systems. Indeed, systems that are related to poorly funded public infrastructure have often been the target of cyber-attacks (Turner 2018).

Third, by introducing the market logic into cybersecurity, influential agents may no longer be willing to support a general, basic level of public protection because they do not require it since they can purchase expensive private protection. This can reduce political support for the public spending necessary to fund a basic level of protection and ultimately lower levels of security for those who rely upon the service. Analogously, when parents send their children to private schools, this can lead to calls for decreases in the spending on state schools (Satz 2010: 107; Trebilcock *et al.* 2000: 224). In the cyber realm, in the US there has been significant lobbying by various interests (some of which are relatively well protected) to oppose stronger legislation on private cybersecurity that would help to ensure adequate protection for all (Etzioni 2014). This can significantly augment the problem of exclusion.

Democratic accountability

A second set of issues concerns the lack of democratic control over private, defensive cybersecurity. Democratic oversight has been one of the main challenges with PMSCs, given the secretive nature of the industry, the lack of understanding of it by the public and legislature, and the absence of data, such as money spent on contracts and the details of the contracts (Avant and Sigelman 2010: 245; Krahmann 2010: 249; Percy 2006: 21). This has meant that it has been much harder for the media, public, and legislature to hold the executive to account (Avant and Sigelman 2010). In a somewhat similar vein, democratically elected representatives and the public have little understanding of cybersecurity, and, even when they do, the transnational, complex, fragmented, and, to some degree, opaque nature of the cybersecurity industry renders democratic oversight tricky (Dunn Cavelty and Wenger 2020: 19; Lachow 2016: 12; Maurer 2018: 80). Moreover, private cybersecurity extends beyond traditional lines of democratic accountability—i.e. the state—which is the main locus of democratic rights (Kjærgaard and Liebetrau 2019: 405). This can render it difficult to hold cybersecurity actors to account, including when they are engaged in defensive measures. For instance, the response to the WannaCry attack involved a myriad of public and private actors, such as the NSA and Microsoft, extending beyond traditional lines of democratic accountability (Kjærgaard and Liebetrau 2019).

Second, PMSCs have become seen as experts in assessing security needs and potential solutions. As Leander (2005*b*) argues, they influence how we understand security threats, possessing 'epistemic power', that is, the power to affect the meaning of discourses. They often favour a military and technical view of security, thereby marginalising nonmilitary, more political approaches to security and nonmilitary solutions to complex political problems (Leander 2005*b*: 819). In the cyber realm, private cyber firms (even when performing only defensive roles) are seen as experts, playing central roles in the attribution of cyber-attacks (Eichensehr 2017) and constructing the broader understandings about cybersecurity and the appropriate responses. Compared to state actors, they focus on different objects—their continued operations as a firm—and on technical (and sometimes exclusionary) understandings of expertise (Christensen and Peterson 2017). For instance, in the development of the EU's Network and Information Security (NIS) programme, private cyber actors have shaped the regulatory standards, as the private sector is seen as holding significant expertise and efficiency (Farrand and Carrapico 2018). In his Presidential Address to the RSA Conference 2017, Brad Smith (2017: 13), President of Microsoft, claimed that, 'regardless of the government' that asks for its assistance in using offensive measures against its customers, it will not engage in these measures. Although the reluctance to use offensive cyber measures should be welcomed (as I argue below), the point here is that Microsoft plays a leading role in determining which measures a government can and cannot use. Thus, private firms are now central security actors that have significant epistemic power in the construction of cyber threats, potential responses, and the role of various actors.[13] The underlying normative concern, then, is that largely unaccountable private actors influence the cybersecurity agenda (including for defensive measures), rather than public actors who are accountable to the demos.

Third, private firms engaged in defensive cybersecurity measures may not be subject to even basic forms of democratic control. Many of the current public-private cybersecurity relationships differ from those traditionally provided by PMSCs in that they are informal rather than contractual. Private actors provide or hire cybersecurity alongside an informal, de facto partnership with the state (Eichensehr 2017), not based on contacts but rather comprised of looser expectations. This can also suit governments since they do not need to pay for cybersecurity and it allows them deniability (Eichensehr 2017: 510), which can weaken transparency.[14] Yet, without a contractual relationship, the state lacks control over private cybersecurity firms (Eichensehr 2017), which is a particular issue when its objectives differ, even more so than with traditional

[13] On the latter point (that private cybersecurity firms construct the roles of various actors) Smith also asserts that 'we are the world's first responders. Instead of nation-state attacks being met by responses from other nation-states, they are being met by us' (2017: 4).

[14] Many of the relationships are framed in terms of 'public-private partnerships', but how firms view this relationship is quite different to how governments do so. In short, both eschew responsibility for cybersecurity and assume that it is the responsibility of the other (Carr 2016).

