



Making the World Great Again: Using Global Public Goods to Enhance Global Governance Outcomes

Matthias Mueller

2018/5



Abstract

How can global governance (GG) facilitate international cooperation to improve the production of global public goods (GPGs)? I argue that using GPGs as the basis for analysis of GG clarifies the cooperation challenges at the heart of different GPGs and provides a coherent framework to assess what pathways are likely to effectively produce GPGs. GPG scholarship provides the theoretical basis for my paper. My contribution focuses on using this basis to analyse how GG can re-frame intractable cooperation challenges amidst a web of different interests and incentives across multiple levels of governance. To date, GPG literature has not directly engaged with GG scholarship in this way. My analysis concludes that for aggregate-effort GPGs, a critical mass of ambitious actors, leveraging win-win cooperation, is most likely to be effective. GG should embrace polycentricity and support a critical mass of ambitious and influential actors involving a multi-level coalition, including states, businesses and civil society from both Global North and South.

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Suggested citation: Mueller, M. (2018). Making the World Great Again: Using Global Public Goods to Enhance Global Governance Outcomes, *UCL Global Governance Institute Working Paper Series*, 2018/5.

Dissertation submitted in part-fulfilment of the Masters Course in Global Governance and Ethics, University College London (UCL), September 2017.



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1. Introduction

Despite great advances in international cooperation over the centuries, global governance (GG) suffers from gridlock, as powerful interests diverge and hinder cooperation (Hale/Held/Young, 2013; Weiss, 2013). Many solutions are readily available, but GG lacks the political impetus to implement them (Hoffman, 2015; Kaul/Blondin, 2016). In this context, the question for this paper is; how can GG facilitate international cooperation to improve the production of global public goods (GPGs)? I argue that using GPGs as the basis for analysis of GG clarifies the cooperation challenges at the heart of different GPGs and provides a coherent framework to assess what implementation pathways are likely to be effective. The point of developing a framework for, what I call, “GPG analysis of GG” is to conceptualise how actors can cooperate effectively to produce GPGs. GPG scholarship provides the theoretical basis for my paper. My contribution focuses on using this basis to analyse how GG can re-frame GPG production from prisoner’s dilemmas into positive-sum games. To date, GPG literature has not directly engaged with GG scholarship in this way.

To produce GPGs, GG needs to understand and incentivise powerful interests to support implementation across levels of governance. GG can use both political and financial incentives to support GPG production, including by ensuring that private goods contribute to public goods. Recognising that barriers to GPG production are often located domestically, GG can leverage local actors’ crucial role in facilitating implementation. My analysis concludes that GPG production is most likely to be effective when GG brings together a critical mass of ambitious and influential actors from across levels of governance. To ensure effective GPG production, GG should involve different types of actors, including states, businesses and civil society, and geographically diverse coalitions, including the Global South. In other words, GG should embrace polycentricity, which is defined as a structural feature of governance with many decision centres that have limited and autonomous prerogatives (Aligica/Tarko, 2012). GPG analysis demonstrates that such a nimble approach based on a critical mass and win-win cooperation is feasible. GG has a crucial role to play in facilitating this.

Both scholars and practitioners implore that improving GG is urgent, not only because of the risks associated with not producing GPGs, such as climate catastrophe, but also because the legitimacy of international cooperation is tested in both Global South and North (e.g. Brown, 2013; Zürn, 2016; Kaldor, 2016; Ramos, 2017; Schwab, 2017). Ten years ago, Stiglitz (2008, p. 323) predicted that ‘unless changes are made, the already palpable disillusionment with globalisation will spread, with untold consequences.’ According to a recent survey, 79% of the global population believe globalisation is failing them (Edelman, 2017).

This challenges GG and GPG production, because GPGs can only be addressed internationally (Dadush, 2011; Hurrell, 2013b; Kahler, 2016a).

The introduction analyses the key concepts of discussion – GPG and GG – and the meaning of *global* and the *global public* within them, explains what I mean by “GPG analysis of GG,” and uses climate stability – the subject of my case study – to explicate the meaning of these concepts. The remainder of the paper is structured as follows: Section 2 considers conceptual tensions in GPG analysis; Section 3 discusses the analytical framework; Section 4 applies GPG analysis to climate stability; Section 5 draws out the broader implications for GG; and Section 6 concludes the paper and proposes areas for further research.

1.1. Defining GPGs and GG

Public goods are defined by two qualities: their benefits are non-rivalrous and non-excludable in consumption (Samuelson, 1954). For example, my enjoyment of fresh air does not inhibit others’ enjoyment and nobody can be excluded from the benefits. Moving beyond the domestic, GPGs are GG outcomes that benefit countries, people and generations globally. GPG consumption is not exclusive to one region or one section of society and they can be enjoyed today without jeopardising future enjoyment (Kaul et al, 1999). The International Task Force on Global Public Goods sets out six core GPGs: climate stability, peace, trade, financial stability, health and knowledge (ITFGPG, 2004). I would add, for example, food security. But, the purpose of this paper is not to define a set basket of goods – an intractable challenge for GPG scholarship given disagreement often resulting from unequal benefits of GPGs. This definitional challenge should not detract from the usefulness of the concept; GPGs highlight what issues need to be addressed internationally and how cooperation challenges across levels of governance can be overcome. The World Bank and Dutch Government take a similar approach, focusing on how the GPG concept informs policy (WB, 2007; Kok et al, 2011). I concretise the analytical merit of GPGs below through the development of three components of GPG analysis.

It is important to interrogate the meaning of *global* in GPG and GG, because the literature is applying domestic terminology internationally. *Global* in GPG describes denationalised origin and benefit. A single actor can rarely produce a GPG alone. More importantly, GPGs cannot be produced for the consumption of a confined constituency. The distribution of benefits makes GPGs truly global (Kaul et al, 2003, p. 4). GG focuses on the mechanisms employed to address international issues. Hence, it is the nature of the issues that makes GG *global*. This is the point on which GG and GPG scholarship converge. Zürn (2013, p. 408) defines GG as: “the entirety of [processes by which norms, rules and programs

are monitored, enforced and adapted, as well as their structures,] put forward with reference to solving specific denationalised problems or providing transnational common goods.’ GPGs, thus, can be a crucial factor in legitimising GG (Avant et al, 2010; Weiss/Rakur, 2010; Bodansky, 2012; Zürn, 2013). I use this definition of GG to conceptualise GPG production as the entirety of processes put forward to provide GPGs.

