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# Master Thesis

The Final Frontier - The Role of the European Union in the Security of Outer Space

handed in to: Dr. Susann Heinecke handed in by: Julia Lohse Master in Advanced European and International Studies (MAEIS) European Policy and Governance - Trilingual Studies Academic year 2019 - 2020

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Outer space is a domain of warfare. As such, it has become a highly contested realm of international politics. A diversity of actors such as governmental, commercial and scientific actors are part of the resurgent turn to the stars. This results in an explosion of activities propelled by technological disruption. Modern societies have become heavily reliant on space assets that support various applications such as telecommunication, weather forecasting, environmental monitoring and navigation, but many states have also "come to rely on space assets to support a broad array of military purposes" (West 2019, p.vi). Hence, such applications increasingly ensure terrestrial security as well. As a result, there is a growing prospect that either conflict on Earth will spill into space or that conflict in space will spark on Earth (Al-Rodhan 2018).

There are now more than 70 countries around the world that have some sort of space programme. Similarly, the number of objects on orbit has increased quite substantially in the last decades. Future growth of objects in space is propelled by the wider availability of low cost, small satellites and the deployment of mega-constellations. SpaceX alone plans to launch around 42,000 small satellites for its Starlink mega-constellation project to offer high-speed broadband internet (O'Gallaghan 2020). The high flying ambitions of SpaceX are only one example of the ongoing space commercialisation process which incentivises major space-faring nations to protect their economic interests in space.

This development proliferates the narrative of a 'Space Race 2.0', in which state as well as commercial actors compete for dominance in space. The major space-faring nations appear to strive for space superiority, a term that describes the "ability to use space for one's own purposes while denying it to an adversary" (Weeden and Samson 2020, p.xxii). As it turns out, space power is yet another aspect of national hard and soft power.

Sino-American rivalry, in particular, seems to extend to space (Liukkonen and Sauzay and Straube 2020). In January 2019, China conducted an extremely challenging mission by acing the first-ever soft landing on the moon's mysterious far side with its robotic Chang'e 4 mission (DIA 2019). With this mission China demon-

strated that it was ahead in the 'Race to the Moon', i.e. the "rivalry between China and the United States to scientifically explore and economically develop the Moon" (Hickman 2019, p.178).

However, Russian-American rivalry in space is just as important given that what is usually referred to as the first space race happened between the United States and the Soviet Union during the Cold War. The first space race was appeased with the end of the Cold War and the establishment of a high level of international cooperation in space in form of the International Space Station (ISS). Moreover, the US reliance on Russia for human spaceflight since 2011 was a symbol for Russian space power. This year, on 31 May, Russia was deprived of that symbol when NASA brought American astronauts to the ISS from American soil. SpaceX providing the service thus becoming the first private company to launch a crewed mission into orbit revolutionised the way people think about space (Chang 2020).

With space becoming an economic and geopolitical playground, space-faring actors are increasingly concerned with the safety of their space infrastructure. As a result, a growing weaponisation of space can be observed. This is a major threat to the sustainability, security and safety of outer space.

Against this background, the international space policy community has become increasingly concerned with space security doubting the effectiveness of the global space governance system (West 2019). Recent events and developments confirm the legitimacy of this concern. For example, in December 2019, NATO declared space as one of its operational domains alongside air, land, sea and cyberspace recognising "that space is a highly dynamic and rapidly evolving area, which is essential for the Alliance's security" (NATO 2020). Last year was also marked by the commitment of several states like the United States and France to build dedicated space forces.

Europe, as well, has come to realise that its safe access to space and space security at large might be challenged and that it needs to make sure not to fall prey to great power politics in space.

In fact, Europe is an important actor in space already and the European Union (EU) has had an unsung but crucial role in this achievement. The EU has independently developed space capabilities in all the key categories relevant to space security (Pellegrino and Stang 2016). For example, Galileo, one of the three flagship

EU space programmes, offers a highly-accurate and state-of-the-art alternative to the American Global Positioning System (GPS) and is expected to be used by 95% of all European smartphone users for e.g. navigation and timing services once it becomes fully operational which it should be this year (ESPI 2020). Moreover, with the Lisbon Treaty European space policy (ESP) became a shared competence. As a result, the EU established itself as an important coordinator and facilitator of European cooperation in space.

Against the background of geopolitical competition in space, the question of the posture to be adopted by Europe in space security is inevitably being raised (ESPI 2020). "Europe has a massive stake in the future of space. Our future prosperity and security depend on that. We must be fully aware of what is at stake and act accordingly" said Josep Borrell, High Representative of the European Union for Foreign Affairs and Security Policy, in his welcoming address to the 12th European Space Conference in January 2020 (EEAS 2020). The role of the EU in a European strategic perspective on space security is expected to become more and more important.

This thesis examines how the EU positions itself in the domain of space security from the perspective of neoclassical realism, a theoretical approach to the study of foreign policy and international relations which investigates how unit-level factors shape foreign policy responses to international systemic pressures (Baun and Marek 2019). While Europe's changing security environment on Earth and in space has created incentives for increased policy engagement in space security, explaining the form and content of European space policy in the domain of space security requires the understanding of the role and the approach of the European Union in space affairs.

The scope limitation of this thesis necessarily leads to the unsatisfying discussion of other important developments in space that are in many ways closely intertwined with the question of space security. This includes first and foremost the intense commercialisation of space, the so-called NewSpace or Space 4.0, and the discussion about an ongoing Space Race 2.0 and Race to the Moon. Moreover, the focus on the EU as an international actor in space and the neoclassical realist approach leads to the neglect of national space strategies of EU Member States, most importantly

France, Germany, Italy and Spain and to some extent the UK as well. Nonetheless, European Union politics always also include intergovernmental aspects and therefore national preferences of European Member States are part of the analysis even if not always mentioned explicitly.

The analytical setup of this thesis is the following. First, a literature review presents how theories of Foreign Policy (FP) and International Relations (IR) have been applied to space security and European studies. Then, the neoclassical realist approach and the framework it provides for this analysis is outlined. The main part of the thesis consists of the analysis of the international system and which incentives it creates for Europe as well as the role of the EU in space and how unitlevel intervening variables shape this role. Thereby, the thesis touches upon the question of space power and the scholarly debate on EU international actorness.

It finds that the EU is already a civilian space power but thus far only an emerging power in space security. The EU possesses the basic features of actorness in space security but rather domestic than constraints from the international system hinder it from becoming a fully-fledged space security power. Currently, the EU's response to the security challenge in space is an incoherent strategic approach of a series of half-measures and muddling through. It seems that so far the benefits the EU would gain from a restored balance of power in space, do not outweigh the domestic costs of balancing behaviour against the great space-faring nations, above all against the United States. The final Chapter presents a synthesis of the insights gained about the role of the EU in space security. Finally, in the conclusion, the usefulness of the neoclassical realist approach is assessed and potential pathways for future research are presented.

Space policy as an object of academic rigour has attracted more and more attention by scholars of the social sciences and related fields. This has many reasons. Among them is the fact that practitioners and policy-makers all around the world have put increasing effort in the development of space activities such as programmes and strategies. Another reason is the need to find policy and governance answers to the changing environment in space that has been propelled by technological change and new actors. Finally, information and data about space has been and continues to be not easily accessible but to a lesser extent. The study of space policy is very complex. Any approach to space policy "must necessarily be pluralistic and interdisciplinary in nature" (Bormann and Sheehan 2009, p.4) in order to "grasp the multitude of themes, approaches, meanings and effects of space" (Ibid, p.4). Therefore, if we approach space from the lenses of political science and international relations (IR) theory, we must always also consider insights from other disciplines such as sociology, anthropology, science and technology studies and even cultural and film studies among others.

Space disappeared almost entirely from IR discourse after the end of the Cold War in 1989 only to resurface again at the beginning of the 21st century. It is not only legitimate to study space from an IR perspective given that the "foundations for the explicit consideration of space exist in IR theory" (Pfaltzgraff Jr. 2007, p.30) but also imperative to do so as space just as Earth is an arena where great power competition by nation states happens in an anarchic system. As Bormann and Sheehan (2009, p.4) state, space is a "political, a social and a discursive arena. It is a place for conflict and cooperation, and for the projection not only of objects but also of ideas, norms and identities".

As IR theory is very much bound to earthly human experience, "our theories about the political behaviour of states and other entities in space are extensions of our hypotheses about terrestrial power" (Pfaltzgraff Jr 2007, p.32). Thus, from IR theory the notion is derived that space as a new arena is in the first place a basis for improving human life on Earth and for enhancing the power position of certain actors. Only as a second step IR theory considers how "sociopolitical relationships

might evolve between space-based entities far from Earth" (Pfaltzgraff Jr 2007, p.30). Hence, many scholars draw comparisons from experiences made with other global commons such as the air and the sea in attempting to understand how political issues such as security and commercialisation are "extended from their terrestrial environment into space" (Pfaltzgraff Jr 2007, p.31).

Realist, (Neo-)liberal as well as Constructivist studies have been produced on space security and governance. Adherents of the realist theory view space as a new frontier to which competition characteristics of terrestrial political relationships are extended "as part of an enduring struggle for power" (Pfaltzgraff Jr 2007, p.32). Common themes in this line of research include space power and security, dissuasion and deterrence as well as territory and sovereignty. Attempts to conceptualise and quantify space power are numerous, see e.g. Bormann and Sheehan (2009), Al-Rodhan (2012) or Aliberti and Cappella and Hrozensky (2019). Especially scholarly debate on the the security dilemma in space and the relation between space power and security has exploded recently, see e.g. Haas (2020) and Lubojemski (2019). While realist theorist usually chose the perspective of one single country and analyse its power position in space, e.g. how China seemingly attempts to close the capability gap in space to the US (Wu 2015), neo-realist scholars focus on a strategic view on world politics and how a balance of power between major space-faring powers could or is developing.

Adherents of the (neo-)liberal theory argue that space can be considered an area for either competition or cooperation or both. By stressing the value of (institutionalised) cooperation the liberal branch often chooses the global space governance system as a focal point for space security research, see e.g. Gallagher (2010) and Martinez et al. (2018). The field of space law that is closely attached to space governance has seen a strong surge in academic attention. Space law studies are extremely various and range from issues such space weaponisation and armed conflict in outer space (Johnson-Freese and Burbach 2019, Zhao 2018) over the plethora of threats to peaceful purposes of outer space (Jakhu and Chen and Goswami 2020) to space tourism activities (Hobe and Goh and Neumann 2007) and space commercialisation in general (Zhao 2018). Finally, the topic of space sustainability and how space can contribute to sustainability on Earth is relatively more represented in liberal

IR theory on space security then in other IR theories. Initiated by the United Nations Office for Outer Space Affairs (UNOOSA) and its Committee on the Peaceful Uses of Outer Space (COPUOS) the issue of space as an enabler and how space can be used in support of sustainable development (in particular the 2030 Agenda for Sustainable Development and its Sustainable Development Goals) is high on the research agenda, see Kumar (2020) and Aganaba-Jeanty (2016).

Constructivism in IR Theory needs prior explanation before outlining the constructivist approach to space security and policy research. Here, constructivism is not understood as a theory, but rather as an ontology, "an understanding of the nature of being, a way of looking at the world" (Pfaltzgraff Jr. 2007, p.41). This means for IR theory and space, that "we have the ability to create, or construct, the types of arrangements that we may wish to have for space" (Pfaltzgraff Jr. 2007, p.42). The constructivist approach to space encompasses a wide range of different methods and disciplines. However, certain theories have been dominant such as the use of discourse or framing theory, see e.g. Burwell (2018) and Cross (2019).

Space security and policy has also been approached from a European studies perspective, see Hoerber (2012), including attempts at quantifying and strategising European space power (Aliberti and Cappella and Hrozensky 2019) and discussions of the role of space in the Common Foreign and Security Policy (CFSP) and the Common Security and Defence Policy (CSDP), see Papadimitriou et al. (2019), Pellegrino and Stang (2016) and Slann (2015).

Furthermore, there has been increasing attempts at explaining European space policy (ESP) within the European integration process. A common theoretical approach in this context is Neo-Functionalism which evolves around the idea of the development of transnational cooperation and coordination through technical decisions that lead to spill-overs into other areas (Sigalas 2016). In most cases, Neofunctionalism is used to explain the shift away from an exclusive area for science and research towards the development of space capabilities and their applications to maximise socio-economic benefits (Sigalas 2016). It is also used to take account of the increasing involvement of the EU in European space matters. However, while there have been strong shifts towards supranational aspects in ESP since the Lisbon Treaty in 2009, intergovernmental aspects still prevail most famously in the form of

the European Space Agency (ESA). How the relation between ESA and EU should be shaped as "ESA has outgrown its bureaucratic roots and has acquired a political relevance" (Hoerber and Sigalas 2016, p.xiv) is the core of the debate in the institutionalist approach which includes theoretical discussions about institutional change (Remuss 2018). How national governments decide on collaborating in space affairs is usually the object of study of intergovernmentalist approaches, see Pellegrino and Stang (2016).

From a social constructivist viewpoint, European space activities could contribute to a European identity which is considered a necessary condition for continuous European integration, see e.g. Hoerber and Sigalas (2016) and Hoerber and Köpping Athanasopoulos (2017). In consequence, the justification for the analysis of space policy form a European studies perspective comprises many aspects. As Hoerber and Sigalas (2016, pp.xii - xiii) conclude: "The European space research has considerable relevance for the European space industry and European economy. Moreover, it is arguable increasingly important for the self-perception of European society, rather than national societies, and is relevant for the development of a European culture; it may even bolster European identity".

Lastly, due to the inherent interdisciplinary nature of space studies an interesting niche in space studies has been recently started to developed by scholars cutting across disciplines ranging from geography, law, economics, history, anthropology and politics to film studies, cultural studies, utopian studies and more. Studies in this area go far beyond the notion of space as an object for the exercise of power and the extension of the nation state to new frontiers. Instead, they engage in mapping out utopian and dystopian ideas of outer space, thinking about how space is culturally constructed and how it interacts with society on Earth (Dickens and Ormrod 2016, Geppert 2018, Butler 2017). "Space offers resources that may facilitate the creation of a new society with a new set of rules - a utopian good place - or lead to the continuation of human politics off-planet with dystopian consequences" (Butler 2017, p.1). What holds this dispersed domain of research together is considering outer space as a social space arguing that "what happens at the intersections of terrestrial and outer space is very important in establishing social power" (Dickens and Ormrod 2016, p. 2). It should be noted, that historians in particular who identify themselves

with this research, criticise and question the "standard account of the space race, and of the history of the American space programme" (Dickens and Ormrod 2016, p. 3). Other scholars even attempt to "break new ground in the historicisation of outer space by introducing the notion of astroculture, inserting a distinctly (West-)European element into the hitherto largely US- and USSR-centred historiography... emphasising the significance of outer space as a site of projection of competing versions of the future" (Geppert 2018, p.xx).

This chapter has briefly surveyed the broad literature on space policy with a focus on the major perspectives from IR theories and European studies. Space security research will have to extend and improve in order to provide policy- and decisionmakers with constructive insights to enable effective space policy-making. Pfaltzgraff (2007, p.43) concludes that "the stakes are immense, how we theorize about space, drawing on existing and yet-to-be-developed IR and other social science theories, will have major implications for strategies and policies". This thesis is an attempt to contribute to the theory development of international relations in space security studies.