PMSCs (which also face contractual issues (see Cohn 2011)). For instance, the UK's National Cybersecurity Centre is unclear what to do about private firms that fail to implement sufficient cybersecurity (Stevens *et al.* 2019: 20).[15]

The problems of a public monopoly on defensive cybersecurity

How should we resolve these problems? On the Highly Restrictive Approach, there should be a public monopoly on defensive cybersecurity to avoid these issues. This follows the logic of the argument for a monopoly on kinetic defensive measures, which might help to ensure equality and democratic accountability (Pattison 2014; Wulf 2007). A monopoly on kinetic defensive measures would include armed guards and protective services, as well as more seemingly more mundane measures such as alarm systems, fencing, and entry systems, to ensure that all are equally protected (and some are not more vulnerable than others). Similarly, a public monopoly on defensive cybersecurity could, in theory, first, increase, and even ensure, equality. The state could ensure the same level of cybersecurity for everyone and preclude individuals from hiring the services of private cybersecurity firms to prevent significant inequalities in cybersecurity developing.[16] Second, a public monopoly on defensive cybersecurity could increase democratic accountability by having public agents in charge of who provides cybersecurity, with clear lines of accountability to the demos.

However, although a public monopoly on force *might* be desirable with kinetic force (I leave this open here), the case is weaker for public defensive cybersecurity. There are four potential problems with a public monopoly on defensive cybersecurity.

First, it is unfeasible. States are unlikely to have the technical expertise or capacity to be able to defend fully against cyber threats. The private sector is vital to much of cybersecurity. Private firms have been integral to the development of the cyber world and have far greater capacity to defend their products. Moreover, the centrality of private actors is likely to increase further still. This is with the advancement of the 'Internet of Things' and artificial intelligence (AI), which are primarily developed by global technology firms and the private sector, and are likely to result in state actors becoming more dependent on private actors further still (Dunn Cavelty and Wenger 2020: 23). To overcome the dependence on private actors would require huge public spending since, as it stands, the resources, capabilities, and expertise of private firms exceed those of many states. For instance, JP Morgan Chase spends more on cybersecurity than is within the budget of the US Cyber Command (Hoffman and Nyikos 2018: 48). Such spending may also be undesirable, if there are limited state resources and these could be better spent elsewhere (e.g.

[15] The undermining of democratic accountability is a deeper problem with private cybersecurity, given that it could not be redressed by a feasible system of regulation since firms can simply choose not to provide their services, thereby rendering it difficult to ensure that the dictates of the democratic polity are realised (Pattison 2014: 103–4).

[16] This provides a deeper reason in favour of the public defensive cybersecurity since even if there were an effective system of regulation of private cybersecurity, it could not force unwilling private actors to protect those who cannot afford protection or whose protection is too risky; public defensive cybersecurity is required for this (Pattison 2014).

on ensuring the provision of education, health, and social care services). A public monopoly on defensive cybersecurity would also require a dramatic expansion of state control beyond national boundaries, given that cyber firms have systems and data across numerous states (Hoffman and Nyikos 2018: 49). This would be likely to raise further normative challenges, such as the significant intrusion into private property (such as source code) across national boundaries (Hoffman and Nyikos 2018: 42).[17] To be sure, this problem should not be overstated; it largely concerns when the public monopoly would involve the state providing cybersecurity *itself*. But on another model of the public monopoly, there would be scope for private actors to be the providers of cybersecurity, paid for by the state—the state would have a monopoly over only the hiring of cybersecurity services within its borders. Thus, this objection applies in greater force only to *some* forms of a monopoly on defensive cybersecurity.

Second, there is a moral hazard problem. If the government provides a monopoly on defensive cybersecurity, developers will have fewer incentives to pay for extensive testing to detect potential vulnerabilities (Sales 2018: 681; also see Hoffman and Nyikos 2018: 10). The upshot would be that poorly tested—and highly vulnerable—products may predominate, and, as a result, much more extensive cybersecurity is necessary, or that the state has to pay for testing. This is likely to significantly increase the resources required for effective cybersecurity, which is a challenge in the face of limited government budgets hamstrung by austerity and pressure to spend public money on the most pressing areas. Like the first issue, though, this might be redressed by carefully crafting the public monopoly on defensive cybersecurity. In this case, a state could require that testing of products be paid for by developers, subject to strict guidelines.