Defining the global public helps to understand the complexity of determining GPGs’ desirability. Ruggie (2004, p. 502f) defines the global public domain as the ‘transnational arena of discourse, contestation and action concerning the production of global public goods, involving private as well as public actors,’ that ‘introduces opportunities for and constraints upon both global and national governance.’ The global public, as the *publicum* of GPGs, determines the desirability of GG outcomes and influences their production across levels of governance (Kaul et al, 1999). Yet, we lack global structures to frame and coordinate action (Ruggie, 2004). The global public is an incoherent space, where public and private domains converge, because different actors participate in and benefit from GPG production (ibid; Best/Gheciu, 2014). So, if GPGs’ beneficiaries are diffuse, it is difficult for the global public to determine the desirability of GG outcomes. Rather than a normative judgement, ‘beneficiaries’ simply refers to people affected by GPGs (Kaul et al, 1999; Koenig-Archibugi/Macdonald, 2017). GG faces a tension between the irreducibility of GPGs and demands for subsidiarity in governing them. The risk is that in this vacuum, common interests are de-prioritised and private interests dominate. I return to this important tension below.

The aptness of GPGs as politically desirable goals of GG remains contested (Karlsson-Vinkhuyzen et al, 2012). There are two main critiques of GPGs as advanced by the United Nations (Kaul et al, 1999, 2003). GPGs are criticised as a means to circumvent democracy by handing responsibility to technocracy, and as a veil for Western dominance (ibid; Hurrell, 2007). The technocratic critique challenges how GPGs are produced. I return to this point throughout the paper; both the determination of what constitutes a GPG and how it is produced are political, not functional decisions. The second critique relates to the benefit distribution in GPG production, but it is also definitional. GPGs cannot hide behind the fact that humanity is their beneficiary (Kaul et al, 1999). In an unequal world, GPGs’ beneficiaries are diverse and some goods are more easily accessible for some people than for others. The critique is addressed by integrating the inequality – or impurity – of GPGs into the analysis.

Purity of public goods refers to the extent to which they are truly non-rivalrous and non-excludable (for in-depth discussion see Kaul et al, 1999, 2003; Barrett, 2007). For local public goods, beneficiaries are relatively easy to identify, whereas globally, everyone is affected, albeit in varied ways (Koenig-Archibugi, 2017, p. 27). Impure GPGs tend towards universality,

but benefits are unevenly distributed. Many GPGs have some degree of impurity, as different actors are more able to derive utility from GPGs or afford adjustment costs (Barret, 2007). For example, small islands benefit disproportionately from climate stability because they are vulnerable to sea-level rises. Poor countries frequently suffer most from under-provision of GPGs (Hou et al, 2014).

Climate stability, as a GPG, can elucidate the politics of GPGs' desirability. Science helps to concretise climate stability. Public and private interests, however, determine the political goal chosen to represent climate stability: around 400 particles per million (ppm, greenhouse gas concentration measured in CO₂ equivalent) (Wallace-Wells, 2017). GPG analysis focuses on how GG delivers climate stability, pursuing not the scientifically most promising, but the politically most feasible path. The adequacy of GPG production is not decided in abstract numbers – though they are important as tangible goals – but in the impact on beneficiaries, the global public. Delivering 400ppm may not achieve climate stability; it is important to differentiate the political goal from the principal good. I use climate stability as my case study, because it provides a clear (even quantifiable) goal, exposes diverging interests in GPG production and, as one of the most complicated GPGs, illustrates the complexity of international cooperation (Kaul, 2017). To illustrate real-world relevance, I incorporate a brief assessment of whether the Paris Agreement is likely to improve GPG production.

1.2. GPG Categories and Analytical Bias

There are three categories of GPGs, differentiated by so-called production technologies (Barrett, 2006, 2007; Cepparulo/Giuriato, 2009). A GPG's production technology is given (ITFGPG, 2006). Conceptualising production technologies clarifies the mechanisms and actors that facilitate GPG production. Whether supply requires action by one actor, all actors, or a critical mass of actors determines incentives and cooperation dynamics (ITFGPG, 2004). Table 1 summarises the production technologies and provides examples. Single-best effort GPGs require action from only one actor. Weakest-link GPGs require the participation of every actor. Aggregate-effort GPGs require the participation of many but not all actors; the cumulative impact counts. All three types are interesting for GG, but this paper focuses on aggregate-effort GPGs. They are the most complex to address, because of the number of actors, difficulty of sustaining production, and risk of free-riding (Keohane, 2001; Barrett, 2007; Loorbach et al, 2015). Production technologies are not mutually exclusive; different aspects of GPGs can combine them. Climate stability is an aggregate-effort GPG, technological innovation can advance mitigation, and adaptation to climate change is a weakest-link problem.

Table 1: GPG Production Technologies (based on ITFGPG, 2004, 2006; Barrett, 2007)

	Single-best effort	Weakest-link	Aggregate-effort
Supply depends on	Single (individual or collective) effort	Weakest individual effort	Total effort of all actors
Cooperation	Cooperation unnecessary or straightforward between few actors	Cooperation from (or pay-off of) weakest actors necessary	Cooperation of many influential actors challenging, free-riding common
Examples	<ul style="list-style-type: none"> • Knowledge and innovation • Vaccine development • Asteroid defense • Geoengineering 	<ul style="list-style-type: none"> • Peace • Disease eradication and containment • Safety from nuclear disaster • Climate adaptation 	<ul style="list-style-type: none"> • Climate stability • Ozone-layer protection • International trade regime • Financial stability • Food security

Beyond production technologies, GPG analysis of GG aims to expose challenges to cooperation and inform how GG can address them. Building on GPG and GG scholarship, the analytical formula proposed is that 1) political economy, 2) investment, and 3) domestic implementation, together explain GPG production. The three components of GPG analysis are interlinked and a combination of all three is necessary for producing aggregate-effort GPGs effectively. I first discuss the premise for including each of the components in the analytical framework and then illustrate the framework and the interconnections between components in Figure 1. The political economy is the central piece of analysis, based on collective action and game theory. The other two supplement the political economy. My consideration of investment and domestic implementation, therefore, focuses on issues that go beyond immediate political economy considerations. GPG production is complex. GPG analysis tries to capture this by putting the multi-level nature of GG at the heart of analysis (Zürn, 2010). By simplifying the framework to only consider three components, several factors inevitably receive less attention, including input legitimacy and the role of international institutions as independently powerful institutions. I base this conceptual decision on the definition of GPGs as outcomes. This necessitates a bottom-up analytical focus on outcomes and actors that most directly influence production.