Explaining the increased attention to space activities, especially in the form of grand national or multilateral policy and security strategies, and how it fits into the broader changing dynamics in the international system requires taking a bird perspective which only IR theory offers. Hence, space is understood as a new frontline for international competition and cooperation besides the traditional areas of land, air, sea and cyber. As no single IR theory is capable of fully explaining international relations on Earth, it is obvious that we cannot expect IR theory to work differently in space. However, given the current state of international space affairs, realist theory seems to have the highest explanatory power for the acquisition of space programmes and space weaponisation. The "dependence of technologically advanced states on space, together with their resulting vulnerability to attack in and from space, contributes to the relevance of realist theory to the analysis of space and national security" (Pfaltzgraff Jr, p. 37). From this perspective, competition on Earth is extended to space as soon as technologies becomes feasible. Furthermore, it can be argued that the development of this technology in the first place happened due to Earthly competition between superpowers in the context of the bi-polar world order during the Cold War. "Space is a new frontier that will be exploited as part of an inevitable and enduring struggle for power... Because international politics is a struggle for power, it can easily be inferred that space power is a manifestation of such a struggle" (Pfaltzgraff Jr 2007, p.36). Hence, the development of space power is yet another aspect of national hard (and soft) power in order to gain leverage for defending national interests and for guaranteeing national security in the presence of international anarchy (or in the absence of space leadership). The concept of space power will be discussed in more detail in Section 3.1.1.

In general, the three major variations of realism include classical realist theory developed by Hans Morgenthau and structural realist theory as set forth by Kenneth Waltz from which departs the third variation neoclassical realist theory (Pfaltzgraff Jr 2007). Neoclassical realism was long understood as a theory of foreign policy,

which it is, but it also has a lot to say about international relations (Ripsman and Taliaferro and Lobell 2016). Neoclassical realist theory shares some core assumptions with structural realism such as (1) the primary unit of analysis is the state; (2) international systemic stimuli are the main driver of foreign policy and (3) international outcomes and foreign policy behaviour are mainly to be attributed to the relative distribution of power. However, neoclassical realist theory augments structural realist theory by unit-level intervening variables such as a state' perception of systemic stimuli, its ideological priorities, the strategic culture within a state or a state's ability to mobilise domestic resources (Ripsman and Taliaferro and Lobell 2016). By doing so, neoclassical realist argue, they can account for the fact that "states often react differently to similar systemic pressures and opportunities, and their responses may be less motivated by systemic-level factors than domestic ones" (Schweller 2004, p.164). Moreover, they assume that systemic outcomes are a result of the grand strategy choices and interactive behaviours of the great powers and adding unit-level intervening variables results in a higher explanatory power to explain structural change in international outcomes. In other words, a neoclassical "realist approach that starts with structure but considers how structure interacts with the strategic choices and domestic political constraints of the principal units of the international system holds out far more promise as a dynamic approach to explaining international politics" (Ripsman and Taliaferro and Lobell 2016, p.88). Finally, neoclassical realist theory focuses more on the particular, e.g. why any particular war occurs or why a particular state pursues a particular grand foreign policy strategy, rather than attempting to find recurring patterns or universal theories in international relations (Ripsman and Taliaferro and Lobell 2016). In the following, the neoclassical realist approach to foreign policy and international relations will be outlined in order to provide the theoretical framework for this thesis.

# 3.1 The Neoclassical Realist Research Paradigm

The international system is the starting point for neoclassical realist theory arguing that it is what first and foremost decides the scope and ambition of a country's foreign policy and its position in that system, specifically by its relative share of

material capabilities (Ripsman and Taliaferro and Lobell 2016). Waltz characterisation of the international system is the basis for neoclassical realist theory. Waltz (2010) argues that the international system is characterised by three key factors: (1) its ordering principle, that is, how the units stand in relation to one another; (2) the degree of differentiation, or lack thereof, among the units; and (3) the distribution of capabilities among the units (Ripsman and Taliaferro and Lobell 2016). The international system refers to the global interstate system (structure) and its anarchy (order). Anarchy creates uncertainty among states and creates a self-help environment (ibid).

In neoclassical realism, the international system is considered the Independent Variable (IV) which poses systemic constraints and opportunities to the policy choices of the state. However, more variables than with Waltz' definition are taken into account such as Intervening Variables (IVVs). These are variables that influence the domestic decision-making process for the optimal policy response "to satisfy systemic constraints" (Ripsman and Taliaferro and Lobell 2016, p.35). It is assumed that domestic decision-making is a complex process that does not always lead to optimal policy choices. Especially because there are not always obvious responses to systemic incentives and threats. As Ripsman and Taliaferro and Lobell (2016, p. 358) suggest, "systemic incentives and threats that arise within a system, at least in the short run, are rarely unambiguous. Seldom is there a single optimal response to systemic constraints and opportunities". Hence, the IV can be just as responsible for non optimal policy choices by other states.

"Like classical realism and structural realism, neoclassical realism views international politics as a never-ending struggle among states for power and influence in a world of finite resources and uncertainty about each other's intentions and capabilities" (Ripsman and Taliaferro and Lobell 2016, p.44). The concept of power and its relative distribution remains a hotly debated issue in international relations. There appears to be little consensus among the different theoretical schools and also within neoclassical realism over what constitutes power. As space is a unique environment, power as regards space or space power is conceptualised differently than Earthly power. Hence, before specifying the IV and IVVs, a concept of space power has to be outlined in the next Section.

# 3.1.1 Space Power

The unit of analysis is the state as nation states remain the most significant actors in space. Space power is not only essential to control space but also to state power on Earth (Al-Rodhan 2018). As Al-Rodhan (2012, p.21) asserts, "if previously air dominance capabilities were key to global control, the control of space could mean potential future mastery of the world".

Pfaltzgraff Jr (2007, p.32) defines space power as the "possession of capabilities to conduct military operations in and from space and to utilise space for commercial and other peaceful purposes" and contends that "strategies for dissuasion and deterrence in the 21st century depend heavily on the deployment of capabilities in space" (ibid, p.32). Considering space power in addition to power on Earth adds another layer, the vertical dimension, to the analysis: "As a concept, space power broadens the domain of IR theory from the traditional horizontal geographical configuration of the Earth divided into land and the seas to include the vertical dimension that extends from airspace to outer space" (Pfaltzgraff Jr 2007, p.32). Hence, space power is a two-way concept meaning that a state's relative power in space is important but this power similarly influences power dynamics on Earth. A separate framework to think about space power is helpful in order to analyse "how global actors use these space capabilities to improve their respective geopolitical postures on Earth" (Al-Rodhan 2012, p.15).

The process of theorising space power is most advanced in geopolitical studies where derivatives of classical geopolitical theory are used (Pfaltzgraff Jr 2007). Departing from this theoretical basis, Al-Rodhan (2012) has developed a multidimensional spatial framework which goes beyond traditional and neoclassical realist conceptualisations about power which tend to focus on military threats to security. The meta-geopolitics framework proposes a multidimensional view of power including "all of the soft- and hard power tools that states can employ to project power" (Al-Rodhan 2012, p.1). Al-Rodhan (2012) identifies seven key areas of power, which are referred to as 'capacities', and extends them into space thereby going beyond traditional conceptualisations about power that were deeply rooted in geography,

sovereignty, demography and economics. Al-Rodhan (2012) claims that based on this framework it is possible to assess the "strategic orientations of major and emerging space powers" (ibid, p.2).

Al-Rodhan (2012, p. 25) defines space power as "the ability of a state to use space to sustain and enhance its seven state capacities as outlined in the meta-geopolitics framework". The seven state capacities are "social and health issues, domestic politics, economics, the environment, science and human potential, military and security issues and international diplomacy" (Al-Rodhan 2012, p.19). An overview with important examples for the illustration of the meta-geopolitics framework is provided in 3.1.

Capacity	Space-based Asset	Service and Applica-	Policy Implication
		tion	
Social and	Satellite Communica-	Telemedicine, crisis	Use space to Improve
Health	tion (SatCom), Earth	response, disaster	life on Earth
Issues	observation	risk reduction (e.g.	
		COVID-19 pandemic)	
Domestic	Human space explo-	Moon Village, Colony	Boost national pride,
Politics	ration	on Mars	generate prestige
Economics	SatCom, Navigation	High speed internet,	Numerous private and
	(e.g. GPS), Telecom-	high speed global mo-	commercial benefits,
	munication, Asteroid	bile connection	revenue creation
	Mining		
Environment	Earth observation,	Track and predict cli-	Enable early response,
	Satellite imaging	mate change or en-	detect environmental
		vironmental degrada-	law breaches
		tion	
Science and	Mega-constellations,	Update and improve	Cheap and easy ac-
Human Po-	nano-satellites	existing technology,	cess to space and
tential		e.g. deliver 5G	space data by develop-
		Internet	ing countries and non-
			state actors
Military	Navigation; Intelli-	Reliance on space	Military reliance on
and Secu-	gence, Surveillance	track movements of	space; Security of crit-
rity Issues	and Reconnaissance	criminals	ical national space in-
	(ISR)		frastructure
International	International fora	arms control, space ex-	Enhance national visi-
diplomacy	(UN), bilateral and	ploration, e.g. Inter-	bility as space power
	multilateral coopera-	national Space Station	
	tion	(ISS)	

Table 3.1: The seven state capacities of space power in the meta-geopolitics framework

Source: Overview compiled from Al-Rodhan (2018)

As regards space security, there are some capacities that are more influential than others such as *domestic politics*, *military and security issues* as well as *international diplomacy*. With the increasing commercialisation of space and the enhancement of commercial participation in national space programmes and missions, particularly in the US, commercial actors become relevant to national security. Therefore the capacity *economics* plays an important role in space security as well.

However, all seven space power capacities are currently destabilised and threatened (Al-Rodhan 2018) and space-faring nations are increasingly concerned about sustaining "their space power in a highly competitive and anarchic environment" (Al-Rodhan 2012, p.41) since "all stakeholders have a clear self-interest in keeping their own assets safe" (Al-Rodhan 2012, p.41).

This concept of space power underlies the analysis of this thesis and will be used to assess the space power of the United States, China, Russia and the EU. The metageopolitics framework is a helpful supplement to the neoclassical realist approach to space security studies. The starting point of the approach will be presented in the next Section.

# 3.1.2 The Independent Variable

The international system as concerns space is state-centric. It is constituted by interstate relations including in international fora such as the United Nations. In this thesis the United States, Russia, China and the EU in its representation and coordination role of European space affairs are identified as the main actors in the international space system. There are many more aspiring space powers such as Japan (which is considered by some as an established space power), India, Israel, Brazil and North and South Korea among others.

There is broad consensus in the literature that the international space system was bipolar at the beginning of human space exploration during the Cold War. There is less consensus among policy-makers and scholars what the polarity of the current international system is. Many argue that we see a transition towards a multipolar system in space or that we already passed the transition phase and that multipolarity is a reality. Others argue that after the bipolar system of the Cold War there began a phase of unipolarity under US leadership while this leadership

might be challenged since the beginning of the 2000s by other space-faring nations, from the US perspective most notably China. Either multipolarity, bipolarity or unipolarity, these terms simply describe ideal types of power configurations and any "international system at any given point in time can only approximate one of these ideal types" (Ripsman and Taliaferro and Lobell 2016, p.45). Moreover, especially at the beginning or during transition periods, which arguably are always present as politics and the international system are never static, it is difficult to determine the polarity of the system which might be more easily determined with several years of hindsight. In Chapter 4, arguments in favor and against multipolarity in space will be presented from major space-faring nations' perspective. Multipolarity in space is always also seen as an arena that shapes the world order on Earth.

Besides polarity there are other approaches to characterise the international system in neoclassical realist theory. To this end, two key systemic variables are identified which are unique to neoclassical realism namely the *clarity of the international system* and the *nature of a state's strategic environment* in the system (Ripsman and Taliaferro and Lobell 2016).

The level of *clarity* refers to the "clarity of signals and information the international system presents to states" (Ripsman and Taliaferro and Lobell 2016, p.47) and can either be high or low (or in-between). The level of clarity depends on three important factors: (1) The nature of threats; (2) The time frame of these threats; and (2) The optimal policy responses to them (Ripsman and Taliaferro and Lobell 2016). The degree to which an international system creates uncertainty among states is closely interlinked to the system's level of clarity. In its simplest form it is assumed that the less clear the system, the higher the degree of uncertainty.

The nature of the *strategic environment* is described as either permissive or restrictive while the imminence and magnitude of the threats and opportunities that states face characterise the system as the one or the other (Ripsman and Taliaferro and Lobell 2016). Essentially, it is assumed that all things being equal, "the more imminent the threat or opportunity and the more dangerous the threat (or the more enticing the opportunity) the more restrictive the state's strategic environment is" (Ripsman and Taliaferro and Lobell 2016, p.53) and conversely.

In consequence, while *clarity* pertains to the scope of signals and information the

international system presents to states, the system's *nature* concerns the content of that information (Ripsman and Taliaferro and Lobell 2016).

Chapter 4 will explain why the *strategic environment* is relatively permissive and why the level of *clarity* is medium to low in the international space system presented to space-faring nations and actors. First, however, the role of intervening variables (IVVs) and how they interact with the IV to shape the dependent variable (DV) has to be discussed.

# 3.1.3 The Intervening Variables

Incorporating the unit-and sub-unit-level Intervening Variables that condition "whether and how states respond to the international systemic pressures that all realists assume underlie foreign policy, grand strategy, and international politics" (Ripsman and Taliaferro and Lobell 2016, p.59) is the defining feature of neoclassical realism and where it makes its major contribution to realist theory.

In space, it is of utmost importance to include unit-level IVVs in order to account for the different perceptions and policy responses of the major space-faring actors to the changing environment in space. How the major space-faring powers build their grand strategy for space will utlimately decide in decades or years if space will be a domain of peacful human action and exploration or if there will be war in space. The IV alone does not offer a sufficient analytical basis to explain how certain actors like the EU decide to position themselves in space as will be shown in the following Chapters.

IVVs are clustered along four broad classes: *leader images, strategic culture, domestic institutions* and *state-society relations* (Ripsman and Taliaferro and Lobell 2016). As illustrated in Figure 3.1, each of these variables influences, in different ways and to different degrees over time, three intervening-level processes: (1) perception of the international system; (2) decision-making and (3) policy implementation (Ripsman and Taliaferro and Lobell 2016).

The perception of systemic stimuli stand at the beginning of the state's policy response building process. Leader perceptions are influenced by their images and the state's strategic culture. Leaders or the foreign policy executive (FPE) are defined in this thesis as individuals who are responsible for foreign policy such as the



Figure 3.1: The Neoclassical Realist Model of Foreign Policy

Source: Ripsman and Taliaferro and Lobell (2016)

"president, minister, or dictator, and key cabinet members, ministers, and advisors charged with the conduct of foreign and defence policies" (Ripsman and Taliaferro and Lobell 2016, p.62).

Leader images matter because more often than not they possess private information about incoming systemic stimuli and their images can affect their perception of systemic stimuli (Ripsman and Taliaferro and Lobell 2016). Psychological models are useful to discuss the role of leaders' beliefs and images. For example, many neoclassical realist scholars have used psychological models and the framework of perceptual intervening variables to "distinguish between the actual or real distribution of power and elites' perceptions of the balance of power in various times and places" (Ripsman and Taliaferro and Lobell 2016, p.66) such as during the Cold War.