More serious are the third and fourth issues. Third, a public monopoly on defensive cybersecurity could restrict individual autonomy. The sorts of monitoring systems necessary to preclude individuals and firms from engaging in private defensive cybersecurity (e.g. topping up their publicly mandated cybersecurity or going beyond their allocated amount of private defensive cybersecurity) would be highly intrusive. To ensure equality, the state would have to preclude topping up, so that there are equal levels of even seemingly innocuous measures, such as antivirus software, firewalls, and authentication systems, so that no one is left more vulnerable (and so attacks are deflected onto them). The monitoring of individuals to see whether they have topped up could curtail Internet freedoms and privacy.[18]

Fourth, even if there were a monopoly on defensive cybersecurity at the state level, there may be significant inequalities between states in their capacities of defensive cybersecurity. States may also deflect attacks onto others. (Indeed, this is already happening with the implementation of the National Cybersecurity Centre in the UK (Stevens *et al.* 2019: 18).) The problem, then, is that individuals will still experience significant inequalities, which will be determined by which state they reside in. To overcome this issue would require an even more infeasible scheme—some form of global arrangement that ensures equal defensive cybersecurity for all, regardless of which state they are in. This may, of course, be undesirable for other reasons, such as if the global arrangement were to be dominated by authoritarian states.

Where does this leave us? The Highly Restrictive Approach is clearly problematic, at least nonideally (i.e. where there are notable ‘unfavourable circumstances’, such as limits on public

[17] In addition, if not ideal, a public monopoly may also fail to tackle the problems of inequality and democratic accountability (e.g. as government bodies are not properly subject to democratic control).

[18] For an in-depth analysis of the effects on privacy, see Lucas (2017).

spending and a lack of cooperation between states).[19] Private defensive cybersecurity, including passive measures, such as firewalls and patch management, and defensive forms of ACD, such as beaconing and honeypots, is permissible, despite the potential effects on inequality and democratic accountability. The most likely alternative of not protecting legitimate interests against cyber-attack seems unpalatable. As revisionist Just War Theorists (e.g. McMahan 2009) hold, defensive force that may harm others is permissible providing that it is *necessary* (i.e. there are no better means of defending against the threat) (see Lazar 2012; McMahan 2018) and *proportionate* (i.e. it is better to defend against the threat than not) (see McMahan 2013–14; McMahan 2018). Crucial here is that, in the absence of a feasible alternative—i.e. effective public cybersecurity—any harms of private cybersecurity in terms of inequality and democratic accountability may often be necessary in the defence of legitimate interests against cyber-attack.[20] To put this another way, private defensive cybersecurity is the only feasible way to ensure some protection, even if it leads to problems in terms of inequality and democratic accountability.[21] Thus, we need to look to the Moderately Restrictive Approach or Permissive Approach. In the next section, I will argue that the Permissive Approach is clearly inappropriate since offensive cyber measures are highly problematic.

Before we turn to this, it should be noted that firms may not simply be *permitted* to engage in defensive cybersecurity but *required* to do so. In other words, there may sometimes be a duty to provide defensive cybersecurity. This is particularly (but not solely) for critical infrastructure, given that the public could be at risk from inadequate protection.[22] My reasoning is this. In general, individuals have humanitarian duties to protect those at risk of notable harm (Singer 1972). Firms can be a means by which these humanitarian duties are discharged as, for instance, major shareholders bear some of the costs of ensuring that there is the adequate protection of critical infrastructure, so that innocent individuals are not harmed. It seems that firms can be asked to bear the costs of fulfilling such duties, given that, in a laissez-faire system, where there is not the public ownership of critical infrastructure, firms often enjoy significant benefits. These include, notably, reduced taxation and less regulation, which can increase the profit margins and the benefits enjoyed by shareholders, compared to a system where there is much greater taxation and regulation of firms.

As it stands, though, the private sector has often failed to protect both its own and the public interest. It has been estimated that 508,000 American jobs have been lost to cyber-crime and the US alone has lost up to $120 billion (Etzioni 2014: 70). The private sector has tended to under-protect itself because it has focused on short-term costs and benefits to the detriment of longer-term ones (e.g. the negative effects of stolen trade secrets can take years to manifest) and because

[19] I leave aside whether a global public monopoly might be *ideally* desirable.

[20] To be sure, if the negative effects on inequality and democratic accountability are very large, then the measure might still be impermissible under the principle of proportionality. If might, for instance, be better not to defend even one’s own interests if doing so will deflect the attack onto others who are more vulnerable.

[21] Private defensive cybersecurity should also, of course, still be subject to regulation nationally and internationally, and follow standards and best practice, such as the ‘Cybersecurity Framework’ of the US National Institute of Standards and Technology (NIST 2018).

[22] Even when critical infrastructure is not at stake, there are other duties to protect individuals or groups at risk of significant harm (e.g. when the violation of their privacy would lead to basic rights violations).

the costs of intrusions are faced by others (Agrafiotis *et al.* 2018; Etzioni 2014: 71). In terms of critical infrastructure, Madeline Carr finds that the private sector accepts responsibility for securing critical infrastructure only to the point that it is profitable to do so, ‘as far as the cost of dealing with an outage promises to cost more than preventing it’ (2016: 57). Thus, it should be mandated (e.g. in national laws) that firms *must* provide adequate cyber defence (especially of critical infrastructure), by doing so themselves or hiring others to do so. This is in line with the EU’s Directive on Security of Network and Information Systems (known as the ‘NIS Directive’), which directs member states to require firms that are tasked with critical infrastructure protection to have adequate cybersecurity (European Union 2018).