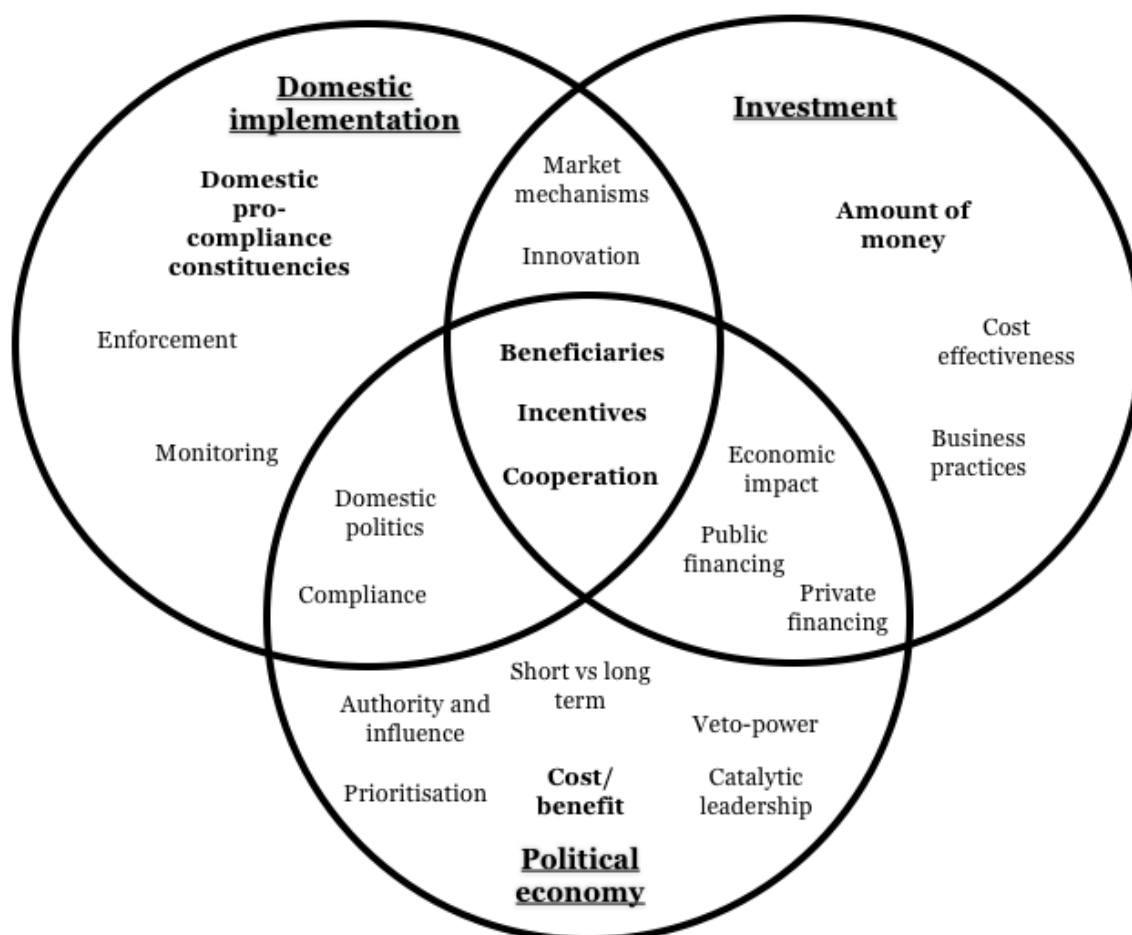
The political economy of GPG production, actors' cost-benefit calculations and incentives, forms the basis of decisions to allocate resources to GPGs. Martin (1999) and Keohane (2005) assert that analysis of political economies examines conditions under which mutual interests lead to cooperation. The point is to understand interests that influence GPG production, ultimately with a view to overcoming opposition by influencing cost-benefit calculations. There is no perfect scientific equilibrium or optimal level of supply for complex GPGs as Bodansky argues (2012, p. 655). GPG production is determined by political choices of cost allocation and benefit distribution. GPG analysis, therefore, underscores that, rather

than a technocratic exercise to achieve objective results, GG often aims at normatively-laden goals (Zürn, 2013). A key challenge for GPG production is policy gridlock because of powerful states prioritising national interests and influential private interests resisting GPG investment (Kaul et al, 1999; Barnett/Duvall, 2014). Without understanding balances of interests, GG 'is at risk of missing the forest for the trees' (Paris, 2015, p. 414). As Sell (2013, p. 77) concludes, 'international politics is largely about who gets what, who benefits, how costs and benefits are distributed [...] and contestation over all of these.'

GPG investment is linked to both the political economy of GPG production and domestic implementation. Based on public goods theory in economics, GPG analysis emphasises the necessity of financing GPG production. GG must influence political *and* financial incentives across levels of governance (Anand, 2004; Stiglitz, 2004; Lay, 2015). The undersupply of GPGs is intrinsically linked to chronic underinvestment and 'both are solved together' (ITFGPG, 2004, p. 15). GPG scholarship shows that GPG investment aligns with who benefits from GPG production (Barrett, 2007). In-country distribution of benefits influences incentives for domestic investment in GPGs, which, in turn, makes actors more likely to create favourable conditions for domestic implementation (Lay, 2015).

The sum of localised actions makes GPG production possible in the first place (Barrett, 2007). Domestic actors have significant influence in determining the viability of GPG production (Kaul et al, 2003; Lamy et al, 2013). To borrow a phrase from human rights literature (Dai, 2007; Pegram, 2015), "domestic pro-compliance coalitions," including local authorities, communities, non-governmental organisations (NGOs), and businesses, that proactively support implementation, are essential for GPG production. Global issues require workable local solutions (Pressman/Wildavsky; 1984; Zürn, 2010). GPG analysis is interested in domestic barriers to GPG production and incentives that help overcome them.