The state's *strategic culture* affects the leaders' perception since socialisation, collective expectations and the institutionalisation of rules and norms define and constrain what are acceptable and unacceptable strategic choices, even in an anarchic self-help environment as Ripsman and Taliaferro and Lobell (2016) point out. For example, norms such as antimilitarism, ideologies such as capitalism or a nationalist culture "can affect the state's attitudes toward international affairs and willingness to use force" (Ripsman and Taliaferro and Lobell 2016, p.67).

However, the *strategic culture* does not only have an effect on leaders' perception but also on the subsequent steps of decision-making and policy-implementation as it subsumes any organisational culture such as that of bureaucratic organisations like the military and "a broader notion of strategic culture such as entrenched beliefs, world views, and shared expectations of a society as a whole" (Ripsman and Taliaferro and Lobell 2016, p.67).

Decision-making and policy-implementation in return are influenced by two additional variables: *domestic institutions* and *state-society relations*. Both refer to the level of a state's ability and autonomy in responding to systemic pressures, i.e. whether states can mobilise resources, adjust and adapt to external shocks or respond to movements in the distribution of power (Ripsman and Taliaferro and Lobell 2016). *Domestic institutions*, both formal and informal, build the setting in which domestic competition over policy occurs. In democracies, important institutional variables "include the degree to which power is concentrated in the executive's hands, executive-legislative relations, party systems and whether it is a two-party or multiparty system, voting rules and whether the electoral system is based on plurality voting or proportional representation, and the quality of the government and its administrative competence" (Ripsman and Taliaferro and Lobell 2016, p.77)

State-society relations refer to the influence that various economic and societal groups can have on policy-making through the domestic institutions. State-society considerations relate to inter alia the degree of harmony between the state and society, the level of political and social cohesion, dynamics of coalition politics, the nature of civil-military relations and the level of public support for general foreign policy and national security objectives (Ripsman and Taliaferro and Lobell 2016).

Both IVVs, *domestic institutions* and *state-society relations* are important to consider given that "foreign policy and grand strategy require immense human, material, and monetary resources. If key societal groups that possess these resources—or the public at large—withhold them from the state, the state apparatus will have to devote considerable revenue collection, policing and internal security, and propaganda resources in order to extract them, which will undermine the efficiency of national policy" (Ripsman and Taliaferro and Lobell 2016, pp.72-73).

How these IVVs influence grand strategy building at EU level in Europe in the

context of European Space Policy will be discussed in Chapter 5. At the end of the three intervening level processes as illustrated in 3.1, stand the different policy response options. Whichever policy option (or a combination of them) is chosen decides the outcome of the international system (Dependent Variable). How the IV and IVVs interact to result in the DV is presented in the following.

# 3.1.4 The Dependent Variable

The Dependent Variable is where all previously discussed variables come together. Ripsman and Taliaferro and Lobell (2016) argue that the "scope of the dependent variable expands over time". This means that in the short term (days, weeks and months) crisis management and "policy responses to unexpected events" (Ripsman and Taliaferro and Lobell 2016, p.84) are dominating. If the time frame is slightly extended to the short-to-medium term (months and years) it opens up room for strategic planning or even grand strategy construction and the policy making scope is widened to future challenges, opportunities or power shifts.

The longer the time frame, the more "flexibility in terms of means and resources" (Ripsman and Taliaferro and Lobell 2016, p.85) to engage in power expansion through e.g. economic growth, research and development building alliances, join forces and many more. Finally, in the medium-to-long term (years and decades), strategic choices made in the past will impact and interact with the "international systemic outcomes" (p.86) resulting in observable political phenomena. Thus, as Ripsman and Taliaferro and Lobell (2016) conclude "whether there will be great power war or peace will depend not merely upon the distribution of power in the international system, but also upon the strategic choices that several states pursue" (p.86).

Neoclassical realism Type l and ll refer to the study of foreign policy and grand strategy while neoclassical realism Type lll "becomes an approach to the study of international politics" (Ripsman and Taliaferro and Lobell 2016, p.89) Hence, the time frame (horizontal axis) decides the level of analysis of the dependent variable (vertical axis), compare Figure 3.2.

Linking the independent, intervening and dependent variables we can build a framework to characterise the international system. However, the neoclassical realist



Figure 3.2: Schematic of Explanatory Range of Three Types of Neoclassical Realism

Source: Ripsman and Taliaferro and Lobell (2016)

approach still pertains to the particular not the universal.

Understanding this linkage is essential. Intervening variables (IVVs) are specified through their logical connection to both independent and dependent variable (DV) in the manner specified in the following. Figure 3.3 shows how intervening variables are clustered along the earlier identified elements of the IV, the *clarity of the international system* and the *nature of the strategic environment*.

When *clarity* is high and the *strategic environment* restrictive leader images should matter most since quick reaction in the face of a clear threat where the optimal policy choice is apparent is asked for under these conditions.

When clarity is low and the environment restrictive then again do *leader images* play a relevant role, and maybe even more so, as information about the nature of

		Degree of Systemic Clarity (High to Low)	
		High Clarity	Low Clarity
Nature of Strategic	Restrictive Environment	Leader images and Strategic culture	Leader images and Strategic culture
Environment (Restrictive to Permissive)	Permissive Environment	Strategic culture, Domestic institutions, and State-society relations	Indeterminate—all four clusters could be relevant.

Figure 3.3: Intervening Variable Clusters by the Degree of Systemic Clarity and the Nature of Strategic Environment

Source: Ripsman and Taliaferro and Lobell (2016)

the threat (or opportunity) even though it is imminent and about the optimal policy choice to respond to it is rather imperfect. Under these conditions, the FPE has to take a decision and in order to do so it might "ignore societal demands on strategic grounds". This is not to say that whenever the environment is restrictive, meaning that there is an imminent threat (or waning opportunity) that other IVVs such as *state-society relations* are irrelevant but there impact is expected to be rather less immediate or discernible.

When *clarity* is high and the *strategic environment* is permissive then there are no pressing threats or waning opportunities giving time for the FPE's selection of optimal policy responses. Hence, there is room for the influence of *state-society relations* and *domestic institutions*. Infi general, it is assumed in this framework that as the time frame lengthens moving from a restrictive environment to a permissive one, the relevance of *leader images* diminishes as "the FPE faces the dilemma of mobilising domestic support for (and defusing potential opposition to) its preferred external strategies" Ripsman and Taliaferro and Lobell 2016, p. 95).

When *clarity* is low and the *strategic environment* permissive this should allow all domestic actors to weigh into the domestic competition for the preferred policy or

grand strategy as any pressing threat or limited time opportunity is absent.

The influence of *strategic culture* is relevant in all four clusters as its importance is largely independent from the given time frame and the magnitude or imminence of a threat or opportunity.

Assuming the *strategic environment* in space is permissive and the level of *clarity* is medium to low (depending on which factor is considered), the neoclassical realist framework would suggest that all four IVV clusters can have an influence on policy-making. Only by looking deeper at the nature of the specific IVVs, there can be an assessment about their influence, as will be shown in Chapter 4. The next Chapter, however, first focuses on the Independent Variable to discuss the *strategic environment* and level of *clarity* of the system.

De facto being heavily reliant on access and use of space, the United States, Russia and China are sensitive to each other's activity in outer space. With increased threats to space security and in the absence of an effective global governance system that would provide global space security, which they are responsible for themselves in the first place, results in an increased investment in counter-space efforts. Counterspace "is the set of capabilities or techniques that are used to gain space superiority. Space superiority is the ability to use space for one's own purposes while denying it to an adversary" (Weeden and Samson 2020, p.xxii). Hence, counter-space activities by one country, also referred to as space control, threaten the space security of an adversary and ultimately global space security as a whole.

This Chapter will describe the international space system as created by the foreign policy choices of the United States, Russia and China as part of the neoclassical realist approach. On the one hand, the international space system, the independent variable, gives the strategic impetus for the EU to find its place among the three major space powers. On the other hand, it poses constraints to the possible ESP options that the EU can pursue. Most importantly, if the EU aims at guaranteeing the safety of European space infrastructure and European access and use of space, it has to ensure global space security in the first place.

Space security as defined in this thesis refers to the "secure and sustainable access to, and use of, space and freedom from space-based threats" (West 2019, p.v).

Space is a political and economic playground and as such has become a major geostrategic challenge (Liukkonen and Sauzay and Straube 2020). Sino-American rivarly, in particular, seems to extend to space. Similarly, just as conflict on Earth might extend to space, conflict in space might spark on Earth (Al-Rodhan 2018). Counter-space efforts are considerably increasing this risk of an armed conflict in outer space in a dangerous interplay between Earth and space.

This Chapter is divided in Sections. The first Section will describe the global space governance system as of today. The following Section will dive deep into the topic of space control. Specifically, how the US, Russia and China are positioning themselve if this strategic area and how this feeds back into the state of play in

space security. The last Sections look more closely at Russian, Chinese and US space strategy and policy. The final Section synthesizes the insights gained into a neoclassical realist characterisation of the Independent Variable, identifying the strategic environment as permissive and the clarity of the system as medium to low.

# 4.1 The Global Space Governance System

In theory, currently 109 states have ratified the 1967 'Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies' (Outer Space Treaty or OST) which provides the leading international framework on the use of outer space and which affirms the principle of non-weaponisation of outer space. This means that no weapons may be stationed in Earth orbit and on other celestial bodies. Among other things, OST stipulates that every nation has free access to space and that no country is allowed to claim territorial claims on other celestial bodies. More concretely, in the OST the signatory states "undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction" (OST Art. IV). Furthermore, the "moon and the other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden" (OST Art. IV). The OST was celebrated at its formation as it showed that Russia and the US were able to negotiate and internationally binding agreement on space security despite military tensions and serious concerns about a possible arms race in outer space during the Cold War (Jackson 2019). However, as mentioned before the nuclear link provided a level of deterrence that arguably made this agreement possible. However, the circumstances are different today making a future development of adequate global space governance more elusive. The Russian and Chinese governments perceive an US threat to their missiles and satellites through US anti-missiles. Russia, in particular, considers ASAT tests (China in 2007 and US in 2008) to be precursors to the weaponisation of space (Jackson 2019).

In general, five UN agreements form the basis of contemporary space law. Besides

the 1967 OST, there is the 1968 Rescue Agreement, the 1972 Liability Convention, the 1975 Registration Convention, and the 1979 Moon Agreement (Zhao 2018). The lunar treaty or Moon Agreement from 1979 declares the moon and other celestial bodies to be the common heritage of mankind. So far, it has been ratified by less than 20 countries, also because of possible economic interests in raw material extraction in space.

However, these regulations are now considered outdated. The provisions in contemporary space law are of very general nature and the propulsion of ever more space actors and activities is driving the need to provide further details to these principles (Zhao 2018). Moreover, the current provisions fail to account for several arising aspects of space activity such as space commercialisation or counter-space (Zhao 2018, Haas 2020). The multiplicity of definitions and categorisations of counterspace weapons remains one of the key obstacles in establishing an effective global governance system for space that reconciles different security perceptions and understandings about "how the laws of armed conflict apply to military (and even civilian) space activities" (Jackson 2019, p.235). Another aspect contributing to this problem is the inherent dual-use nature of many space technology components, i.e. that they can be used both for military and for civilian purposes and that the discrimination between the two is extremely difficult to determine (Johnson-Freese and Burbach 2019).

Recurring attempts to establish binding norms and standards of behaviour have been rather unsuccessful (Haas 2020). China and Russia brought forward a joint proposal for a Draft Treaty on the 'Prevention of the Placement of Weapons in Outer Space and the Threat or Use of Force Against Outer Space Objects' at the Convention on Disarmament (CD) in 2008 arguing that counter-space weapons are to be considered equal to weapons of mass destruction and that their deployment of counter-space weapons would have a destabilising effect on the global strategic balance (Jackson 2019). The CD is a UN forum for discussing multilateral agreements on arms control and disarmament where decisions are taken unanimously. "This draft treaty extended the OST prohibitions on placement of weapons of mass destruction (WMD) to all forms of weapons" (Jackson 2019, p.233). However, the US consistently objects this proposal arguing "that space weapons cannot be defined

or effectively verified" (Jackson 2019, p.233). Also in 2008, the European Union brought its own proposal to the table, the Draft 'International Code of Conduct for Outer Space Activities' which will be discussed in Chapter 5.

In general, the concept of global governance of outer space encompasses a wide range of instruments, institutions and mechanisms which "range from international and regional treaties, agreements, model national laws and regulations, to a number of international co-operative mechanisms, guidelines, and transparency and confidence-building measures" (Di Pippo 2018, p. 118). In the face of the rapid diversification of the space sector, the highest level of global space governance in form of the UN seems unable to adequately respond to issues such as space debris mitigation, space traffic management, space resource mining and engagement with the private sector and industry. Most importantly, it cannot prevent the propulsion of space control. This could be explained by the lack of political will by the major space-faring actors who, having a head start, can engage in space order-making according to their particular interests (Sethi 2012). With growing Chinese space power, the United States arguably fears to loose its space superiority and hence its power of persuasion and coercion.

# 4.2 Space Control and Modern Warfare

In the field of counter-space, also known as space control, the US, Russia and China are most active and to a lesser extent Iran, North Korea, India, Israel and Japan. In Europe, only France and the UK engage in this field. In addition, non-state actors begin to play an important role as well.

Counter-space weapons are understood as either being defensive (protect own assets) or offensive (prevent somebody else from using their assets) (Harrison et al. 2020, p.55). As Weeden and Samson (2020, p.xxiii) explain: "Both offensive and defensive elements are supported by space situational awareness" (SSA), a term that refers to the access to and gathering of information about the space environment including "detection, tracking and characterisation of space objects and space weather monitoring and prediction". The offensive site of counter-space weapons is widely discussed thereby usually referring to one subset of offensive counter-space

weapons, the so called Anti-satellite (ASAT) weapons. ASAT weapons "can be used to deceive, disrupt, deny, degrade, or destroy any of the three elements of a space system: the satellite, the ground system, or the communication links between them" (Weeden and Samson 2020, p.xxii).

The proliferation of counter-space weapons reveals the geopolitical opportunities that states seem to have identified in using space to improve or keep their power on the international stage (Al-Rodhan 2012). Given the above mentioned unsuccessful attempts at banning counter-space weapons and the immense impact that they can have, countries that dispose of them, monitor each other closely. This is not new.

The subject of counter-space weapons was discussed since the US feared that the Russian 1957 Sputnik Satellite was to be a precursor to space-based nuclear weapons. As a reaction, the US launched an ASAT program already in 1958. However, with the First Gulf War in 1990-91 it became apparent to conflicting parties that the US used space systems for near real-time operational and tactical support to militaries (Harrison et al. 2020). This has increased the incentives for other countries as well to develop offensive counter-space capabilities in support of their militaries (Weeden and Samson 2020). This development is propelled by the decreasing deterrent value of the nuclear link which was present during the Cold War where "the close link between space capabilities and nuclear war provided a level of deterrence against actual attacks on space systems" (Weeden and Samson 2020, p.xxii). While all three major space-faring nations have the capability to launch a nuclear weapon into space (low-earth orbit), they appear to be focusing their deterrence efforts in other areas based on their perception of modern warfare.

Both, Russia and China, have similar perceptions about characteristics of modern warfare which include: (1) close interconnection between land, sea, air, space and cyber (2) non-contact warfare (3) competition about information dominance.