IV. Private Offensive Cybersecurity

Thus far, we have seen that defensive cybersecurity is permissible (and required). Let us now turn to offensive cybersecurity, such as offensive forms of ACD (e.g. takedown of botnets and white-hat ransomware) and hacking back. Is it permissible—and even obligatory—for private firms to engage in such measures, as suggested by the Permissive Approach?[23] Again, I will start with the prima facie, idealised case, which seems plausible, before considering the nonideal problems. I will argue that private offensive cybersecurity should be precluded.

The prime facie case turns on extending the argument for defensive cybersecurity to offensive cybersecurity. The crux is this: if (necessary and proportionate) defensive action to protect legitimate interests is justified, why is (necessary and proportionate) offensive action to protect legitimate interests also not justified? To see this, consider first an individual-level case involving traditional security interests.

> *Terrorists*: You are reliably informed by an associate of a terrorist group that they will blow up your house whilst you are on holiday. What’s more, the group have already begun the early stages of their attack by accumulating bomb-making material. Luckily, you can stop the attack by acting quickly now. This is by breaking into their house and spilling the bomb-making material. You foresee that, in doing so, you will cause the terrorists’ house severe damage. If you were to call the police, they would not be able to stop the attack in time.

In this case, it seems that you can justifiably engage in offensive force in order to protect yourself. Crucially, this is necessary—it is the only way that you will be able to defend yourself; your house will otherwise be blown up. Defensive measures, such as barricading your house, will not work. Moreover, the terrorists are liable to (proportionate) offensive force, given their enactment of their culpable plan to harm you.[24]

The same, it seems, is true of engaging in offensive cybersecurity. Consider an analogous

[23] Those sympathetic to this view include Gandhi (2019), Lin *et al.* (2014), Powell (2005), and Rosenzweig (2014). Others call for some offensive cyber operations to be permitted, e.g. Hoffman and Nyikos (2018: 56) and Center for Cyber & Homeland Security (2016).

[24] To be sure, if your information is not reliable, it might not be permissible to target the terrorist. Also note that it is important here that the terrorists have already *begun to act* upon the plan; I leave aside the controversial issue of whether individuals can be liable for merely *intending* a culpable act (i.e. which they have not yet enacted). See Alexander and Ferzan (2012).

case.

> *Hackers*: You are reliably informed by an associate of a group of hackers that they will steal much of your money. What's more, the group have already begun the early stages of their attack by developing their hacking tools. Luckily, you can stop the attack by acting quickly now. This is by hiring a private firm to hack into their network and disable it. You foresee that, in doing so, you will harm the hackers' computers, which will also mean that they cannot engage in legitimate online activity. The government lacks the spare resources to stop the attack.

Again, it seems that you can hire the private firm to hack their computers. The hackers are liable to force, given that they will culpably attack you. What is crucial, again, is that defensive measures will not be sufficient.

In fact, even if defensive measures might work *somewhat*, or be less likely to succeed, offensive force might be justified if it is likely to better protect your legitimate interests. For instance, if barricading your house might mean that only half of it is blown up, spilling the bomb-making material can be justified. Similarly, if using defensive cybersecurity measures will work somewhat, or be less likely to succeed, offensive cybersecurity might be justified. Suppose that defensive measures (e.g. honeypots) might have only a 50% chance of success of preventing the attack. Suppose further that, by contrast, an offensive cyber measure (e.g. hacking back) has a 60% chance of success. Crucial again here is that those subject to the force—e.g. the hackers—are liable to it. They cannot complain that they are subject to offensive force (when proportionate to their degree of liability) since they are culpable. Indeed, for this reason, several philosophers of self-defence and Just War Theorists (e.g. Buchanan 2007; Buchanan and Keohane 2004; McMahan 2005) hold that proportionate and necessary preventive operations can be justified against liable attackers and not simply defensive or pre-emptive military action.[25]

Likewise, it seems that private firms could engage in offensive operations against hackers in order to protect legitimate interests, when doing so is the best means of defending themselves. This seems most intuitive when the interests protected concern those who are very poor. Suppose, for instance, that rich hackers target the pension funds of a small, impoverished mining community, which is invested in a local firm. It seems that the firm could use offensive operations against the hackers if they are likely to be more effective, even if defensive operations would be somewhat likely to succeed.