Figure 1: Components of GPG Analysis



Many global challenges have at least some of the attributes of GPGs. But it is important to note that I am not arguing that GG can or should be reduced to managing GPGs. Instead I argue that, analytically, GPG analysis can be helpful for GG scholarship, for understanding GPG production, but also in terms of generalisable insights, to which I return at the end.

2. Conceptual Tensions in GPG Analysis

Before moving to the main part of the paper – the analytical framework and my case study – it is important to acknowledge inherent tensions in the proposed analytical approach and interrogate conceptual implications. The first point relates to the tension between input and output in GG. The second point focuses on the tension between private and public goods in GPG production.

GPGs are outcomes. Consequently, GPG analysis focuses on results rather than the procedure for determining production. This raises an important question on how GPG production relates to the legitimacy of GG and whose interests GG serves. The logical

conclusion of the outcome-focus of GPG analysis is a prioritisation of output legitimacy of GG, which has often been neglected in GG and GPG scholarship (Hurrell/Macdonald, 2012, p. 565; Rothstein/Tannenberg, 2015). Hurd (1999, p. 381, my italic additions) defines legitimacy as 'a subjective quality, relational between actor and institution [...]. The actor's perception may come from the substance (*output*) of the rule or from the procedure (*input*).' Focusing on output legitimacy of GG creates a tension between the role of the global public in determining legitimacy based on the desirability of outcomes, and, by marginalising input legitimacy, the means of achieving those outcomes. GPG analysis risks empowering beneficiaries at the same time as ignoring their input in decision-making. Keohane (2001), however, demonstrates that the choice between input and output legitimacy is not binary. Koenig-Archibugi/Macdonald (2017) even find that beneficiaries' involvement in GG enhances outcomes. This supports the principle of subsidiarity; governance functions should be performed as close to beneficiaries as possible (Keohane, 2001). Linking input and output legitimacy, GG should aim to include the concerns of beneficiaries and implementing agents in decision-making, connecting the multiple levels of GG to facilitate effective GPG production.

GPG analysis, nevertheless, necessitates prioritisation of output legitimacy, when input legitimacy hampers ambition and effectiveness (Barrett/Dannenber, 2016). However, differing interests, carrying different influence in setting public policy, complicate cooperation (Kaul et al, 1999). This raises crucial questions of who has the power to set the political agenda and how truly global access to GPGs is facilitated (ibid). As I argue in Section 5, these questions are particularly poignant in an increasingly polycentric world where most people live in the Global South and non-state actors are increasingly influential. Prioritisation of input legitimacy in GG scholarship (e.g. Zürn's (2010) two-step authority) purports that institutional design can foster sufficient cooperation to address global challenges. Gridlock, however, suggests that GG is coming up to the limits of what these paths of least resistance can achieve. This is why a focus on outcomes is important. If GG does not overcome diverging interests that prevent implementation, GG is of little value to beneficiaries irrespective of input procedures. Rather than democratising inputs to GG as some scholars argue, (Held, 2002, 2009; Koenig-Archibugi, 2011) GPG analysis stipulates the democratisation of outputs. Producing a GPG inevitably has costs, as well as benefits. Both are often unequally distributed, difficult to measure and complex to anticipate. GG should, therefore, aim for equitability in implementation to counter GPGs' impurities (Kaul et al, 2003; Dadush/Shaw, 2011; Rothstein/Tannenber, 2015).

Diverging interests in GPG production and difficulties in cooperation arise from prioritisation of private goods (Kaul, 2013a; Lamy, 2014). Private goods can be made excludable and exclusive in consumption (Kaul et al, 2003, p. 3). The pre-dominance of private

goods permeates society domestically and internationally (Monbiot, 2017; Raworth, 2017). Politics remains domestic, so that politicians have a clear interest in prioritising the nation or segments of society (Weiss, 2013). Companies are set up to serve clients, shareholders and employees (Goldring, 2017). Markets are designed to provide private goods (Kaul et al, 1999). Many NGOs counter this trend, but there are some that serve private interests (see e.g. Greenpeace, 2010; Goldenberg, 2012). Finally, as private citizens, employees, and consumers, we spend much of our lives pursuing private goods. The consequence of the prioritisation of private goods is a disconnect between political priorities and GPGs. Inequalities of power and wealth hinder cooperation to produce GPGs given competing private priorities (Hurrell, 2007, p. 10). To effectively produce GPGs, however, GG must recognise that different private goods are required as intermediary steps to GPG production. Private goods can undermine GPG production and the legitimacy of GG, but they must also be part of the solution. Private goods are not sufficient, but are necessary for GPG production (Kaul et al, 2003). The challenge for GG is to incentivise private goods that contribute to GPG production, whilst ensuring equitability of outcomes.

3. Analytical Framework: GPG Analysis

GPG analysis encourages scholars and practitioners to apply existing tools in different ways (Gartner, 2012, p. 318). GPG analysis does not propose new analytical tools, rather it attempts to provide a coherent approach to conceptualise and re-frame GPG production. I discuss the three components of GPG analysis in order: 1) political economy, 2) investment, and 3) domestic implementation. The GPG production technology is given, as well as part of the distribution of benefits. The interests involved in GPG production and the incentive structures can be influenced – difficult though that may be (ITFGPG, 2004). Consequently, my discussion focuses on these aspects.

3.1. Political Economy

Politics determines whether GPGs are prioritised in the context of tough competition for finite resources, leading to trade-offs against national and private interests (WB, 2007). GPGs, however, need to be produced collectively and in the context of different utility for different actors. Actors' incentives for GPG production differ and GG can influence actors' incentive structures. GPG production is a long-term game, underscored by including inter-generational benefit in the GPG definition. GPG production is prone to free-riding and trade-offs against shorter-term private interests, notably given the short-termism of politics and

financial markets (WB, 2007). Leadership can help overcome this and act as a catalyst for cooperation (ITFGPG, 2006).