For example, Russia sees modern warfare on a trajectory to non-contact warfare where information dominance is the prerequisite to dominate the conflict either in space or through space (Weeden and Samson 2020). Russia sees space closely interconnected with land, sea, air and cyber. This is reflected in Russians using the term 'aerospace' rather then outer space when referring to space strategies stressing "the interrelatedness of airspace and outer space of contemporary threats and con-

flicts" (Jackson 2019, p.228). To achieve information dominance with the help of space-based, information-driven military capabilities that make non-contact warfare possible in the first place, Russia has invested heavily in the development of electronic counter-space weapons and broader electronic warfare (Weeden and Samson 2020, CSIS 2020).

China, as well, "expects that its future wars mostly will be fought outside its borders" (DIA 2019, p.14) and its People's Liberation Army (PLA) focuses on "informatized warfare" (DIA 2019, p.14) i.e. "using information to conduct joint military operations across the domains of land, sea, air, space, cyberspace, and the electromagnetic spectrum during a conflict" (DIA 2019, p.14). A major part of informatized warfare includes achieving information superiority through denying others access to it with the help of e.g. counter-space weapons. Based on this view of modern warfare, both countries focus on and invest heavily in the development and testing of electronic warfare (EW) and non-kinetic physical capabilities including lasers, jamming and spoofing (Weeden and Samson 2020). Moreover, there is some evidence that both countries use cyberattacks against space systems (Harrison et al. 2020). Cyberattacks are a useful means to "establish information dominance in the early stages of a conflict" (DIA 2019, p.20).

# 4.3 The Space Power of Russia and China

Beijing and Moscow not only recognise that outer space as well as cyberspace have become domains of strategic competition among all parties but see space as an integral part to dominate modern conflicts.

Russia and China show some similarities in their attempt to reduce the asymmetric capability advantage of the US. However, the intentions of Russia are somewhat clearer than those of China. From an US perspective, there is little doubt that Russia "is seeking to mitigate the superiority of U.S. space assets" (Weeden and Samson 2020, p.30) to achieve "parity with the United States in space" (Ibid, p.30). While it appears that China will use counter-space weapons "as a means to deter and counter a possible U.S. intervention during a regional military conflict" (DIA 2019, p.14), it is not clear if China fosters similar great power aspirations. In contrast to

Russia, the priorities of China seem to lie in domestic (socio-economic) goals such as to establish "a powerful and prosperous China" (DIA 2019, p.13).

As regards their respective approach to space security, they show some important differences. The Russian approach to conflict in space has different dimensions. First, "the Russian military sees the U.S. reliance on space-based assets as a vulnerability to be exploited" (Weeden and Samson 2020, p.29) and is concerned about the vulnerability of its own space-based capabilities at the same time. Its own vulnerability is to be met with both offensive and protective means, again mostly through information dominance. Second, as mentioned before the Russian leadership opposes the placement of weapons in space "that can target ground-based assets and critical infrastructure" (Weeden and Samson 2020, p. 29). Russia is concerned with increases in the US' military budget and perceives "a US first strike against its nuclear forces from space-based weapons as the key security threat from outer space" (Jackson 2019, p.228). This perception stems from the 2002 US withdrawal from the 1972 ABM Treaty (restriction on deployment of intercept missiles) and the US refusal to accept constraints on Ballistic Missile Defence (BMD) (Jackson 2019). It is technologically possible to integrate space-based weapons into BMD architecture and Russia fears that this could be a threat to its strategic missiles forces.

In this context, the continued Russian effort in promoting treaties against the weaponisation of space may be interpreted like an attempt to restrain the ability of the United States to hamper Russia's freedom of action by diplomatic means in the absence of Russian capabilities that would match US counter-space capabilities (Jackson 2019). Enhanced diplomatic capacities to influence the global discussions on space security and the visibility of Russia in the respective global institutions can constitute a measurement of a state's prestige and power (Al-Rodhan 2012). This fits well into the general Russian foreign and security policy approach of an aspirational great power wanting to be recognised as a key player in global affairs and of stressing the rise of a multipolar world (Jackson 2019). In contrary to public statements and initiatives that would suggest Russian engagement to prevent conflict in space, it might rather be the case that Russia sees "space as a natural domain within which competition and conflict will grow" (Weeden and Samson 2020, p.29). However, its foreign policy strategy includes to spread uncertainty and ambiguity

about its own intention in space (Jackson 2019). This, in turn, might be a lever to induce overestimations about its counter-space strike power and advance its power aspirations in a multipolar world.

Alongside Russia, China has been promoting anti-weaponisation treaties in international fora. This is in line with the Chinese foreign policy approach of supporting multilateralism. Moreover, China does not want to be perceived as a threat in space or attract to much attention on its activities in space control. Intentions of Russia and China are therefore different but their interests are similar giving way to the joint proposal. In 2007, China successfully intercepted one of its own satellites in an ASAT testing creating thousands of debris on-orbit that will likely stay there for hundreds of years. International criticism was strong as most of the debris is on orbits that could potentially harm the International Space Station (ISS). Since then, it seems that China is acting more carefully with three more ASAT test conducted without kinetic impact. Engaging in international fora with an anti-weaponisation narrative might help the Chinese image to recover from this incident.

In general, China is less outspoken about its security concerns in space. Instead, Beijing is portraying a picture of a rising technology superpower in space with lofty space goals ranging from Mars missions to a Chinese Space Station and its first human mission to the moon in 2036 (Goswami 2019).

Moreover, Figure 4.1 shows that China has seen a major growth in successful orbital launches of satellites since the 2000 with slight fluctuations each year. At the same time, Russia reduced its number of orbital launches. This shows the increased succesful activity of China in space. Nonetheless, Russia and the US already have many satellites in space from previous orbital launches and China is still catching up which partly explains this increased activity. This year only, China plans on launching 60 satellites into orbit via 40 launchers (Xinhua News Agency 2020).

Chinese ambitions spread evenly over civil, military and commercial space applications. Its civil space program is focused on the BeiDou Network, the Chinese counterpart to the American GPS. China wants to offer the network to the whole world giving "additional services and incentives to countries taking part in the Belt and Road Initiative" (DIA 2019, p.20). Following the general logic of the Belt and Road Initiative (BRI) China's space capabilities are oriented towards the global



Figure 4.1: Successful orbital launches per year and country

Source: Harrison et al. (2019)

economy in an attempt to create strong economic ties with other countries and "shaping their interests to align with China's" (DIA 2019, p.20). To this end, China is exporting its satellite technology globally and providing Satellite Communication (SatCom) support to users worldwide (DIA 2019). The successful commercialisation of the Chinese space industry is commented with increasing concerns in the United States given the strong hold of the Chinese state on space companies.

In contrast, Russia's space industry is relatively weak in comparison. While the Russian space sector is strong as far as military space applications and national security are concerned and in some areas capable of providing technology superior to Chinese technology (DIA 2019), the Russian civil and commercial space sector lacks far behind. The country faces a long lasting stagnation and loss of market share in its space industry at the same time due to several structural problems. Factors leading to the overall decline of Russia's space industry include severe government funding shortages (leading to decay of existing space infrastructure), quality control lapses and system reliability faltering over time, brain drain, corruption and multiple
reorganisations (McClintock 2017). Reprimands to face the crisis in the Russian space industry were rather unsuccessful so far (Ibid). That SpaceX was successful in May 2020 in bringing Astronauts to the ISS with its Falcon 9 from American soil (NASA 2020), effectively releasing the US from its reliance on Russian launch vehicles seems like the ultimate sign that Russia has lost its global leadership in space. Given the above mentioned structural constraints, Russian space projects like its Global Navigation Satellite System GLONASS (counterpart to GPS and BeiDou) will have a hard time reestablishing the image of Russia as a global leader in space. Nonetheless, Russia can build heavily on past technological achievements and will remain a key placer in space control.

In conclusion, Russia and China are both highly active in space and are putting effort into closing the gap to the asymmetric space capability advantage of the United States. However, they pursue different strategies and foreign policy approach depending on their respectives opportunities and constraints. Nonetheless, they are building a strategic partnernship to counter US space power. If they are developing and deploying counter-space weapons in order to harm other space powers, such as the US, cannot be said with certainty. At this point, it seems more plausible that they aim at protecting themselves from US space superiority and that they have a strong interest in an effective arms control in space as they are still in many ways inferior to US space power.

### 4.4 The Space Power of the United States

Currently, the United States has the most advanced space and space control capabilities in the world and has pioneered the integration of space-based services into "military operations, having done so in every conflict since the 1991 Persian Gulf War against Iraq" (Weeden and Samson 2020, p.81). Even though, it is unknown to the public which counter-space weapons the US exactly disposes of already and how effective existing ones are, it seems plausible that with political will and investment the US would be able to quickly build and deploy a vast range of space control capabilities. In any case, the US is constantly testing dual-use technology that could lead to serious ASAT capability (Weeden and Samson 2020). Hence, their latent

capability could quickly develop into operational capability given the political will. This holds true for co-orbital ASAT, direct-ascent ASAT (both conventional and nuclear-tipped) and directed energy weapons (e.g. high energy lasers).

Figure 4.2 shows the large gap in numbers of operational satellites between the US, Russia, China and Europe. Due to the successful commercialization of its space sector, the US has the highest number of civil and commercial satellites, a number to which Europe comes closest with half as many civil and commercial satellites. In contrast, Russia deploys mostly military satellites and China government satellites (of which many could be of military and civil-commercial use at the same time). Overall, as of today, the United States has still by far the largest number of operational satellites.

Figure 4.2: Operational satellites for top 10 global space actors Figure 1: Operational satellites for top 10 global space actors



Source: Pellegrino and Stang (2016)

Moreover, the US disposes of capability superiority in strategically important areas where perceived adversaries, e.g. Russia and China, focus their counter-space capability development on. These include EW and SSA capabilities. For example,

the US is fully able to prevent adversaries from the use of navigation services from space and assure the availability of navigation system for U.S. military units in operations at the same time (Weeden and Samson 2020). However, their "effectiveness of measures to counter adversarial GPS jamming and spoofing operations is not known" (Weeden and Samson 2020, p.91) which would be important to assess the US vulnerability to adversial EW capabilities which are being quickly proliferated. While other space-faring nations are quickly catching up in areas such as EW operational counter-space system, the US still and will probably for some time possess the most advanced SSA capabilities in the world. This holds true in particular for military applications such as missile warning and defence. Nonetheless, in order to solidify this strategically important capability superiority, the United States is investing heavily in upgrading its SSA capabilities by inter alia deploying new radars and telescopes and "signing SSA data sharing agreements with other countries and satellite operators "(Weeden and Samson 2020, p.92). Again, capabilities such as SSA and EW are crucial for information dominance in advance and in the middle of a potential conflict. It is clear, that the US has information superiority in space giving the country strategic power in deciding with whom to share which information.

Nonetheless, "there is evidence to suggest a robust debate is underway, largely behind closed doors, on whether the United States should develop new counterspace capabilities, both to counter or deter an adversary from attacking U.S. assets in space and to deny an adversary their own space capabilities in the event of a future conflict" (Weeden and Samson 2020, p.81). Arguably, the impetus for this debate stems from the US perception to be currently engaged in great power competition in and through space with Russia and China. This perception might be overdrawn in the short-term given the US superiority in space. The initial motivation by Russia and China among others might simply be to gain strategic autonomy in space and protect themselves from and potentially counter space-supported US intervention in regional conflicts. However, given the medium- to long-term strategic political goals of moving to a multipolar world where more and more countries gain strategic (political) autonomy especially in domains where critical national infrastructure is concerned, the US attempts to enhance its position in space to keep its influence.

Table 4.1 gives an overview of the space power of the three major space-faring

nations in comparison based on the meta-geopolitics framework with its seven dimensions.

	USA	Russia	China
Social and	positive externality,	central for improving	social progress is cen-
Health	not a priority	quality of life	tral to domestic pres-
			tige
Domestic	US space leader, na-	core source of national	national pride, unity of
Politics	tional pride	prestige and internal	the Chinese people
		cohesion	
Economics	internationally com-	relatively weak level of	high priority (driver
	petitive space in-	international competi-	for economic develop-
	dustry, strong civil-	tiveness, strong ties to	ment), strong civil-
	military-commercial	government	military-commercial
	ties		ties
The Environ-	critical to US security	non-existent capacity	high priority and capa-
ment		but priority goal in	bility development
		space policy	
Science and	high priority (US	lack of technical exper-	high priority, receives
Human	leading position in	tise and human capital	high investment, quest
Potential	space exploration is		for high-technology su-
	challenged)		perpower
Military and	central to US national	central to Russian na-	recognition of space as
Security	security, world's most	tional security, high	a military domain, cen-
	advanced military ca-	level of military space	tral to Chinese na-
	pacities	capability	tional security, devel-
			ops counter space sys-
			tems
International	willingness to consider	high priority and	active in international
diplomacy	and discuss the issue of	visibility, joint ini-	diplomacy, bilateral
	space weapons but un-	tiatives with China,	and regional space
	der US leadership, en-	searching for strategic	cooperation
	sure stability in space	partnerships (against	
		US), strengthen world	
		power status	

Table 4.1: Space power country comparison along seven dimensions

Information is compiled from a range of sources including Harrison et al. (2020), Weeden and Samson (2020), DIA (2019), West (2019), Pellegrino and Stang (2016)

### 4.5 The Independent Variable

Based on the analysis of the previous Sections, here follows a discussion of the two key systemic variables identified by neoclassical realism and discussed in Chapter 3.

With regard to *clarity*, there is general agreement on the nature of threats that actors and their systems in space are facing. Firstly, the threats posed by the space environment and by human activities conducted in it are largely known. The range of counter-space weapons and how they can be deployed is also known. However, there is uncertainty about the scope of operational capability of the major space-faring nations and about their intentions. Nonetheless, most space leader's in the respective governments do not hold back with their personal assessment of the adversary's intentions.

Secondly, the time frame of these threats can be determined with high probability on the medium-to-long-term. Nonetheless, unexpected sudden events might always ask for short-term foreign policy response and action. Given the particularities of the space environment, such events can have extremely detrimental, far-reaching and cross domain effects. Hence, many space-faring actors still feel time constraints in preparing for such events and increasing their resilience even though the time frame lies between the medium and long term.

Thirdly and lastly, optimal policy responses do not stand out. Given that they seldom do in international relations, this comes to no surprise. But the inherent security dilemma of human space activities, the connection to Earth-bound politics, the plurality of actors and the complexity of their networks and the cross-fertilisation of space policy with almost every other policy area makes finding an optimal policy response extremely complicated. Nonetheless, from the above analysis it crystallises that most actors are preparing to be able to choose from a range of policy choices in the future when *clarity* might achieve a higher level due to certain events or due to increasing technological development in space. So far, space strategies are formulated in the context of long-term strategic policy choices. Hence, space actors and nations face a certain level of uncertainty as the international space system is not completely clear but as most consider human space activities to stand at their beginning, they do not expect it to have the highest level of clarity and therefore can handle a certain degree of uncertainty.

As regards the relative permissiveness of the system, the characterisation of the system to be permissive is based on the assumption that there is no imminent threat posed to any state active in space and that there will be none in the immediate future or in the short to medium term. Even though counter-space weapons are readily disposable, the weapons with large scale kinetic impact are not likely to be deployed as they harm all space assets alike including those of the aggressor. Current development of counter-space weapons focuses on temporary disablement and electronic weapons in order to conceal from which actor the attack originated from. Hence, the magnitude of the threats similar to their imminence is limited. Nonetheless, opportunities offered by space-based capabilities and services are enticing which is a factor speaking for a more restrictive environment as space-faring nations engage in a competition for access to and use of space. Indeed, it is a race for the future space leader who has a head-start in space and is in a position to maintain it in order to set the rules for entering space actors and to have the dominating voice and implementation force in global space order making. So far, the US holds this position although increasingly challenged by China in particular.