What *ideally* appears to matter, then, is how justifiable a response is at tackling the unjust threat and, in doing so, protecting legitimate interests, rather than simply whether the operations are defensive or offensive (to be sure, I will argue shortly that the distinction between offensive and defensive operations is important in practice, that is, *nonideally*). Somewhat analogously, humanitarian intervention may be viewed as 'offensive', given that it involves coercive action beyond the borders of the state, but is sometimes permissible (and indeed required) to tackle mass atrocities (Reichberg and Syse 2002). This is because, although it transgresses state sovereignty (on a view of sovereignty as authority), this can sometimes be outweighed by the greater importance of effectively saving lives. In a somewhat similar vein (where the stakes are often

[25] To reiterate, any response must be proportionate to the degree of liability of the attackers. It would, for all intents and purposes, not be proportionate to use lethal or significant physical force in these cases, if the sort of harm from the attacker involves only property damage.

lower), it does not seem that the fact that offensive cyber measures occur within the networks of others is decisive, if the response would be likely to bring about a significant enough benefit, such as stopping a significant theft of property or attack that threatens significant harm to innocents. In fact, when the basic interests of others are at stake and they would otherwise not be protected, there may be a *duty* to engage in offensive operations. Not properly protecting the interests of, for instance, the impoverished mining community by engaging in the more effective offensive operations would be highly problematic. The firm would be morally *required* to hack back. The Permissive Approach can, then, potentially ground not only a *permission,* but also a *duty* to engage in offensive cybersecurity.

There is, then, a seemingly plausible *idealised* case for offensive action. Yet when we consider more nonideal features, it becomes clear that private offensive cybersecurity is highly problematic. The problems that face defensive cybersecurity of inequality and undermining democratic control are also likely to apply to offensive cybersecurity as, for instance, the poor cannot purchase private offensive cybersecurity and the private cybersecurity firms engaged in private offensive cybersecurity transcend traditional lines of democratic accountability. In addition, offensive cybersecurity faces three further problems.[26] These mean that, *in practice*, whether a measure will be offensive or defensive will be central to its justifiability.

Collateral damage

First, offensive cyber measures are of particular concern because they can cause collateral damage to innocent third parties or networks, or to those wrongly attributed as the source of the attack (Hoffman and Levite 2017: 4–10). As Eugene Volokh (2012) notes, we should be sceptical about drawing a straightforward analogy between physical self-defence and self-defence in the cybersecurity sector. This is because, compared to physical self-defence (where the risks are serious), there is an even greater risk of error in the cybersecurity sector that you might attack the wrong target, given the well-known problems of attribution, and there is significant potential that your response will harm third parties (Kerr 2005: 204–5; Volokh 2012). To elaborate, the servers attacked may also host important civilian services, such as for emergency services, hospitals, or schools (Rosenzweig 2014: 108). It is also very difficult to contain a cyber-attack. For instance, Microsoft's takedown of two botnets associated with No-IP.com (a domain name server (DNS) service) had the effect of denying 5 million legitimate users access to their domains (O'Connor 2016: 36).

In their defence of private ACD, Lin *et al.* (2014: 51–2) claim that the worry about innocent third parties being harmed is exaggerated. First, they argue that innocent cyber threats can be liable. Second, they claim that the innocence of third parties can be overridden by the 'greater good of public health' in the cyber realm (2014: 51; also see Baker 2012).[27] Third, they claim that those

[26] These problems are not unique to private cyber actors; they may also apply (to varying degrees) when states engage in offensive operations. I leave aside the issue of whether states should engage in offensive operations, which has been subject to significant attention already. See, for instance, Gandhi (2019), Iasiello (2014), Kerr (2012), Lin (2016), Valeriano and Jensen (2019), and Volokh (2012).

[27] The greater good here concerns the potential to access command and control machines and potentially compromise the attacker's home machine and identify other victims who do not yet know that they have been attacked (Baker 2012).

involved in botnets can fail in their obligations to preclude themselves from being hijacked and so can be viewed as somewhat morally responsible (i.e. negligent) for being botnets. If this is true, they would be what are called ‘innocent threats’ in the literature on revisionist Just War Theory (McMahan 2009).

These claims rest, however, on a far too permissive notion of liability for harm. First, although space precludes a detailed assessment of the issue, it seems wrong to hold that innocent threats are liable (Lazar 2009). Innocent threats are not culpable for their threat and so have not forfeited their right not to be subject to force. Thus, if those involved in botnets are innocent threats, they are not liable. Second, although consequentialist considerations can sometimes outweigh liability (i.e. through what are called in the literature on revisionist Just War Theory ‘lesser-evil justifications’ (McMahan 2009)), it is very doubtful that this is the case with private offensive cybersecurity. The potential benefits of targeting botnets are too uncertain and vague, and the harms too clear, for this to be justified (Kerr 2012). One worry in this regard is that there is a risk that permitting offensive cybersecurity creates an incentive to hide their location even more (Kerr 2005: 205; 2012). Another worry is that, even if a firm takes down one botnet, there may be multiple botnets, which limits the effectiveness of the responses (Iasiello 2014: 108). Third, many of those who become part of botnets will have taken reasonable precautions or lack the means to take reasonable precautions, and so are not negligent (Huang 2014: 1254–6). Thus, many who are part of botnets are still innocent threats. Moreover, even if some involved in botnets are *somewhat* negligent (e.g. if they have failed to take reasonable precautions), this does not seem to be sufficient to render them liable to offensive cyber measures, which would be a large cost for them to bear. This seems to be beyond that which can be required by their degree of liability for failing to fulfil their obligations to protect themselves.