Actors with a stake in GPG production, especially those with significant resources, cooperate based on their cost-benefit analysis of GPG production. According to collective action theory, this will determine decision-making, compliance and investment in GPG production (Kaul et al, 1999; Keohane/Oppenheimer, 2016). This is the central point of this component of GPG analysis. Many actors will not use a pure economic analysis, but rather make a political decision, for example, considering domestic politics, reputation, ability and moral duty to influence GPG production (Martin, 1999; Keohane, 2001, 2005). The point of leveraging these insights for GG is to understand how to overcome free-riding by altering incentives in favour of implementation; weakening incentives that impede GPG production and strengthening incentives that facilitate it (Keohane, 2001; Barrett, 2007). GG can make GPG production 'incentive-compatible' by ensuring it is an attractive or at least acceptable resource investment (Kaul, 2013a, p. 12). In the regulation of civil aviation, for example, there is limited benefit but significant cost involved in deviation, making cooperation straightforward (ITFGPG, 2006). The alternative is gridlock because of opposition from powerful veto-players (Kaul et al, 2016).

A simplified game-theoretical formula can illustrate the long-term cost-benefit framework for cooperation on GPG production (ITFGPG, 2004; Bodansky, 2012; Kaul, 2017). As a necessary but not sufficient condition, the net global benefits of GPG production should be positive. This ensures political feasibility and is the basis of win-win cooperation (Kaul, 2013b; Guterres, 2017). A similarly necessary but not sufficient condition for states' and other influential actors' (e.g. large NGOs and companies) participation in GPG production is a net positive political economy of GPG production nationally. Finally, net positive benefits of GPG production domestically are neither necessary nor sufficient for GPG production, when communities are considered individually. At the aggregate level, positive local impact, however, is necessary for effective implementation. The challenge for GG is to enhance all key actors' political economy across levels of governance, re-framing GPG production as win-win cooperation (Lichbach, 1996; Potoski/Prakash, 2011; Kaul et al, 2016). Recent developments illustrate this point. President Trump's (2017) vision for Great America prioritises short-term relative national gains. Following a meeting between German and US leaders in July 2017, German Foreign Minister Gabriel accused President Trump of viewing international cooperation as a "battle arena" where the 'strongest seek alliances to fight against others' (Gabriel in Luther, 2017). The fallacy of this approach is that global politics does not have to be a zero-sum game (Summers, 2017). Indeed, GPG production is unlikely to be possible through zero-sum games where shared goals are sacrificed for individual political

gains (Keohane, 2001). GG must address this tension between private and global public interests to facilitate effective GPG production. Centring on balances of interests, GPG analysis helps us understand how GG outcomes are influenced and ultimately produced in the context of different actors' cost-benefit analyses of GPG production.

3.2. Investment

GPG investment has three components – state financing, private investment, and market mechanisms – all of which have an important role to play (ITFGPG, 2004, 2006). The point of including investment in GPG analysis is to conceptualise how GG can use financial incentives to enhance cooperation. GG should aim to increase private and public funding, but also leverage innovative instruments, such as market mechanisms, to support investment and implementation (Held, 2009). Beyond the political economy discussion, here I focus on the role of business and market mechanisms. Some scholars propose global taxes to directly finance GPGs (Anand, 2004; ITFGPG, 2004, 2006). I assess that the combination of the financial crisis, disillusionment with globalisation, and the rise of emerging powers opposed to such global measures, makes it politically unfeasible to implement them (Stiglitz, 2008; Nayyar, 2016). GG must seek other sources of financing.

Business plays a crucial role in GPG production both as part of the problem and the solution (Guterres, 2017). GPG investment is often in the long-term business interest, but competes with short-term demands for profits (MorganStanley, 2015; RiskyBusiness, 2016). Many companies already leverage the efficiency gains, innovation and reputation enhancement of responsible business practices (Mittal, 2017). To incorporate GPG production in the core of business activities, rather than just social responsibility initiatives, market mechanisms are an important policy tool to financially incentivise GPG investment (Krugman, 2010). Examples of market mechanisms range from effective use of subsidies and research funding to trading conditionality (ITFGPG, 2006). European initiatives to blend public and private investments such as the European Fund for Strategic Investments, and global funds, such as the Global Climate Fund (GCF) are innovative examples to boost public good investment (Birdsall/Leo, 2011; Kaul, 2013a; Wickstead, 2015). Market mechanisms can be an integral part of GPG production; because, I re-emphasise, private goods are necessary intermediary steps for GPG production. GG has a crucial role to play affecting change in business practices by financially incentivising meaningful investments in GPG production.

3.3. Domestic Implementation

Domestic implementation has been analysed widely, I merely highlight several key aspects for GPG production. Domestic goods must be produced to cumulatively deliver GPGs. This linkage between local and global determines whether GPGs are supplied (Barrett, 2007). Viruses, such as Ebola, can only be contained when counter-measures are successful locally. Comparative scholarship on the domestic impact of the European Union finds two pathways to domestic change; through resource distribution and presence of supporting institutional structure (and absence of veto points) or through change in opportunity structures affected by norm entrepreneurs as “change agents” (Boerzel/Risse, 2003; Treib, 2014). In both pathways, effective implementation relies on convergence between the objectives of governance and domestic pro-compliance coalitions (ibid; Pegram, 2015, p. 12). Put in the terms of Pressman/Wildavsky’s (1984) canonical work on implementation, effective GPG production, thus, requires coherent strategy and execution, where execution needs to work domestically. The key point for GPG analysis is that implementation pathways, and local actors’ roles within them, are crucial for effective GPG production, linking together multiple levels of governance (Zürn, 2010; Rothstein/Tannenber, 2015).

Institutional mechanisms can facilitate the convergence between objectives of GG and local actors by influencing incentive structures, for example through monitoring mechanisms that help generate compliance (ITFGPG, 2006). Systematic monitoring facilitates the creation of indicators to censure key actors, so that monitoring becomes a tool to influence outcomes (Kelley/Simmons, 2015). Public scrutiny through monitoring can disincentivise free-riders (Keck/Sikkink, 1998; Kaul/Le Goulven, 2003; Hoffmann, 2015). Recent scholarship shows that decentralised monitoring can enhance impact where it leads to more direct involvement of beneficiaries in implementation (Gartner, 2012; Koenig-Archibugi, 2017).