From a structural realist perspective, the discussion of the IV would be sufficient to theoretically determine if the EU would push for and coordinate European balancing behavior against the major space-faring powers and how it would attempt at enhancing its own relative space power. According to most structural realists, bipolar distributions such as during the Cold War on Earth and similarly in space are most stable, followed by multipolar distributions. However, with the end of the Cold War and with the emergence of new space powers such as Europe, China and India, we have witnessed the end of a bipolar space order (Al-Rodhan 2012). Nowadays, the space order comes closest to an unbalanced multipolar distribution which structural realist consider the least stable system. In such a case, structural realist would assume, that states automatically engage in balancing regardless of other factors influencing foreign policy besides the international system. Hence, by only looking at the IV, one would assume that the only viable space policy option for the EU would be to weaponise space or pursue a space dominance strategy as articulated by the three major space-faring powers.

This is where neoclassical realists intervene by arguing that each state's range

of policy options is shaped by important domestic variables that structural realism ignores such as "the ability of leaders to perceive systemic stimuli correctly, the lack of clarity in the international system, the problem of rationality, and the difficulty of mobilizing domestic resources" (Ripsman and Taliaferro and Lobell 2016, p.21) and which decide if a state engages in balancing behaviour or not.

In fact, no EU space weapon programmes were launched. Instead the EU intends to tackle the danger of an arms race in space by other approaches which will be discussed in the next Chapter. It will be shown that the structural realist approach by ignoring IVVs would neglect the particularities of Europe and the role of the EU. The permissiveness of the strategic environment and the medium to low clarity of the system gives room to unit-level intervening variables that influence the European perspective on space policy and power. By including the IVVs, it is not only possible to analyse the role of the EU in pan-European space efforts, it also allows to gain a more comprehensive understanding about the EU as an international actor in space as will be argued in the following.

The question of the characterization of the EU's foreign policy in space presuposes that the EU is an international actor in the first place. Similarly, in order to position the EU space power, such an identity can be attributed to the EU only by assuming the existence of an identified actor on the international scene. Realist IR Theory traditionally has difficulties conceptualising the EU as it is not a state per se. Nonetheless, there has been developing extensive scholarly debate on the question of Europe's international actorness. For realists, one of the key features of actorness is the ability to guarantee the actor's own security. If the EU possesses the ability of guaranteeing space security, then realist scholars can treat the EU as a legitimate international actor in space even though it is not a state. The scope of this thesis does not allow to summarise or elaborate on the scholarly debate on EU actorness. Instead, this thesis builds on Mutschler and Venet (2012) who have already convincingly argued that the EU "is an actor under construction in the field of space security, and that it has engaged in a rather normative approach so far" (Mutschler and Venet 2012, p.121). In other words, the EU is an emerging actor in space security (ibid). Therefore, while recognizing that many different actors within and outside the EU framework play an important role in a European perspective on space policy, the EU is treated as the main actor in European space policy (ESP) similar to Mutschler and Venet (2012).

The EU has been a main driver of ESP. With the Lisbon Treaty making space policy a shared competence the EU showed that it has major influence in Europe on the strategic choices in space. Given the political and security sensitivity of space, the high risks and costs of space endeavours and the traditional intergovernmental organisation of this policy domain, that the EU can count space among its official policies is extraordinary. Explanations for this outcome are manifold and are not part of this thesis. It is clear, however, that the ESP emerged with the broader foreign policy development in the EU leading to a Common Foreign and Security Policy (CFSP) and a Common Security and Defence Policy (CSDP). EU competences in

space are strengthened through a comprehensive space capability development at EU level. Space systems pivotal to European space capability are partly or entirely owned by the EU which is certainly a major game-changer in European Foreign Policy that usually does not foresee operational capability development at a nonnational level, adding a supranational element to CFSP that is often overlooked. From the three flagship programmes: 1) Copernicus, an Earth-observation satellite system; (2) Galileo, a satellite navigation system that is a hyper-accurate European alternative to the Global Positioning System (GPS) and (3) EGNOS, the European Geostationary Navigation Overlay Services the latter two are entirely owned by the EU while Copernicus is only partly owned by it (European Commission 2020). With these three programmes the EU possesses a comprehensive Earth-Observation and Navigation system. Additional programmes such as SSA and GOVSATCOM, the Governmental Satellite Communication Initiative complement the three flagship programmes with more security focused capabilities, see Figure 5.1. Not all of these programmes are fully operational yet, but by 2030 at the latest, Europe "should be able to fully benefit from its space solutions in the implementation of its policies, strengthening European values and security, improving the knowledge base and fostering prosperity" (Antoni et al. 2018, p.772).

Due to the extension and development of ESP, the EU now acts as a coordinator and facilitator of European space cooperation. The ESP is shaped by the EU Institutions involved in the Ordinary Legislative Procedure (OLP) as far as changes and additions to EU space programmes and EU-ESA relations are concerned. These institutions include the European Council, the European Commission, the European Parliament and the European External Action Service (EEAS) and its High Representative. The role of the Council of the EU and the European Court of Justice is negligible in space. Moreover, the ESP is shaped on the one hand by related EU agencies and organisations including e.g. the EU Satellite Centre (SatCen), the European Global Navigation Satellite Systems Agency (GSA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). As far as security and defence matters are concerned, the European Defence Agency (EDA) also contributes to ESP. On the other hand, organisations and agencies outside of the EU framework play an important role in shaping ESP as well. This includes



Figure 5.1: The EU in Outer Space

Source: European Commission, European Parliament (2018)

first and foremost the European Space Agency (ESA) and the North Atlantic Treaty Organisation (NATO). The impact of Permanent European Structured Cooperation (PESCO) on ESP is not clear yet, but it might play a role in the future.

Having established the EU as the central actor in the European perspective on space and having established the emergence of ESP and its complex governance structure, the question of what kind of actor the EU is in the field of space security (Mutschler and Venet 2012) and how it positions Europe in the international space system will be addressed in the following. For this purpose, the neoclassical realist approach is very useful by including unit-level intervening variables.

### 5.1 The Intervening Variables

The intervening variables identified in Chapter 3 include (1) leader images, (2) strategic culture, (3) domestic institutions and (4) state-society relations. Based on the modelling of the international system in chapter 4, all four variables are expected to have an influence on foreign policy choices. Nonetheless, some might have a larger impact than others. Leader images affect how the incoming stimuli from the independent variable is perceived. This perception is also influenced by strategic culture. However, strategic culture similarly impacts decision making and policy implementation. While state-society relations and domestic institutions influence decision making and policy-implementation, they do not influence perception.

All four intervening variables are closely interconnected and a sharp distinction is not always possible.

### 5.1.1 Leader Images

Leaders are all people inclined with the conduct of CFSP and ESP and are hence also referred to as the foreign policy executive (FPE). Their beliefs and images are important to consider, because they influence how the systemic stimuli are perceived and interpreted and how leaders react to them (Ripsman and Taliaferro and Lobell 2016). Moreover, the FPE might have access to private information and intelligence services which could be reflected in their decisions (ibid). Or they do not in which case their perception of the power distribution might matter rather than the actual distribution of power. In fact, Brands (2016) finds that in some cases contradictory information is either ignored or twisted to fit leader images and perception. Leader images are closely interconnected with strategic culture as the FPE has beliefs about which strategies are best to achieve policy goals.

The EEAS is the institution where foreign policy grand strategy is condensed and communicated to the public. However, given the organisation of the EEAS and the special role of the High Representative, the EU Global Strategy (EUGS) published in 2016 for the European Union's Foreign and Security Policy by the EEAS reflects the views of the FPE of other EU Institutions as well like the European Council (EC) and the European Commission, hereinafter referred to as the Commission.

As the increased integration in space affairs happened in the larger context of the development of the CFSP, the EUGS is a grand strategy highly relevant to space. Subsequent to and based on the EUGS and within the same year, the EU Space Strategy (EUSS) and the European Defence Action Plan (EDAP) were published by the Commission to enhance cohesion over the different strategic areas and make the EUGS concrete in its respective fields. These strategic documents are a valuable source to assess leader images by the major EU institutions.

The EUGS seems to originate from a deep sense of urgency for a new EU strategic security impetus in the face of many challenges. The foreword by Frederica Mogherini reads: "The purpose, even existence, of our Union is being questioned. Yet, our citizens and the world need a strong European Union like never before. Our wider region has become more unstable and more insecure. The crises within and beyond our borders are affecting directly our citizens' lives. In challenging times, a strong Union is one that thinks strategically, shares a vision and acts together. This is even more true after the British referendum" (EUGS 2016, p.3). In this context, it becomes clear that the EU aspires to become a "global security provider" (EUGS, p.3) and that soft as well as hard power are critical for this purpose. To this end, the EUGS (2016, p.10) states that "investment in security and defence is a matter of urgency" and that a full "spectrum defence capabilities are necessary ... to guarantee Europe's safety". Although explicit references to space capabilities are only made twice in the EUGS and the focus seems to lie still on other security threats apart from a potential arms race in outer space, e.g. cyberwarfare and terrorism, there is no doubt that space capabilities are considered important strategic enablers for European security.

This point is taken up by the Commission in the EU Space Strategy. In the EUSS, apart from encouraging a strong market uptake of space-based services and using their socio-economic benefits, space is viewed as a tool to support important CFSP (and sustainable development) goals such as strategic autonomy, strengthening Europe's role as a global actor and promoting a rules-based global order as outlined in the EUGS. Additionally, the Commission views space infrastructure as a means for policy-multiplication, i.e. space-based services enable, complement and enhance existing policies and projects and improve their effectiveness and efficiency

(Slann 2015). Because of the policy-multiplication effect of space capabilities, the Commission stresses the need to secure critical space infrastructure in the European Defence Action Plan (EDAP).

Commission President Ursula von der Leyen follows her predecessor, Jean-Claude Junker, in building a more political Commission. In his State of the Union Speech in 2016, Juncker stressed the need for Europe to take greater responsibility for their security and that it can act as a provider of hard as well as soft security (Juncker 2016). For both hard and soft security, space is an important means. With establishing the new Directorate-General for Defence, Industry and Space (DG DEFIS) and putting it under French leadership with Thierry Breton (France being the only real space power in the EU after Brexit), von der Leyen signals her willingness to advance with the issue.

The conclusions from May 2019 on "Space as an enabler" by the European Council, hereinafter referred to as the Council, show that the position of the Council largely corresponds to that of the Commission regarding the protection of space infrastructure, ensuring European access to space, enhancing socio-economic benefits and reinforcing the global role of Europe in space (Council of the European Union 2019). In contrast to the Commission, however, the Council does not always "share the same sense of urgency regarding the protection of space assets" (ESPI 2020, p.19), hence is less supportive of the extension of supranational aspects of ESP and more often than not prefers intergovernmental solutions in CFSP. A more recent example was the creation of project-based intergovernmental CFSP organisation, the Permanent Structured Cooperation (PESCO). Other bodies set up as part of a space defence framework that are heavily dominated by member states include EDA, SatCen and potentially ESA if dual-use space capabilities are considered.

The European Parliament (EP), hereinafter also simply referred to as the Parliament, conveys an interesting image of itself in ESP and actually takes on a leading role in this policy domain. Sigalas (2016) looked at all non-technical Parliament resolutions, which are legally non-binding documents that reflect the EP's opinions as an institution on a given topic, from 1979 to 2013 to see how the it justifies the existence and progress of the ESP and finds that the EP is "a staunch ally and supporter of Europe's common endeavours in outer space" (Sigalas 2016, p.256). That

the first resolution dates back to 1979 shows that the Parliament was promoting ESP before it even existed. The Parliament understands ESP mainly in utilitarian terms, i.e. bringing benefits to the public. At the same time, it is aware that this risky and expensive public policy is in need of public funding and support. Most importantly, the Parliament thinks that as daring and risky ESP is, for Europe to become an independent space power is a feasible goal (Sigalas 2016).

Figure 5.2 summarises the European space policy goals based on leader images.





Source: Antoni et al. (2018)

On the whole, leader images across the EU seem to converge as concerns space even though with slightly different priorities depending on the role of the particular institution. Based on EU leader images, the role of the EU seems to be to justify and push for joint European solutions in space. Moreover, from their viewpoint ESP might be a policy area where further European integration might lead to spill-overs to other policy areas, to a strengthened role of the EU as a global leader and to the creation or strengthening of a European identity to only name a few argumentations.

All EU leaders responsible for space or inclined with ESP in any war are resourceful in finding arguments to convince Member States to allow for the EU to act as a catalyst and a facilitator for a stronger Europe in and through space.

Overall, the year 2016 was a an important moment for Europe in space. The EU Global Strategy including its Implementation Plan on Security and Defence, the EU Space Strategy, the European Defence Action Plan and the EU-NATO Joint Declaration are all part of a the attempt to create a new strategic impetus in the EU towards strategic autonomy, European security and resilience and European leadership. The EU foresees space to play a major part in this attempt.

#### 5.1.2 Strategic Culture

Strategic culture subsumes in the broad sense all forms of organisation, socialisation and institutionalisation (rules and norms) that shape and limit the range of strategic choices, i.e. which strategic choices are acceptable or even possible and which are not (Ripsman and Taliaferro and Lobell 2016). For example, norms such as antimilitarism, ideologies such as capitalism or a nationalist culture "can affect the state's attitudes toward international affairs and willingness to use force" (ibid, p.67).

As the EU is not a state, strategic culture materialises slightly different to that of a state. Nonetheless, the general patterns are the same. But instead of focusing on the strategic culture generated by the state and its domestic audience, the next level of strategic culture evolving around the EU and its member states is discussed. Naturally, similar to strategic culture within a state, it changes over time. However, as regards the EU if big steps in European integration occur, strategy can change more drastically than it is usually the case within a state. The Lisbon Treaty (LT) was certainly one of these steps that lead to a massive evolvement in strategic culture in the EU. How the LT affected the CFSP and the ESP was hinted to before. With the LT giving the EU its own legal personality, the co-ownership of space capability was made possible and hence drastically changed the strategic environment and culture in ESP. Moreover, with the LT the ESP became a sharedcompetence adding the element of supranationalism to European space activities. Since then, one major part of the strategic culture in the European public space

policy domain is the balancing act between supranational and intergovernmental cooperation (within or outside of the broader EU framework). This balancing act is extremely challenging since the EU has to account for and reconcile the different strategic cultures in the member states that can be very dissimilar.

Finally, in the EU there is always the chance or risk, depending on how you choose to perceive it, that one policy domain like the ESP is subsumed under the general debate of Europeanisation or Brusselisation. Hence, additional dimensions are added to the already complicated, multi-layered, multi-dimensional and highly sensitive policy area of critical space infrastructure and its governance.

In its CFSP, the "EU embraces an integrated or comprehensive security approach to external conflicts and crises" (Friis and Juncos 2019, p.289) which "entails a coherent and strategic use of all the EU's available tools and instruments in order to increase security and stability for the EU and the wider world" (ibid, p.289). This approach is based on a holistic view of security and peace that requires the use and coordination of policy instruments throughout the conflict cycle (Friis and Juncos 2019). Space is undoubtedly already such an instrument that can be a valuable tool over the entire cycle from conflict prevention, to crisis management to peacebuilding. With the extension of space-based services the value of space assets for the EU security approach will only grow in importance.