Putting these points in terms of Jeff McMahan’s (2018) influential terminology of ‘wide’ and ‘narrow’ proportionality, taking down botnets would fall foul of *narrow* proportionality, that is, how much those who are liable can be required to bear, e.g. for some minor negligence in failing to update a security patch. Such measures could also fall foul of *wide* proportionality, that is, how much those who are innocent threats or innocent third parties can be required to bear, with innocent individuals having to bear unreasonable costs. Hijacked computers can, for instance, play an important public role, such as a high-tech computer that belongs to a hospital or an airport, and so disabling them could have excessive costs for innocent third parties (Volokh 2012).

Rights violations

Second, offensive cyber measures—and particularly those that involve espionage—can increase rights violations. This is when private cybersecurity firms provide services to help governments spy on populations. Cyber espionage provided by private firms can be used by governments to facilitate the repression of dissidents and human rights activists. In October 2019, head of WhatsApp, Will Cathcart (2019), identified the NSO Group, an Israeli-based company, as the source of a hack that had led to more than 100 incidents of abusive targeting of human rights defenders and journalists.

To be sure, just as conventional PMSCs often appeal to governments by promising not to do business with other states, cybersecurity firms claim that they will work only for legitimate organisations (both private and public). For instance, Netragard, a firm that focuses on exploits, claims that it works only for US customers (Maurer 2018: 78), the Grugq (a broker) claims that he does not sell to Russian or Chinese buyers in part out of self-interest (because they do not pay much), and Vupen claimed that it sells only to NATO members and those currently not subject to international sanctions (Sales 2018: 640). Others, however, are less reticent and are instead willing to let numerous clients hire their services. The co-founder of ReVuhn reportedly claimed that 'I don't see bad guys or good guys. It's just business' (Sales 2018: 642). The clients of Hacking Team allegedly included Azerbaijan, Bahrain, and Sudan—and their products have allegedly been used to target dissidents (Maurer 2018: 78). For example, a pro-democracy activist in the UAE was allegedly targeted by a remote-control system sold by Hacking Team and he was subsequently arrested in the UAE and tortured (Maurer 2018: 79).

Private cybersecurity firms may be able to attempt to stop some abuses by requiring customer service and product updates, especially given the transitory nature of software, although some firms may have no control over their products once they are sold (Maurer 2018: 79). Analogously, defence firms may have little control over the conventional weapons that they sell to governments and rebel groups, including when they are used for human rights abuses and to fuel conflicts. Moreover, states can easily circumvent firms' self-imposed limits by commissioning private firms or other states to serve as proxies (Sales 2018: 655). For instance, despite extensive sanctions, in 2011 Syria was able to obtain Internet filtering devices which it used to block and monitor thousands of attempts to connect to websites of opposition figures and those covering the Syrian uprising, even though the devices were originally supposed to be for Iraq's Ministry of Communications (Sales 2018: 655).

Instability

The third point is more speculative: it concerns when private actors engage in hacking back. There are notable risks, particularly if a more permissive environment develops (which I consider shortly) where private firms are permitted to engage in hacking back.[28] Various firms could conceivably use offensive operations to accidentally or intentionally target other firms. Such hacking back operations might potentially also drag states into conflicts. As Irving Lachow notes, '[i]f a contractor inadvertently launched a cyber attack that was perceived by another country as an act of war, the United States could be held responsible for that action' (2016: 12). A related worry here is that of 'friendly fire', where hackers attack from an allied or friendly country (e.g. through a botnet) and a response risks creating tensions with allies (Iasiello 2014: 110). To reiterate, I am not claiming that these risks are *currently* manifest; my aim here is to highlight the *potential* dangers of a Permissive Approach in the future.

In reply, Patrick Lin (2016) argues that escalation is unlikely because private cyber-attacks will be seen as more like 'frontier incidents'—i.e. force short of war—rather than outright attacks. Such incidents are, he suggests, less provocative because they are invisible and less visceral, even if the economic costs are sometimes high (Lin 2016: 17). In response, Lin is right that escalation is not necessary (also see Borghard and Lonergan 2019). However, it might still occur *sometimes* (as he admits). Much depends on whether the incidents are, in fact, perceived by the victims (even if the harms are small compared to kinetic warfare) as minor transgressions or major attacks.