The literature finds domestic follow-up to international agreements is often patchy, reflecting a lack of domestic incentives or an inadequacy of policy prescriptions (Kaul, 2003, p. 7; Simmons, 2009). The UN’s bold initiative to define a basket of global goals in the shape of the Sustainable Development Goals (SDGs), for example, provides no clear path for delivery (Green, 2017). Rather, the SDGs serve as a rallying ground and monitoring tool for myriad other initiatives (Kaul, 2013a; Guterres, 2017). To improve implementation, Rothstein/Tannenber (2015) argue that effective GG institutions need to create incentives for collective action with participation from actors across levels of governance, based on reciprocity rather than pure self-interest.

To enhance GPG production, GG should aim to influence domestic implementation directly. Hameiri/Jones (2016) conceptualise complex shifts in governance that facilitate the

influence of GG on implementation as state transformation. GG should leverage domestic pro-compliance coalitions and aim to influence domestic politics, even where this challenges conventional concepts of sovereignty (Lamy/Goldin, 2014; Hameiri/Jones, 2016). Implementation through local structures is critical, but also relates back to the tension between public and private goods. It means GG is subject to domestic interest constellations that will not necessarily produce outcomes that best serve beneficiaries (Hameiri/Jones, 2016). This underscores both the importance and the difficulty of influencing local GPG production. There is no singular model for how GG can produce domestic change (Dokal, 2017). Domestic implementation will only be successful where political entrepreneurs have the capacity and incentives to invest in GPG production (Keohane, 2001). GG needs to incorporate domestic incentives to overcome local resistance and, in turn, increase costs of non-compliance (Gartner, 2012, p. 316). GG scholarship has an important role to play in understanding mechanisms that enable GG to address the domestic politics of implementation and respond to both globalising and localising trends (Zürn, 2010). Further research should explore how GG can affect domestic impact considering domestic politics of implementation. This accords with current research on the regulator-intermediary-target model (Abbott et al, 2017; Pegram, 2017).

4. GPG Case Study: Climate Stability

This case study applies GPG analysis – through the three components – to climate stability and concludes with an assessment of how, post-Paris, GG can enhance prospects of delivering climate stability. Climate stability means stabilising greenhouse gas emissions at a safe level to contain temperature rises (Bosetti et al, 2017). Climate stability has received extensive scholarly attention as a GPG (Karlsson-Vinkhuyzen et al, 2012). My case study does not aim to review this literature, but rather to understand barriers to cooperation and re-frame them, pointing GG towards feasible pathways for GPG production. I start by briefly clarifying the nature of the GPG, since this shapes the analysis (Perrings, 2012). Greenhouse gas emissions fuel climate change impacting all people. The impact on people of climate stability, and lack thereof, varies; climate stability is an impure GPG. The political goal of 400ppm used to be seen as the threshold of catastrophe, now it is our goal (Wallace-Wells, 2017). The impact on many beneficiaries will be devastating, undermining the prospects for output legitimacy from the outset.

Reducing emissions is the cooperation challenge that produces climate stability. Individual actors reducing emissions bear the full cost, whilst benefits are shared globally (IPCC, 2014). This creates incentives to free-ride, especially in a globalised economy where

energy costs influence competitiveness (German Economic Council, 2017). Individual efforts have small effect (Grasso, 2004). The aggregate effort matters. Scientific analysis demonstrates the GG outcome, hitherto, is excessive emissions threatening our environment's viability at accelerating pace (GCEC, 2014; IPCC, 2014). A key feature of climate stability is uncertainty – what the safe level is and when the threshold is crossed (Barrett, 2016). This is amplified by two factors: climate disasters are already a reality and past emissions lock-in future temperature rises (Keohane/Oppenheimer, 2016; Wallace-Wells, 2017). Significant parts of Bangladesh and Miami are likely to be flooded by 2100 regardless of mitigation efforts (Wallace-Wells, 2017). Whilst the precise trajectory of climate impacts remains uncertain, science is clear on the extent of the catastrophe of business-as-usual emissions: 'absent a significant adjustment to how billions of humans conduct their lives, parts of the Earth will likely become close to uninhabitable,[...] as soon as the end of this century' (Wallace-Wells, 2017). The net global benefits of climate stability are massive and positive.

4.1. Political Economy of Climate Stability

Synthesising the literature, there are three broad factors that political economies of mitigation are based on 1) impact of mitigation efforts on climate stability (actors' share of total emissions), 2) impact of climate change on the actor and capability to adapt, and 3) politico-economic cost-benefit of mitigation (Keohane, 2005; Barrett, 2007; Falkner, 2015; Keohane/Oppenheimer, 2016). The impact of mitigation efforts (1) is quantifiable in terms of emissions reductions. But like the impact of climate change, (2) tangible impacts of mitigation are somewhat uncertain and accumulate slowly (Barrett, 2016). The economic cost-benefit (3) of mitigation is quantifiable in dollar-terms, though the complexity of the calculation also brings uncertainty (Krugman, 2010). It is the political cost-benefit (3) that is most elusive. Actors – from national governments to small companies – face competing priorities and powerful opposition with motivations ranging from self-interest to indifference (Green, 2015). Decisions to cooperate on and invest in GPG production must be politically feasible to be effective in each actor's own circumstances. Perceived political constraints, however, do not render ambitious action impossible. Like the Anthropocene, the political climate changes and decisive leadership can turn the tides. I first consider political economies for countries and then for businesses, before arguing that climate stability can be re-framed as a positive-sum game. Political economies of mitigation are complex and highly specific to individual circumstances. I merely provide a global perspective to illustrate my point that actors face very different political economies.