To increase the role of space in CFSP and CDSP, the EU pursues several different strategies in parallel. These strategies can be categorised into three broad categories: (1) policy-multiplication; (2) dual-use capability development and (3) cooperation and diplomacy.

The strategic setup hints towards the important enabling and policy-multiplication role of space-based assets and services, especially in security related policy areas. Slann (2015, p.81) concludes that "such policy-multiplication can be framed as a form of space power projection: through its main outer space programmes... the EU is expecting to increase its internal coherence and strength, whilst simultaneously affirming its position as a noteworthy independent spacefaring actor on the international stage". The link of space to CSDP and the broader CFSP is strong. Space is part of a cross-cutting strategy pursued by the EU that encompasses the domains of cyber security, maritime security and hybrid warfare.

However, to be able to benefit from space assets and to use them as a means of policy-multiplication, the access to and safe use of space must be secured in the first place. Hence, space security makes up an important part of the EU Space Strategy. As Slann (2015, p.278) states space "power and space security are complementary and arguably mutually dependent" and the "former could not exist without the latter". Hence, the EU aims at maintaining Europe's autonomous access to space.

Independent launch and operational capabilities in outer space are a prerequisite to enable independent access to space. Therefore, part of the EU strategy are the intergovernmental launcher programmes Ariane-6 and Vega-C which provide "Europe with an acceptable level of autonomous access to space" (Pellegrino and Stang 2016, p.37). Another part are satellite earth observation (Copernicus) and communication (SatCom) programmes. These technologies not only put Europe in a position to independently access space but also facilitate dual-use applications, i.e. civil and military applications that cannot be distinguished from each other. Since 2016, the EU has been more outspoken about this strategic culture of applying dual-use technologies that reinforce civil-military synergies (EUSS 2016). A good example is the Governmental Satellite Communications (GOVSATCOM) programme. GOVSAT-COM's objective is to "ensure in both the civil and military environment reliable, secure and cost-effective satellite communication services for EU and national public authorities managing security critical missions and operations" (European Commission 2020). In the frame of GOVSATCOM, the Commission decided to cooperate with EEAS, EDA, SatCen, ESA and member states "to explore possible dual-use synergies in the space programmes" (European Commission 2016), "thus enabling civil satellites to be used for military purposes and encouraging cooperation at EU level on space defence programmes" (ESPI 2020, p.35).

Equally important besides independent access to space is a strong European space industry that has independent access to critical components and technologies which is not the case so far. Again, the strategic culture in ESP leads to space being treated first and foremost as an enabler and facilitator for larger strategic goals across all policy areas. With the advance of CSDP there has long been a call for a Defence Single Market. This need for the creation of a Defence Single Market, inherently enabled by the space industry, is underlined by the EDAP 2016. It reads:

"the European defence market suffers from fragmentation and insufficient industrial collaboration. A more efficient use of public money and a stronger industrial base could be achieved by strengthening the Defence Single Market, reducing duplications and improving the competitiveness of the EU defence industry" (EDAP 2016, p.2).

Once, the EU had gained an acceptable level of independent access to space, it started to care about the safe conduct of space. A precondition for the safe conduct of space is the knowledge and awareness about the space environment, also referred to Space Situational Awareness (SSA). The EDAP stresses the Commissions' commitment to "contribute to ensuring the protection and resilience of critical European civil and military space infrastructure, enhancing the existing EU space surveillance and tracking (SST) support framework" (EDAP 2016, p.17). SST is the main pillar of SSA. SSA capabilities are "compulsory to fully monitor operations in orbit" (ESPI 2018, p.61) and they are a "prerequisite to build the required credibility and capacity to participate to the development of rules and norms" of an international space traffic management (STM) framework that will reflect Europe's interests in space.

As explained in the previous chapter, SSA is the area where the majority of capability extension activity takes place internationally. It is also the area, where Europe lacks behind the most. The EU on its quest to establish itself as a pioneer in climate change mitigation and sustainability, acts accordingly in space. The EU in space acts like "a trailblazer in the adoption of best practices for Space Environment Protection and Preservation (e.g. legislation, standards) and in the development of related technologies (i.e. passive de-orbitation, active debris removal)" (ESPI 2018, p.61).

As a result, Europe is still largely dependent on the US as space situational awareness is concerned. Not by accident, is the US the only country explicitly mentioned in the EUSS when it is referred to global cooperation and strategic partnerships. Nonetheless, for the same reason, the importance of strategic autonomy is repeatedly insisted upon. This arguably stems form the capability gap that Europe is still facing in important space control areas that, most importantly, do not require direct counter-space weaponisation such as SSA.

To the attentive observer, it seems plausible that the EU relinquished on SSA sys-

tems not out of unawareness about the importance of this technology for successful space operations but rather out of concession to the US which prefers to keep European dependency on US space data and situational awareness. The EU catching up on availability of space data to US level would allow Europe to assess and interpret events in space on their own, potentially in opposition to the US. This would only be to a disadvantage to the US who likes to perceive of Europe as an allied space power.

Space security holds a central position in international space diplomacy. Given the self-image the EU portrays and its CFSP goal of multilateral and rule-based solutions to security problems, the EU is actively pursuing coordination and cooperation in space mainly but not exclusively through international diplomacy. Over the past decade, the leading and only substantial diplomatic action of the EU has been the proposal of an International Code of Conduct for Outer Space Activities (CoC) in 2008. Since then, the CoC has been revised regularly taking into account comments received from other states with the last update published in 2014 (EEAS 2014). The purpose of the CoC is to "safeguard the continued peaceful and sustainable use of outer space for current and future generations" (ibid, p.1). As a non-legally binding and voluntary-based code, it is an attempt to establish soft law when the hard law approach at the CD has stagnated since quite some time (Su et al. 2014).

Mutschler and Venet (2012, p.119) argue that the CoC is an expression of the EU to develop a "singular identity in space security based on a normative, rule-based approach" and that it is the first step in strengthening "its international role as a norm entrepreneur" of norms such as multilateralism, transparency and confidence. The EU as an actor in space is credible as a norm entrepreneur as it focused mainly on science, technology and research from the beginning of European presence in space in the early 1960s unlike the US and the Soviet Union who mainly focuses on the military aspect of space from the beginning (Su et al. 2014).

However, this attempt of the EU to establish itself as one the "principal advocates of the preservation of a safe and secure space environment and of the peaceful use of outer space" (ESPI 2018, p.16) was tarnished by the unsuccessful outcome. At this moment, it is not likely that the Code will ever be passed by the UN General Assembly. Moreover, the CoC was not followed by further substantial measures

and initiatives in international space diplomacy besides establishing a number of Space Policy Dialogues with major space faring nations like the United States, Russia, China and Japan. There certainly is willingness from the EU to participate in international space diplomacy as shown by its active engagement in international organisations and committees such as UN COPUOS and ITU. But its international position seems to be weakened after showing indecision on a CoC follow-up potentially loosing its influence on the debate of arms control in space and "wasting the precious credibility it has earned with the CoC" (Mutschler and Venet 2012, p.122). Instead of taking care of a CoC follow-up, the EU seems to focus on the further development of SSA capability which is the way to allow the EU to ride on the wave of the CoC and become a strategic partner for major space-faring nations in space.

Nonetheless, it was the first action of an emerging actor in space security and made the EU visible in that field for the first time (Mutschler and Venet 2012). In general, cooperation and diplomacy can only ever be an addition to a comprehensive European strategy on space security.

### 5.1.3 State-Society Relations

The variable state-society relations tries to capture how and to what extent various economic and societal groups affect policy making and implementation (Ripsman and Taliaferro and Lobell 2016). State-society relations are shaped e.g. by the level of political and social cohesion, public support or disagreement and competition over state resources (ibid). In other words, the more differences and disputes between state and society, the more difficult for the state to freely choose a foreign policy strategy and to mobilise the required resources for implementing it. Hence, the process of policymaking becomes more complicated.

The Special Eurobarometer from 2014 finds that only 47% of the respondents think that the EU should invest in space exploration and that even fewer (35%) think that Europe should be participating in an international mission to explore Mars (Special Eurobarometer Nr.403). This can be interpreted as a lacking interest in space and many might argue that Europe should focus its efforts on Earth. However, it could also be a case of missing knowledge and awareness about the enabling role of space for Earth-bound policies. The ESP is a policy area that requires immense

efforts and resources and a lack of public support will constrain Europe in accessing these resources and therefore in remaining a key player in space. Hence, some scholars argue that space policy should be made more publicly accessible and refer to this process as the 'popularisation of space' (Hoerber and Köpping Athanasopoulos 2017). Moreover, Hoerber and Köpping Athanasopoulos (2017, p.4) contend that space should be made an "ideal which inspires towards further European integration and which delivers a positive vision for humanity as a whole".

Given the substantial investment in EU space programmes, the public has a general interest in protecting them and seizing their benefits. Moreover, the dependency of the European economy and society on space-based infrastructure and services also calls for their protection from a society's viewpoint. Users in defence and security of space services lobby quite extensively for their protection. In general, however, ESP is still a domain of a limited number of experts and the interest of the general public is low. As ESP is no priority and the EU is faced with a plethora of challenges including austerity and the COVID-19 pandemic that require a high level of investment, ESP and the space sector will have difficulties to attract investment. This might hurt the future development of space programmes considerably.

Last but not least, the defence industry and commercial space markets influence ESP. If new regulations, practices and procedures are developed to promote space security this might constrain commercial actors in conducting space activities. In turn, this might create competition "between industries that are constrained and those that are not" (ESPI 2018, p.62) and "between industries that are prepared to implement such constraints and those that are not" (ibid, p.62). Moreover, the EU will have to choose if it wants to support the emergence of European champions in space or how to specifically build the public-private nexus in Europe.

Enhancing synergies between the defence and space industry and showing implementation steps in the form of e.g. DG DEFIS seems to be well received by the commercial space sector. The request of the European space sector is to tackle the problem of technological dependence, i.e. not being able to access state-of-the-art space technologies in each of the space application sectors (Aliberti and Cappella and Hrozensky 2019). Which ultimately means to ensure that "domestic technologies: a) have the required level of performance; b) have the right level of maturity

to be available for application; and, c) are affordable" (ibid, p.10). Technological non-dependence is different from strategic autonomy as the goal is short-term economic competitiveness rather than long-term security and independence in critical space infrastructure. The European space sector looks with an envious eye to the United States where the commercialisation of the space sector has been supported immensely over the last decades. According to ESPI (2019, p.1), stakeholders of the European space sector request governments to "implement all necessary measures to protect the industrial, commercial and strategic interests of Europe, in the same way other space powers do" and claim that if this will not be done that "it is the place of Europe as a competitor on commercial markets, as a partner in international endeavours and even as an actor in outer space that is at stake".

To conclude, state-society relations are cooperative rather than competitive. This is partly also due to the fact that the state-society relations at Member States level are more important as Member States' governments act as an intermediary to voice their respective society's concerns at EU level. Explicit EU-society relations are dominated by parts of the European society who have a special interest in space such as space enthusiasts, commercial actors or research institutes. Another reason, is the slow progress in the popularisation of space. Outer space and its relevance has not, yet, entered debate about public policy in most Member States and at the EU. Hence, EU-society relations at EU level could be characterised as no opposition but also no support to ESP goals.

#### 5.1.4 Domestic Institutions

The last one of the four IVVs involves the degree to which state structures and domestic political institutions allow the FPE to build policy preferences and "its willingness to make and implement particular grand strategic choices" (Ripsman and Taliaferro and Lobell 2016, p.74). In democracies in Europe, where there is a division of power with checks and balances, structural impediments to the autonomous action of the FPE are usually quite high. Generally, domestic institutions often crystallise state-society relations (Ripsman and Taliaferro and Lobell 2016). Again, all four intervening variables are closely interconnected and a sharp distinction is not always possible.

As mentioned before, the space security dimension of ESP in the EU is characterised by a complex governance architecture composed by a multiplicity of stakeholders. However, three tiers of main actors stand out: member states and their space agencies, the European Space Agency (ESA) and the EU and its agencies. EU Agencies active in space security are the European Defence Agency (EDA), the European Union Satellite Centre (SatCen) and the European GNSS Agency. As the EU is subject of this analysis, the domestic institutions of the EU will be discussed in this section. However, the ESA is at the heart of European space activities and the possibility of ESA being subsumed into the EU framework is not to be neglected. Thus, ESA will be discussed as fit.

Since ESP became a shared competence it falls under the Ordinary Legislative Procedure (OLP). This means that EU institutions have different roles.

The role of the Parliament in OLP is that of a veto power in ESP. Thus, any additional EU space programme requires the approval of the Parliament. Any change in the relations between ESA and the EU also requires the approval of the Parliament. However, as mentioned before the Parliament is a major supporter of ESP and in favor of granting more powers to the EU in this policy area. It often acts as a legitimising force to enhance ESP and 'sells it' to the Member States.

The Council gives policy guidelines and the Commission has the exclusive right of legislation initiation. Even though the Commission is "the sole funding source and holds the responsibility over the security of the EU space programmes" (ESPI 2018, p.66), its role in ESP in constrained by the Council. Between Member States there is a huge discrepancy in space capabilities and strategic interests. The danger of some states "free-riding" on the investments and efforts of more motivated and capable states in space is often leading to intergovernmental, if any, solutions for Member States cooperation in space. "This situation, which cannot be overlooked, is at the core of the governance debate which eventually boils down to the question of the weight of national concerns and interests against European added-value and to the sharing of responsibilities between Member States and the EU" (ESPI 2018, p.67). However, at the same time, the Council is concerned about the relationship of the EU with ESA. The Council acknowledges the contributions by ESA but reading between the lines it seems like the Council would prefer if critical space programmes

and activities would be situated in an EU framework or in the words of the Council conclusions "institutional space activities and space programmes at European level should be under civil or governmental control." (Council of the European Union, p.6). It seems noteworthy to the Council to stress the importance of a shared strategic vision for space with ESA, repeatedly referring to the Joint statement on shared vision and goals for the future of Europe in space by the European Union and the European Space Agency (European Commission and ESA 2016, p.1) where it is explicitly stated that the "EU and ESA share a common vision and goals for the European space sector to respond to … new challenges and turn them into opportunities". The role of ESA in space security is a grey area. By its convention it is confined to work "for exclusively peaceful purposes" (ESA 2005) but ESA has been "progressively reinterpreting the word 'peaceful' as 'non-offensive' rather than 'non-military', thus opening a door to dual-use activities" (Mutschler and Venet 2012, p.118).

Nowadays, ESA contributes to space and security in many different ways by inter alia enhancing the contribution of space to Europe's security needs, ensuring Europe's unrestricted use of its space assets and technological non-dependence on strategic technologies and increasing the resilience of critical European space infrastructure (Giannopapa et al. 2019). The ESA model is unique in building on the strengths of each cooperation partner and in allowing voluntary participation. Köpping Athanasopoulos (2019) even argues that ESA translates its culture to the international level through concepts for global space cooperation such as the Moon Village.

The European Defence Agency (EDA) was established in 2004 as an intergovernmental agency of the Council of the EU under the CSDP. All EU member states are members except Denmark. EDA considers itself the "Hub for EU Defence Cooperation" (Benien 2020, p.6) and its goal is to ensure coherence among EU members states in defence. EDA recognises the importance of space assets and applications for defence capabilities and cooperates with ESA, SatCen and GSA among others to build capability in three priority areas: space based information services (Earth observation, SSA, Satellite Communication); air superiority and cyber defence in space (EDA 2018). EDA is also part of the GOVSATCOM Initiative alongside the

Commission and ESA.