But this is to some extent beside the point: the forms of instability that might develop from offensive operations are not simply about dragging states into conflicts. It is broader than this: the issue is increasing the number and range of actors that are engaged in offensive cyber operations. This can, in the longer term, increase instability, even if this takes a while to be manifest. In

[28] For somewhat analogous issues with PMSCs, see Avant (2006).

addition, there are other ways in which international stability can be undermined through private cybersecurity offensive operations, beyond hacking back, most obviously through *political* instability with interference in democratic elections. As Tim Maurer notes, focussing too much on military conflict 'ignores the full spectrum of political effects hacking has been used for, as the events in Ukraine and the malicious hacks during the 2016 US elections make clear' (2018: 3–4).

Regulating offensive cybersecurity

Given these issues, it is clear that the Permissive Approach is mistaken and that the Moderately Restrictive Approach is favourable, where private actors perform only defensive cybersecurity. Unlike for defensive cybersecurity, there is also a plausible, potentially feasible solution: do not permit private firms to engage in such operations. If private firms are not permitted to engage in offensive operations, and states cannot fill the void, this might well be desirable, given the risks of offensive cybersecurity. (As noted above, I leave aside the issue of whether states should also be precluded from engaging in offensive cyber operations, although some of these problems seem likely to apply to statist operations as well.) Whereas the risks of precluding firms from engaging in defensive operations are serious, especially as they are responsible for protecting much critical infrastructure, the risks of precluding offensive operations are far lower (given the potential efficacy of defensive approaches) and the harms potentially much greater. Important here is that private offensive operations may not be necessary because the ineffectiveness of passive cybersecurity is often exaggerated. Many firms do not implement basic defensive security procedures, such as the 'Twenty Critical Security Controls for Effective Cyber Defence (CSC)', which has been found to reduce vulnerability by 88% (Iasiello 2014: 111). In short, if firms defend themselves properly, offensive measures would not be required. The upshot is that there should be a presumption against engaging in offensive operations. This may be overridden on occasion, when the evidence is patent, but there is a significant burden of proof, given what we know about private offensive cybersecurity.

It also follows that there should be robust domestic and international regulation to preclude offensive cyber measures.[29] Domestically, although several states preclude offensive cybersecurity, especially hacking back, few enforce it, and some states permit it tacitly (Hoffman and Levite 2017: 4; Huang 2014; Rosenzweig 2014). To be sure, domestic regulation, when enforced, can play an important role in precluding private offensive cybersecurity. Yet, although valuable, it is unlikely to be sufficient because if the regulation is strict, firms may relocate (Hoffman and Levite 2017: 14–15). Indeed, some cybersecurity firms have entire divisions located abroad so that they can engage in activity that they would not be permitted to undertake in the US (Hoffman and Levite 2017: 15). A coordinated, international approach is therefore required. Yet, according to the authors of the *Tallinn Manual 2.0 on the International Law Applicable to Cyber Warfare*, 'international law by and large does not regulate cyber operations conducted by non-State actors, such as private individuals or companies' (2017: 175). For instance, if Sony had

[29] To the extent that regulation is feasible and would address the issues raised by private offensive cybersecurity, these issues are not deeper ones, although they are still are, of course, very serious. (There are deeper issues with private cybersecurity in general, discussed in the first half of the article, which would apply to private offensive cybersecurity). Also note that it may be better to preclude states from engaging in offensive cyber operations, but, again, this is beyond the scope of this article.

chosen to hack back against North Korea for its attack on it in 2014, 'it would have violated no customary rule of general international law' (although it might have raised the issue of US due diligence) (Tallinn Manual 2017: 130).[30] There needs, then, to be clear and strong global norms against offensive private cyber action, and ultimately, as Mette Eilstrup-Sangiovanni (2018) powerfully argues, a new 'International Cyberwar Convention' (ICWC). This would hold states responsible for cyberattacks launched from their jurisdiction, most clearly, when the attackers are under the direct control of the state, but also when the state is not in direct control—specifically, when it fails in its duties to take reasonable measures to prevent nonstate actors from launching attacks against other states from within its borders (Eilstrup-Sangiovanni 2018: 397).[31] Although a diplomatic breakthrough on a new cyber treaty is unlikely anytime soon (Maurer 2019), given *some* states' interests in allowing offensive cyber operations to occur, attempts to bring the ICWC into existence could add political weight and visibility to the issues (Eilstrup-Sangiovanni 2018: 400).

In the meantime, the room to engage in offensive cyber operations seems likely to expand as the market for private cybersecurity firms grows and existing laws change to become more permissible (Maurer 2018: 19). The Active Cyber Defense Certainty (ACDC) Act, introduced by Republican Tom Graves in 2017 (and reintroduced in 2019), aims to create a far more permissive environment, amending the Computer Fraud and Abuse Act (CFAA) to allow for individuals and firms to, for instance, go beyond their networks to disrupt and identify attacks and retrieve stolen data (Gandhi 2019: 300). Even if this bill is defeated, it seems that private offensive cyber operations are more likely in the future. The US's previous reluctance to use offensive cyber measures has waned (Temple-Raston 2019), as the more defensive cyber stance adopted by the Obama Administration has moved to a more aggressive, preventive one under the Trump Administration (Valeriano and Jensen 2019).[32] The US has acknowledged openly that it hacked the media operations of ISIS, by, for instance introducing dropped connections, access denials, and program glitches, in order to frustrate its online operations without it realising that it was being hacked (Temple-Raston 2019). Other states perceive a need to adopt more offensive stances, including Russia, China, Germany, and France (Eilstrup-Sangiovanni 2018: 386). The reliance on the private sector, and the experience with PMSCs, suggests that it is likely that private firms will play a role in states' offensive postures.