Disaggregating cost-benefit calculations matters, because individual actors are responsible for emissions. Notwithstanding the uncertainty of predicting mitigation, macro-economic modelling (Seo, 2012) finds that, economically, Europe, India, and Africa are likely to benefit most from climate stability, whereas China, Canada, Russia and the United States are likely to face net economic costs. The global economy is likely to suffer significantly from business-as-usual (ibid; Stern, 2007; OECD, 2017b). From a perspective of relative gain, business-as-usual may look to be most beneficial for some countries even if harmful globally. Such economic calculations influence political decisions and encourage free-riding. President Trump claims to roll-back US mitigation efforts because of economic disadvantages (Trump, 2017). Given the aggregate nature of climate stability, this weakens global mitigation efforts as high emitters are particularly important (Hale, 2017). More generally, high emitters facing low adverse climate change impacts have high potential for mitigation, but little political and economic incentive (Grasso, 2004). Emerging economies are concerned about sacrifices to economic growth and prefer maintaining flexibility in mitigation (Keohane/Oppenheimer, 2016). Relative contributions to emissions are shifting towards the Global South. China alone is expected to contribute 40% of emissions by 2050 (OECD, 2017b). Emerging economies' relative share of emissions masks the relative poverty of their populations compared to the Global North, making it more difficult to justify costly mitigation domestically (Dadush/Shaw, 2011; Kahler, 2013, 2017). Yet, climate stability is increasingly difficult without key emerging markets. Some countries even benefit from climate change – through higher agricultural productivity for example – and others suffer disproportionately from mitigation – because of reliance on commodity exports for example (Barrett, 2007; Bodansky, 2012). The key point is that complex national political economies result in diverging incentives for climate action. Some countries may free-ride or even oppose mitigation.

In an economic system set up to prioritise private over public goods, businesses also face complex political economies (Raworth, 2017). For example, mitigation threatens the core business of fossil-fuel companies; more than half of global industrial emissions since 1988 can be traced to just 25 companies (Carbon Trust, 2008; ICGN, 2015; Griffin, 2017). Mitigation initiatives that increase energy costs and decrease demand concentrate costs on fossil-fuel producers, utility companies, and energy-intensive manufacturers (Porter/Reinhardt, 2007; Carbon Trust, 2008). They have little incentive to support mitigation and often leverage their influence to counteract mitigation efforts (Greenpeace, 2010; ICGN, 2015). Opponents to ambitious mitigation have often been successful in advocating their private interests and reinforcing institutional “carbon lock-in” (Unruh, 2000; Green, 2015). Many multinationals in other sectors, nevertheless, are committed to 100% renewable energy and sustainable business practices, as for example the RE100 and We Mean Business initiatives illustrate

(Griffin, 2017). As individuals, we face similar choices – our lifestyles have huge impacts on mitigation (Dietz et al, 2009).

GPG analysis can help challenge assumptions underpinning politico-economic calculations on GPG production. Conventional calculations are misleadingly based on median scenarios and assume mitigation is a prisoner's dilemma (Krugman, 2010; Drahos/Downie, 2017). Even if not the most likely scenario, the significant chance of catastrophe should dominate politico-economic calculations (Weitzman, 2009, 2011; Oppenheimer, 2017; Wallace-Wells, 2017). Adverse climate change scenarios increase costs for all actors individually, but also significantly increase risks to cross-cutting issues, such as security, food security, and health (CNA Military Advisory Board, 2014; DoD, 2015). Some models calculate a 12% chance of climate change reducing global economic output by >50% by 2100 (Burke et al, 2015). This fundamentally changes the political economy of climate stability and provides the strongest rationale for coordinated climate action (Hale, 2017).

Even outside adverse scenarios, mitigation can be net-beneficial for individual actors – irrespective of actors' broader political economy of mitigation and independent of serving the common good (Keohane, 2001; Green, 2015; Stern, 2015; Drawdown, 2017). Gulf countries, for example, are investing heavily in solar energy; Dubai is building the world's most cost efficient solar energy plant producing cheaper energy than local gas plants (IRENA, 2016). The Global Commission on the Economy and Climate (GCEC, 2014) shows that countries, cities and businesses can build lasting growth whilst supporting climate stability, facilitated by structural and technological changes. Benefits accrue from a combination of private financial benefits (e.g. energy efficiency) and broader national co-benefits (e.g. public health, energy security and productivity gains) (Green, 2015). Some private benefits even accrue short-term, helping to address persistent challenges for GPG production of political deprioritisation of long-term benefits. Burgeoning research shows that long-term strategies and climate risk management make companies' financial performance more predictable and profitable (MorganStanley, 2015). On average sustainable investments outperform over time; the business case for climate stability is increasingly self-evident (ibid; GCEC, 2014; Paulson, 2015; RiskyBusiness, 2016; Hierzig/Phillips, 2017). This relates directly to GPG investment, which I explore further below.

Re-framing climate stability as win-win cooperation significantly strengthens the case for GPG production, spurring a race to cut emissions (Keohane/Victor, 2011; Drahos/Downie, 2017; Hale, 2017). Ambitious action by one actor can generate imitation by others. GPG analysis supports the case for enhanced international cooperation on climate stability, because it clarifies the incentives for GPG production. There is a clear case for private goods

converging towards GPG production. Leadership to facilitate win-win cooperation and mobilise action of a critical mass of key actors is required. So, to borrow a phrase from Stern (2015), ‘why are we waiting?’

4.2. Investment in Climate Stability

Climate stability is expensive. The International Energy Agency (IEA, 2015) estimates the world needs to invest US\$358 trillion by 2050 to keep warming below 2°C. Climate stability cannot be financed by any actor or even group of actors alone. A critical mass of different actors is required to aggregate the necessary resources globally. Incentives to free-ride are widespread given the cost-benefit calculations and complex politics of resource allocation (Lay, 2015; Koenig-Archibugi, 2017). For investment to be sustainable and have knock-on effects on how markets operate, long-term business commitment is critical. Yet, government still has a central role in facilitating climate finance, both through the provision of capital and by creating incentives through policy mechanisms (GCEC, 2014). The most cost-effective low-carbon technologies that increasingly enjoy broad market acceptance, including LED lights, solar panels and wind turbines, were all developed with effective government support (GS, 2016). Market mechanisms similarly rely on government to facilitate implementation.

Research has produced effective and tangible solutions to deliver climate stability (ibid; Stern, 2015). The Drawdown Project, for example, provides a set of 100 solutions, ranging from refrigerant management and wind energy to reduced food waste and plant-rich diets (Top 4 solutions from Drawdown, 2017). Many of these solutions are within reach not only of government and big business, but individuals, small companies, and cities. The challenge remains mobilising sufficient investment. Some developments are encouraging. For example, 400 investors representing US\$24 trillion of assets signed a commitment to low-carbon investment (IGCC, 2015). But there is still a significant gap between practices across the financial sector and its potential to catalyse the transition to a low-carbon economy (Hierzig/Phillips, 2017). The financial system needs to redirect capital flows to sustainable investments and stipulate adoption of climate risk management throughout the economy (Gurria, 2017a; TCFD, 2017). This illustrates that the convergence between private and public goods investment is both desirable and feasible.