However, EDA adds yet another level of complexity to the already complex European space governance framework. The complex governance structure of ESP between EU, EDA and ESA through overlapping memberships with different institutions is illustrated by 5.3.



Figure 5.3: EU, EDA, ESA and NATO Memberships

Source: Pellegrino and Stang (2016)

At its most basic level, the Council-EDA-Commission triangle reflects the inherently European intergovernmentalism-supranationalism co-existence. Not to men-

tion that there exists an EDA-Commission rivalry because of a danger of overlapping mandates (Fiott 2014). The EDA is the "main stakeholder when considering synergies in the field of space and security" (Papadimitriou et al. 2019, p.186) and its pooling and sharing efforts are based on the logic that "space and defence share to a large extent the same technology and industrial base and therefore face similar problems" (Papadimitriou et al. 2019, p.186). The same logic is applied by the Commission in establishing DG DEFIS.

Finally, member states contribute to this competition between institutions by forum shopping, i.e. shop between institutions depending on the policy issues (Fiott 2014). EDA is an important vehicle for member states in this context as it "allows them to maintain control over procurement and capability development processes" (Fiott 2014, p.554).

The European Satellite Centre (SatCen) was established in 2002 to support EU decision-making and action in CFSP/CDSP. As such, it is under the supervision of the Council like EDA. The SatCen is an operational entity in space and security matters in support of the EEAS and hence under the operational direction of the High Representative. It is the leading provider of security-related geospatial information and as such act as the front desk to the Space Surveillance and Tracking Support Framework (EU SST), the programme at the heart of the EU's SSA framework (SatCen 2020). It closely cooperates with the Commission, EEAS, EDA and ESA among others. Moreover, SatCen is "providing geospatial intelligence products on a wide range of topics relevant for general crime and international security issues like border control, terrorism, piracy, illegal cropping or cross-border state disputes" (Papadimitriou et al. 2019, p.187). Given the strategic importance of geospatial intelligence and SSA systems, SatCen holds a crucial role for European activities in space and it has become more and more important to the EU's crisis management (Lovrencic 2014).

The European GNSS Agency was established in 2004 as the European GNSS Supervisory Authority but underwent restructuring to an agency in 2014. The agency handles the security tasks of Galileo and EGNOS. Both, Galileo and EGNOS, make up the European GNSS Programme that is implemented by ESA and managed by the Commission (Papadimitriou et al. 2019). Galileo is the EU's Global Navigation

Satellite System (GNSS). The European Geostationary Navigation Overlay Service (EGNOS) "is a satellite-based augmentation system that increases the accuracy of GNSS positioning" (Pellegrino and Stang 2016, p.39) and has been the first EU venture into satellite navigation (ibid). In other words, Galileo is the counterpart of the American GPS, the Russian GLONASS and the Chinese BeiDou. However, the latter three are all military programmes while Galileo is the only civilian-controlled system (Pellegrino and Stang 2016), underlining the EU's character of a civilian power in space. EGNOS, thereby, increases the performance and accuracy of Galileo to meet international technological standards and live up to European needs of information and positioning services. As Pellegrino and Stang (2016, p.39) point out: "Galileo is now recognised as an essential project in terms of European autonomy, infrastructure resilience and technological/industrial development."

While Europe has long been a space-faring nation, the EU seems to be in the phase of an emerging actor in space security with EU SST, Galileo, EGNOS, Copernicus and GOVSATCOM. Domestic institutions are still being created and restructured to enable the operability of these EU space programmes. So far, they all take a role of support and enabling rather then restricting the effective use of European space infrastructure. However, the lack of political autonomy at EU level and the hesitancy to further develop ESP restricts space policy planning endeavours. The question of European space governance, exemplified by EU-ESA but also Commission-EDA relations, will be posed continuously in the future with the full uptake of EU space programmes. Finally, with NATO recognising space as one of its operational areas besides land, air, sea and cyberspace, the role of space in EU-NATO defence cooperation will add an extra layer of complexity to the European space governance system.

### 5.2 Summary

While structural realists are right to assess that the international system and the systemic and strategic environment it creates give the main impetus for the EU to complement its normative approach to space with a space security approach, the actual form and content of the EU's actorness in space is heavily influenced by

domestic intervening variables discussed in this Chapter. Table 5.1 gives an overview of the four clusters of intervening variables as they unfold in the EU.

IVV cluster	European Union			
Leader Images	ESP as a key driver for European integra-			
	tion, joint capacity building, secure Euro-			
	pean space infrastructure, ensure uptake of			
	EU space programmes			
Strategic Culture	Strategic autonomy, project-based ad-hoc			
	cooperation and coalition of the capable			
	and willing, civil-military synergies, policy-			
	multiplication, cross-fertilisation			
State-Society Rela-	Space popularisation, EU-society relations			
tions	are transmitted through Member States, Eu-			
	ropean commercial space sector and defence			
	industry			
Domestic Institutions	Intergovernmental vs supranational, EU In-			
	stitutions (European Parliament, Council,			
	Commission, EEAS) and ESA, National			
	Space Agencies, EDA, European GNSS			
	Agency, SatCen			

Table 5.1: Intervening Variables in the European Union (EU)

Information is compiled from a range of sources including ESPI (2020), Papadimitriou et al. (2019), Antoni et al. (2018), Pellegrino and Stang (2016)

Among the four clusters of intervening variables, strategic culture is arguably the most influential at EU level. While leader images, state-society relations and domestic institutions are expected to have an impact in the neoclassical realist model as well, there are less influential at this point in time. However, changes are likely as ESP develops further.

The EU has independently developed space capabilities in all the key categories relevant to space security (Pellegrino and Stang 2016), even though it lacks behind in SSA. Combined with ESP becoming a shared competence, the EU arguably already possesses the basic features of actorness in space security.

Even though the advancement of the CoC came to a halt, the EU's normative actorness in space security keeps staying strong as "space activities in Europe have

been driven primarily by civilian rather than defence considerations" (Pellegrino and Stang 2016, p.37) and its leadership in using space for sustainability and climate change purposes builds on that. However, once the EU had gained an acceptable level of independent access to space and the ability to pick up the use of space capabilities, it started to engage in an attempt to complement its normative approach with a more comprehensive space security approach. To increase the role of space in CFSP and CDSP, the EU pursues several different strategies in parallel which include policy-multiplication, dual-use capability development and cooperation and diplomacy.

As Papadimitriou et al. (2019, p.189) concludes: "The increasing security challenges the European States are facing, together with the political momentum favourable for advancing the EU role in the field of security and defence may lead to further integration covering the entire dual-use spectrum of space activities".

Nonetheless, there is still a long way to go for the EU to follow a coherent strategy in space that goes beyond enhancing socio-economic benefits from space. Challenges to an effective and comprehensive European action in space facilitated by the EU are numerous. Disagreement about the most adequate strategic response to the changing environment in space between Member States, especially along the Franco-German nexus; free-riding and forum-shppoing among Member States as well as overlapping mandates between EU and non-EU Institutions and Agencies, and the missing institutional link between CSDP and ESP hinder effective ESP action. As of now, the lack of political autonomy at EU level and the hesitancy to further develop ESP is what first and foremost restricts effective and coherent European action in space. What does this mean for EU actorness in space and its identity as an emerging space power? By synthesising the previous two Chapters into the Dependent Variable in the next Chapter will offer an attempt at answering this question.

### 6.1 The Dependent Variable

Neoclassical realism differentiates from structural realism after Kenneth Waltz by connecting foreign policy to international politics instead of theoretically constructing a clear distinction between the two (Ripsman and Taliaferro and Lobell 2016). The basic argument for this differentiation is that the interaction between foreign policy by major powers affects international outcomes and systemic structure over time (Ibid).

The dependent variable refers to international outcomes and, as mentioned before, varies depending on the time frame. In the short term policy making is restricted to accepting the distribution of relative power and navigating through that. In the long term, however, states can engage in strategic planning and internal balancing by augmenting their own power through e.g. technology development, weaponisation or forging alliances. By expanding the time frame, the neoclassical realist theory allows to account for changes in relative power and thus changes in the international system.

While in the previous chapters, this thesis looked at the nature of the international system (Independent Variable) and at space policy making as regards space security at the EU level (Intervening Variables), in this chapter both variables come together and the result of their interaction is considered in order to assess if the EU can be considered a space power in the international space system (Dependent Variable). All three variables are logically connected.

Table 5.1 shows a characterisation of EU space power based on the meta-geopolitics framework similar to the space power characterisation of the United States, Russia and China presented in Chapter 3.

Table 6.1:	Space power	of the Eu	ropean	Union (	$(\mathrm{EU})$	based	on t	the r	neta-
	geopolitics fr	amework	with sev	ven din	nensi	ons			

Capacity	European Union			
Social and Health	Use space-based services for socio-economic			
	benefits			
Domestic Politics	European integration, ESA-EU coordination,			
	EU prestige, budget constraints			
Economics	high priority (critical to EU economy),			
	achieve technological self-reliance			
The Environment	Central to EU leadership in fight against cli-			
	mate change, Copernicus			
Science and Human	Top EU priority to enhance EU's global com-			
Potential	petitiveness and prestige			
Military and Security	Acknowledged by the EU but hampered by			
	national sovereignty considerations and bud-			
	get constraints, only some Member States			
	like France, reliance on US SSA capabilities			
International diplo-	High visibility and experience, high priority			
macy	but failed attempts of establishing soft law			

Information is compiled from a range of sources including ESPI (2020), Papadimitriou et al. (2019), Antoni et al. (2018), Pellegrino and Stang (2016), Al-Rodhan (2012)

Based on this characterisation, the EU can at best be described as an emerging space power. The lack of political autonomy at EU level and the hesitancy to further develop ESP is what restricts effective and coherent European action in space ultimately preventing it from becoming a space power so far. In general, given the big picture of EU strategic culture in CFSP and the particularities of the space environment it is impressive that the EU is as active in space as it is. However, based on its normative actorness in space as a civilian space actor, many scholars are hoping for the European way of security in space which will allow for the EU to act as a "norm entrepreneur" in space and balancing force between China, Russia and

US (e.g. Mutschler and Venet 2012, Su and Lixin 2014). Mutschler and Venet (2012, p.123) argue that the EU could act as a "neutral mediator between the USA on the one hand, and China and Russia on the other by acting as a norm entrepreneur for arms control in space". These arguments stem from a liberal-idealistic point of view usually rejected by realists. In contrast, realists usually exclude any normative specificity of the EU.

From a neoclassical realist perspective, the fact that the EU is developing space capability mainly or exclusively in the areas where it is no serious competitor to the US or where strategic interest of the US is low, could be a sign that the EU is bandwagoning US space power. Bandwagoning is a form of under-balancing where "other states do not balance against the hegemon because they are too weak (individually and collectively) and, more important, because they perceive their well-being as inextricably tied up with the well-being of the hegemon" (Schweller 2004, pp.167-168).

The EU might even be buck-passing China and Russia at the same time. Buckpassing is "a form of underreaction to threats by which states attempt to free ride on the balancing efforts of others" (Schweller 2004, p.165). With the US retracting from transatlantic relations and the informal security guarantee for Europe, the EU might well be at unease with exorbitant US space dominance and might welcome balancing efforts from other actors like China and Russia. That following two or more strategies of non- or under-balancing might be an effective grand strategy is largely neglected by neoclassical realist scholars so far. But an analytical bias might be at play here. Such theories of non-or under-balancing are usually tested against scenarios in the past where this strategic behaviour led to conflict and crisis. As regards space, really it is too soon to tell.

The year 2016 was certainly one moment where the space security factor of ESP got pushed forward. However, it seems that so far the benefits the EU would gain from a restored balance of power in space, do not outweigh the domestic costs of balancing behaviour. Nonetheless, the EU is engaging in space just enough to be able to choose from a set of strategic choices in the future when a threat to space security appears more imminent. In other words, when the strategic environment becomes more restrictive and the clarity of the system becomes higher, which neoclassical

realists assume, will happen sooner or later.

Currently, one gets the impression that the EU's response to the security challenge in space is an incoherent strategic approach of a series of half-measures and muddling through. The strategic culture of the EU in space is characterised by a combination of contradictory elements of balancing, bandwagoning, buck-passing, and appeasement (Schweller 2004). But contrary to what realist usually posit, normative actorness plays a role as well, as a means for power projection and a means to find a distinctive identity of European space power. As the EU is not yet a fully fledged space power, it has an asymmetrically high interest in the safe and sustainable conduct of space as it has no means to force others to ensure space security. In conclusion, the EU could potentially use its dual-use space power and its power in other areas (diplomatic experience, multilateral engagement, economic power) to achieve its goals in space security without actually having to develop or deploy counter-space weapons.

# 7 Conclusion

The current space environment is characterised by a high diversity in actors and activities, a major disruption caused by technological change and the lack of an effective global governance system for space. The EU will have to take important decision to make sure that Europe will keep playing a central role in space on a global level and to seize the opportunities that space has to offer for sustainability and security on Earth.

This thesis has looked into the role of the EU in the European perspective on space security and how the EU positions itself in the Space Race 2.0. Only by taking unit-level variables and the different time horizons of effects into account, plausible conclusions could be drawn about the foreign policy choices of the EU as regards space security and how this feeds back into systemic outcomes.

This thesis finds that the EU is still an actor under construction in the field of space security and that questions of European space policy are closely interlinked to other policy domains in the EU such as the CFSP. Space plays a major role of general CFSP goals such as strategic autonomy. From the beginning of the engagement of the EU in European space affairs, it has followed a rather normative and rules-based approach which is the basis of its actions in space. Nonetheless, the EU is developing capabilities that could potentially have dual-use applications and could be used for military purposes. Its current space strategy though focuses on the uptake of space-data and services, on the effective and inclusive operability of its space programmes and on the development of space situational awareness (SSA). Disposing of comprehensive SSA capability is the first step for Europe to achieve strategic autonomy in space.

The neoclassical realist approach gives room to the assessment of a Europeanspecific perspective on space security. Joining the Space Race 2.0 by engaging in counter-space similar to the major space-faring powers does not stand out as a viable policy option to the EU. Instead, it should build on its standing as a credible civilian space power that is at the forefront of scientific space exploration and of leveraging space for sustainability and other socio-economic benefits. Only, with the status of a highly capable but peaceful space power will the EU be able to act as

#### 7 Conclusion

a norm entrepreneur at an international stage. The possibility of success with such an approach was demonstrated by the International Code of Conduct and follow-up initiatives such by pursued. The EU, envisaging to become strategically autonomous, has the potential to act as a mediating and stabilising force between the space powers in an unbalanced multipolar space order thereby preserving the principle of multilateralism. With this status high responsibility rests on the shoulders of the EU.

While the discussion about the contribution of ESP to European integration and identity creation was not covered in detail, it becomes apparent that Member States will have to give up sovereignty in security and defence if they take the goal of a strong Europe in space seriously. In the long-term, only a cooperative pan-European approach will give the EU the necessary means to ensure space security.

The analytical value of this thesis should, however, be qualified according to the limited access to primary sources and 'raw' space data. Information and assessments about a state's counter-space capabilities, for example, are usually provided by reports of an adversary government or of private policy institutes that have a certain national background. These reports probably have a considerable analytical bias as they rely on estimations and over-or under-estimations, depending on the message that is intended to be conveyed, are likely. Moreover, publicly available data sets intended for social science research are rare and have only been setup recently. Hence, with a higher level of transparency on space activities, results might be different.