V. Conclusion

[30] For instance, the Tallinn Manual has failed to gain widespread support from states and the Budapest Convention on Cybercrime does not cover important states such as Russia and Brazil (Eilstrup-Sangiovanni 2018: 388, n. 17). The Wassenaar Arrangement precludes states from exporting some offensive cyber weapons but covers only 42 states.

[31] It might be worried that an ICWC would lead to authoritarian states increasing their violations of human rights domestically. However, this could be avoided if the ICWC is carefully crafted so as to focus on offensive measures. Moreover, it is unclear whether an ICWC would change existing practice where authoritarian states can already use extensive Internet controls.

[32] This is notable with the Department of Defence's 'Defend Forward' posture, which concerns confronting threats before they reach US networks (Taillat 2019: 375) and the Director of the National Security Association, Paul M. Nakasone's, recent statements that the US will react robustly to cyberattacks (Temple-Raston 2019).

In conclusion, private firms can permissibly launch defensive cybersecurity (passive measures and defensive ACD) and are obliged to do so (most clearly for critical infrastructure), despite concerns about equality and democratic accountability, given the problems of a public monopoly on defensive cybersecurity. They are not, however, permitted to perform offensive cybersecurity (offensive ACD and hacking back), given the myriad of problems with this, despite the idealised, prima facie case for it. On the contrary, there should be international regulation to preclude private offensive cybersecurity. Thus, I have defended the Moderately Restrictive Approach against the Highly Restrictive Approach and Permissive Approach.

I will finish by highlighting how this analysis is significant more broadly for the fields of the ethics of cyber operations and the privatisation of military force. First, in regard to the ethics of cyber operations, the issue of private cybersecurity is clearly of major importance. This is not simply because private actors currently play major roles in cybersecurity and are likely to do so for the foreseeable future. It is also because the issue of private cybersecurity calls into question how much the existing frameworks in this literature are fit for purpose. These tend to focus on applying statist Just War conditions to the cyber realm (e.g. Eberle 2013; Lee 2014; Orend 2014). At the very least, such frameworks that rely on Just War Theory should reflect the significant role played by private actors by, for instance, updating the principles to reflect the changing security landscape.

However, it might be preferable to move away from the standard, state-focused lists of Just War criteria, and instead adopt new fit-for-purpose frameworks. These may still draw on some of the morally relevant *underlying* principles that are crystallised in Just War criteria, such as proportionality and necessity, and that are widely held as relevant in moral and political philosophy, and highlighted by revisionist Just War Theorists. Yet the frameworks would use these principles to offer criteria that are *particularly applicable to the cyber world*, which relies heavily on the private sector.[33] An applied, specifically relevant framework—specific principles for cybersecurity, including private firms —would be quite different to the principles normally offered in Just War Theory, drawing only on the underlying insights for thinking about international ethics, and would not depend on the war context.

Second, in regard to the privatisation of warfare, PMSCs have been criticised heavily when performing traditional security functions. In this article, we have seen that there are also problems with the use of private firms for security in the cyber realm. Our understanding of the problems of PMSCs performing traditional security helps *somewhat* with understanding the problems posed by private cybersecurity firms. However, we have also seen that there are two major differences between cybersecurity and regular security. The first is that cybersecurity has not, unlike regular security, been outsourced. The second is that, in large part, private firms are not contracted to ensure cybersecurity, but instead are largely entrusted to do so. The former means that there is not an obvious process to reverse privatisation that can be followed to reduce the role of the private sector, which lends further credence to the Moderately Restrictive Approach as the Highly Restrictive Approach seems even more infeasible. The latter—that private firms are entrusted to provide cybersecurity—means that the private cybersecurity sector largely steers, and not simply rows, whereas the state plays a much larger contracting, and to some degree controlling, role in

[33] The cyber realm may not raise different *fundamental* challenges to the central moral principles in moral and political philosophy governing war and self-defence (Crisp 2012; also see Sleat 2017). My point, rather, is that it raises different *applied* issues. See, further, Pattison (2018a; 2019).

the traditional security sector. Whereas the state has some form of control that comes from the contracting process, this is not relevant for much of private cybersecurity. As we have seen, this gives us perhaps even more reason to be concerned about the prevailing systems of private cybersecurity than those of PMSCs.

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