Without reliable information on actual space capabilities and activities, the creation of a 'space war narrative' and a self-fulfilling prophecy is high. This is why, the international space community repeatedly calls for the quick extension of global SSA and confidence- and transparency-building measures. The EU attempts to contribute to the improvement of global access to space knowledge and repeatedly reiterates its commitment to make space a priority. At the beginning of this year, Thierry Breton, European Commissioner for the newly setup Directorate-General for Defence, Industry and Space (DG DEFIS), said: "Space is at the intersection of technological leadership, industrial strategy and geostrategic considerations. This is why, as your new European Commissioner in charge of space, you will be able to count on me to push an ambitious European Space Agenda" (European Commission
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2020). The creation of DG DEFIS and the decision to put it under French leadership, with France being the only real power in space security in the EU after Brexit, was a clear sign of the aspiration of the European Commission to transform the EU into a more strategic actor by strengthening the link between space and defence.

However, the outbreak of the COVID-19 pandemic reshuffled the cards for Europe's role in space security. If for better or worse, is still to be seen. The outcome of the on-going negotiations regarding the Multiannual Financial Framework 2021 - 2027 and the role of space-based services for crisis management and response to the pandemic will be decisive for the future of European space policy.

Space continues to change rapidly and what the EU's role in the new space era will be is still written in the stars.

- Aganaba-Jeanty, T. (2016). "Space sustainability and the freedom of outer space". Astropolitics, 14(1), 1-19.
- [2] Aliberti, M. and Cappella, M. and Hrozensky, T. (2019). Measuring Space Power. European Space Policy Institute (ESPI) Executive Summary.
- [3] Al-Rodhan, N. R. (2018). "The Interplay between outer space security and terrestrial global security". *Harvard International Review*, 39(3), 29-33.
- [4] Al-Rodhan, N. R. (2012). *Meta-geopolitics of outer space*. Palgrave Macmillan.
- [5] Antoni, N. et al. (2018). Re-affirming Europe's ambitions in space: Past, present and future perspectives. *Acta Astronautica*, 151, 772-778.
- [6] Baun, M. and Marek, D. (2019). "Making Europe Defend Again: The Relaunch of European Defense Cooperation from a Neoclassical Realist Perspective". *Czech Journal of International Relations*, 54(4), 27-46.
- [7] Benien, T. (2020). "European Defence Agency Quo Vadis?". Military Technology, 44(4), 6-8.
- [8] Bormann, N. and Sheehan, M. (2009). "Introduction". In: Bormann, N. and Sheehan, M. eds. Securing Outer Space: International Relations Theory and the Politics of Space. Routledge. pp.1-7.
- [9] Brands, H. (2016). Making the unipolar moment: US Foreign policy and the rise of the post-Cold War order. Cornell University Press.
- [10] Burwell, J. (2019). "Imagining the Beyond: The Social and Political Fashioning of Outer Space". Space Policy, 48, 41-49.
- [11] Butler, A. M. (2017). [Review of] Dickens, P. and Ormrod, J.S. eds. (2016) The Palgrave handbook of society, culture and outer space. In: Utopian Studies, 28(2), 348-353.

- [12] Chang, Κ. (2020).HowNASA's Astronauts Became SpaceX'sCustomers [Online]. New York Times. Available from: https://www.nytimes.com/2020/05/26/science/spacex-launch-nasa.html [Accessed 1 June 2020].
- [13] Council of the European Union (2019): "The Council conclusions on Space as an enabler". 9248/19.
- [14] Cross, M.A.K.D. (2019). "The social construction of the space race: then and now". International Affairs, 95(6), 1403-1421.
- [15] Defense Intelligence Agency (DIA) (2019). Challenges to Security in Outer Space.
- [16] Di Pippo, S. and Journal of International Affairs (2018). "Space Provides the Required Magnitude of Perspective. It Unites Us towards Common Goals". *Jour*nal of International Affairs, 71(2), 116-120
- [17] European Commission (2020). Closing Speech by Commissioner Thierry Breton at the 12th Annual Space Conference on 22 January 2020. Available from: https://ec.europa.eu/commission/commissioners/2019-2024/breton/announcements/12th-annual-space-conference-closing-speech\_en [Accessed 5 March 2020]
- [18] European Commission (2016). "Communication from the Commission on the Space Strategy for Europe". COM(2016) 705. Brussels: European Commission.
- [19] European Commission (2016). Communication from the Commission on the European Defence Action Plan. COM(2016) 950. Brussels: European Commission.
- [20] European Commission and the European Space Agency (2016). "Joint Statement on shared Vision and goals for the future of Europe in space by the European Union and the European Space Agency". Brussels, 26 October 2016.
- [21] European Defence Agency (EDA) (2019). Space [Online]. EDA Information Sheet. Available from: https://www.eda.europa.eu/docs/defaultsource/documents/eda-information-sheet-on-space.pdf [Accessed 21 June 2020]

- [22] European External Action Service (EEAS) (2020). European space conference: Welcome address by High Representative/Vice-President Josep Borrell [Online]. Available from: https://eeas.europa.eu/headquarters/headquartershomepage/73266/european-space-conference-welcome-address-highrepresentativevice-president-josep-borrell\_en [Accessed 5 June 2020].
- [23] European External Action Service (EEAS) (2014). International Code of Conduct for Outer Space Activities [Online]. Available from: https://eeas.europa.eu/sites/eeas/files\_space\_code\_conduct\_draft\_vers\_31march-2014\_en.pdf [Accessed 24 March 2020].
- [24] European Union Satellite Centre (SatCen) (2020). EU SatCen Annual Report 2019.
- [25] European Space Agency (ESA) (2005). "Convention for the establishment of a European space agency". ESA SP-1300. Paris: European Space Agency.
- [26] European Space Policy Institute (ESPI) (2020). Europe, Space and Defence: From "Space for Defence" to "Defence of Space". ESPI Full Report No. 72.
- [27] European Space Policy Institute (ESPI) (2019). Toward a more strategic, assertive and united Europe in Space. ESPI Brief No. 34.
- [28] European Space Policy Institute (ESPI) (2018). Security in Outer Space: Rising Stakes for Europe. ESPI Report No. 64.
- [29] EUGS 2016: Shared Vision, Common Action: A Stronger Europe. A Global Strategy for the European Union's Foreign And Security Policy
- [30] Fiott, D. (2014). "The European Commission and the European Defence Agency: A Case of Rivalry?". Journal of Common Market Studies, 53(3), 542-557.
- [31] Friis, A. M. and Juncos, A. E. (2019). "The European Union's Foreign, Security, and Defence Policies". In: Cini, M. and Pérez-Solórzano Borragán, N. eds. *European Union Politics*. Oxford University Press. pp. 282-293.

- [32] Gallagher, N. (2010). "Space governance and international cooperation". Astropolitics, 8(2-3), 256-279.
- [33] Geppert, A. C. ed. (2018). Imagining outer space: European astroculture in the twentieth century. Springer.
- [34] Giannopapa, C. et al. (2018). Elements of ESA's Policy on Space and Security. Acta Astronautica, 147, 346-349.
- [35] Harrison, T. et al. (2019). Space Threat Assessment 2020. Report of the Center for Strategic and International Studies Aerospace Security Project.
- [36] Haas, M. (2020). "Space Security: The Next Decade". CSS Analyses in Security Policy.
- [37] Hays, P. L. and Lutes, C. D. (2007). "Towards a theory of spacepower". In: Space Policy, 23(4), 206-209.
- [38] Hickman, J. (2019). "Research Viewpoint: International Relations and the Second Space Race Between the United States and China". Astropolitics, 17(3), 178-190.
- [39] Hobe, S. and Goh, G. M. and Neumann, J. (2007). "Space Tourism Activities-Emerging Challenges to Air and Space law". *Journal of Space Law*, 33, 359.
- [40] Hoerber, T. and Köpping Athanasopoulos (2017). "Popularising European space policy: Introduction". Space Policy, 41, 1-4.
- [41] Hoerber, T. and Sigalas, E. (2016): "Theorizing European Space Policy". In: Lexington Books.
- [42] Hoerber, T. (2012). "New horizons for Europe A European Studies perspective on European space policy". Space Policy, 28(2), 77-80.
- [43] Jackson, N. J. (2019). "Outer space in Russia's security strategy". In: Kanet, R.E. ed. Routledge Handbook of Russian Security. Routledge. 227-238.

- [44] Jakhu, R. S. and Chen, K. W. and Goswami, B. (2020)." Threats to Peaceful Purposes of Outer Space: Politics and Law". Astropolitics, 18(1), 22-50.
- [45] Johnson-Freese, J. and Burbach, D. (2019). "The Outer Space Treaty and the weaponization of space". *Bulletin of the Atomic Scientists*, 75(4), 137-141.
- [46] Juncker, J.-C. (2016). State of the Union Address 2016: Towards a better Europe - a Europe that protects, empowers and defends. European Commission. Brussels, 14 September 2016.
- [47] Köpping Athanasopoulos, H. (2019). "The Moon Village and Space 4.0: The 'Open Concept'as a New Way of Doing Space?". Space Policy, 49, 101323.
- [48] Kumar, A. S. et al. (2020). "Coordinated Capacity Development to Maximize the Contributions of Space Science, Technology, and its Applications in Support of Implementing Global Sustainable Development Agendas—A Conceptual Framework". Space Policy, 51, 101346.
- [49] Liukkonen, J.-M. and Sauzay, A. and Straube, S. (2020). *Space: Will Europe Awaken?*. Institut Montaigne Policy Paper.
- [50] Lovrencic, T. (2014). "Use of Geospatial Information for Crisis Management: The Case of the European Union Satellite Centre". In: Jiyoung, P. ed. Space Technology Development: Effect on National Security and International Stability. Asan Institute for Policy Studies. 33-51.
- [51] Lubojemski, A. M. (2019). "Satellites and the Security Dilemma". Astropolitics, 17(2), 127-140.
- [52] Martinez, P. et al. (2019). "Reflections on the 50th anniversary of the Outer Space Treaty, UNISPACE+ 50, and prospects for the future of global space governance". Space Policy, 47, 28-33.
- [53] McClintock, B. (2017). "The Russian space sector: Adaptation, retrenchment, and stagnation". Journal of the United States Air Force Academy. Eisenhower Center for Space and Defense Studies, 10(1), 3-8.

- [54] Mutschler, M. and Venet, C. (2012). "The European Union as an emerging actor in space security". Space Policy, 28(2), 118-124.
- [55] North Atlantic Treaty (NATO) (2020).Organisation NATO's approach tospace [Online]. Available from: https://www.nato.int/cps/en/natohq/topics 175419.htm? [Accessed 27April 2020].
- [56] O'Callaghan, J. (2020). SpaceX Launches Its Sixth Starlink Mega Constellation Mission Into Earth Orbit [Online]. Forbes. Available from: https://www.forbes.com/sites/jonathanocallaghan/2020/03/18/spacexlaunches-its-sixth-starlink-mega-constellation-mission-into-earthorbit/#30b444926e47 [Accessed 18 March 2020].
- [57] Ormrod, J. S. and Dickens, P. (2017). *The Palgrave handbook of society, culture and outer space.* Springer.
- [58] Pellegrino, M. and Stang, Gerald (2016). Space security for Europe. European Union Institute for Security Studies. Report No. 29.
- [59] Papadimitriou, A. et al. (2019). "Perspective on space and security policy, programmes and governance in Europe". *Acta Astronautica*, 161, 83-191.
- [60] Pfaltzgraff Jr, R. L. (2007). "International Relations Theory and Spacepower". In: Hays, P. L. and Lutes, C. D. eds. *Towards a theory of spacepower: Selected Essays*. Institute for National Strategic Studies at the National Defense University, 30-43.
- [61] Remuss, N. L. (2018). Theorising Institutional Change: The Impact of the European Integration Process on the Development of Space Activities in Europe. Springer.
- [62] Ripsman, N. M. and Taliaferro, J. W. and Lobell, S. E. (2016). Neoclassical realist theory of international politics. Oxford: Oxford University Press.
- [63] Schweller, R. (2004). "Unanswered Threats: A Neoclassical Realist Theory of Underbalancing". *International Security*, 29(2), 159-201.

- [64] Sethi, M. (2012). "Decoding the International Code of Conduct for Outer Space Activities". Indian Foreign Affairs Journal, 7(4), 466.
- [65] Sigalas, E. (2015): "Legitimizing the European Space Policy". In: Al-Ekabi et al. eds. Yearbook on Space Policy 2014: The Governance of Space. Springer. pp. 255-265.
- [66] Slann, P.A. (2015). The security of the European Union's critical outer space infrastructure. Keele University. PhD Thesis.
- [67] Special Eurobarometer 403 (2014). textitEuropeans' attitudes to space activities.
- [68] Su, J. and Lixin, Z. (2014). "The European Union draft Code of Conduct for outer space activities: An appraisal". Space Policy, 30, 34-29.
- [69] Weeden, B. and Samson, V. eds. (2020). *Global counterspace capabilities: An open source assessment.* Secure World Foundation.
- [70] Waltz, K. N. (2010). Theory of International Politics. Waveland Press.
- [71] West, J. (2019). Space Security Index 2019. Project Ploughshares.
- [72] Zhao, Y. (2018). "Space commercialization and the development of Space Law". Oxford Research Encyclopedia of Planetary Science. Oxford: Oxford University Press.
- [73] Zhao, Y. and Jiang, Shengli (2019). "Armed Conflict in Outer Space: Legal Concept, Practice and Future Regulatory Regime". Space Policy, 48, 50-59.

# **Glossary of Acronyms**

ASAT	Anti-Satellite
BMD	Balistic Missile Defence
BeiDou	Chinese Global Navigation Satellite System
BRI	Belt and Road Initiative
CoC	International Code of Conduct for Outer Space Activities
CD	Convention on Disarmament
CFSP	Common Foreign and Security Policy
CSDP	Common Security and Defence Policy
DG DEFIS	Directorate-General for Defence, Industry and Space
DV	Dependent Variable
EDA	European Defence Agency
EDAP	European Defence Action Plan
EEAS	European External Action Service
EGNOS	European Geostationary Navigation Overlay Services
EP	European Parliament
ESA	European Space Agency
ESP	European Space Policy
EU	European Union
EUGS	European Union Global Strategy
EUSS	European Union Space Strategy
EU SST	European Union Space Surveillance and Tracking Support Framework
EW	Electronic Warfare
FP	Foreign Policy
FPE	Foreign Policy Executive
GLONASS	Russian Global Navigation Satellite System
GNSS	Global Navigation Satellite System
GOVSATCOM	Governmental Satellite Communications
GPS	Global Positioning System
ID	Independent Variable
IR	International Relations

### Glossary of Acronyms

ISR	Intelligence, Surveillance and Reconnaissance
ISS	International Space Station
IVV	Intervening Variables
LT	Lisbon Treaty
NASA	National Aeronautics and Space Administration
NATO	North-Atlantic Treaty Organisation
NGO	Non-governmental organization
OLP	Ordinary Legislative Procedure
OST	Outer Space Treaty
PESCO	Permanent European Structured Cooperation
PLA	People's Liberation Army
SatCen	European Union Satellite Centre
SatCom	Satellite Communication
SSA	Space Situational Awareness
SST	Space Surveillance and Tracking
STM	Space Traffic Management
UN	United Nations
UN COPUOS	United Nations Committee on the Peaceful Uses of Outer Space
UNOOSA	United Nations Office of Outer Space Affairs
USSF	United States Space Force

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