Investment is crucial, but it needs to combine with structural adjustments to the global economy (Keohane/Oppenheimer, 2016). Market mechanisms are important tools to support this by altering financial incentives (Victor/Jackson, 2016). Trade sanctions were a crucial factor for the success of the Montreal Protocol on Substances that Deplete the Ozone Layer (Barrett, 2006, 2017; Bodansky, 2012). There are a variety of market mechanisms to support

climate stability; I focus on carbon pricing. The monetisation of carbon is a radical idea, based on the principle that emissions, which are costly for the world to absorb, should not be free to produce (Krugman, 2010). Carbon pricing incentivises low-carbon business practices. It facilitates reciprocity and penalises energy inefficiency by putting a price on emissions, using for example taxes or trading schemes (Cramton et al, 2015). Carbon pricing would be most effective globally, but border adjustment mechanisms allow for indirect pricing of non-participants (Krugman, 2010; Keohane/Victor, 2011). Cooperation of a critical mass of markets could develop a workable international carrot-and-stick trading model, whilst poorer countries could be compensated through a climate fund modelled on the Montreal Protocol (German Economic Council, 2017). Economists expect the negative effects to be manageable (Krugman, 2010; Cramton et al, 2015). Carbon pricing would enhance cooperation by supporting a shift in international negotiations from a prisoner's dilemma focused on individual emission targets to a win-win cooperation focused on setting a fair price for all (ibid). Carbon pricing also enables instantaneous monitoring, facilitating public pressure on companies and governments (Krugman, 2010).

4.3. Domestic Implementation of Climate Stability

Mitigation efforts take place locally, but their impact will only be sufficient if effectively aggregated nationally and globally (Bosetti et al, 2017). Delivering climate stability requires the combination of domestic execution and coherent over-arching strategy (Pressman/Wildavsky, 1984). Taking the top Drawdown solutions as examples, refrigerant management relies on companies switching technologies, but the recent milestone Kigali agreement and national commitments to phase-outs will be crucial to ensure action (Barret, 2016; GIZ, 2016). Wind turbines are installed locally, but often financed regionally and made more efficient by global technological advances (GS, 2016). Plant-rich diets (and to some extent food waste) are consumer choices, but related business practices, societal acceptance and education are broader issues (Kaul, 2013a; Paulson, 2015). The effective implementation of mitigation efforts cuts across levels of governance (Zürn, 2010; Keohane/Oppenheimer, 2016). No single mechanism will deliver climate stability in isolation, we need a collaborative effort that combines policy, money, technology, lifestyle, and business models (Loorbach et al, 2015). GG has a crucial role to facilitate these different dimensions of cooperation, leveraging both top-down and bottom-up approaches to coordinate ambitious local, national and global initiatives to build a critical mass in implementation (Barret, 2007; Bosetti et al, 2017).

Much GG scholarship has focused on international negotiations (Hameiri/Jones, 2016; Kahler, 2017). Yet, if the political economy analysis is correct and climate stability can be a positive-sum game, the biggest obstacles are domestic (Green, 2015). Domestic politics determines both the viability of local mitigation efforts and countries' international commitments. This logic also runs in reverse. Public concern over air quality, as well as increasing interest in the changing opportunity structure of the green economy, are, for example, pushing China towards meaningful mitigation efforts and proclamations of global climate leadership (Boerzel/Risse, 2003; Paulson, 2015; Drahos/Downie, 2017; Wallace-Wells, 2017; Xi, 2017). The relative importance of vested interests and the domestic public varies between political systems, but a generalised perspective illustrates challenging interest constellations (Keohane/Oppenheimer, 2016). Benefits of climate stability accrue long-term and to the public at large, but general concern for climate change is shallow (Green, 2015). Costs of mitigation meanwhile are concentrated on often powerful actors, such as fossil fuel companies (Carbon Trust, 2008). Simply put, mitigation efforts face tacit support from winners but loud opposition from losers. Powerful veto-players challenge the domestic politics of climate action and help propagate "carbon lock-in" regardless of the feasibility of positive-sum games (Unruh, 2000; ICGN, 2015). This underscores the importance of both supporting domestic pro-compliance coalitions and recognising losers of the carbon transition.

One central challenge for GG, therefore, is to influence the domestic politics of mitigation (Kahler, 2017). Domestic pro-compliance coalitions, or at the aggregated level, the global public have a central role in making mitigation action politically feasible in specific domestic circumstances and facilitating win-win cooperation (Kaul/Le Goulven, 2003; Ruggie, 2004). Businesses and civil society play an important role as "change agents" leading the low-carbon transition and mobilising domestic support for costly climate action (Boerzel/Risse, 2003; Loorbach et al, 2015; Keohane/Oppenheimer, 2016). Cities, which generate around 70% of emissions, and sub-national governments play an increasingly important role in the development and implementation of climate governance (GCEC, 2014; Kahler, 2016a; Hale, 2017). National and local authorities can create targeted incentives for domestic mitigation efforts (Kaul/Le Goulven, 2003; Treib, 2014). Domestic implementation can make positive-sum games, and the development of a critical mass supporting ambitious mitigation, viable globally.

Climate governance is marked by complexity. GG needs to combine a broad range of initiatives involving different actors to produce climate stability (Paris, 2015; UNEP, 2016). GG has a crucial role to play in determining what works, persuading all actors of the importance of their individual contribution and their options for achieving genuine scale bottom-up, and, ultimately, coordinating effective action globally (Keohane, 2001). This means that effective

climate governance is subject to domestic interest constellations that will not necessarily produce outcomes that best serve the ultimate beneficiaries. Domestic pro-compliance coalitions take on responsibility for mitigation efforts but are not accountable to beneficiaries, especially when they pursue private goods contributing to GPG production. GPG analysis must acknowledge this undermines input legitimacy (Hameiri/Jones, 2016). Ultimately, however, this is a price worth paying where GG supports effective collective mitigation across levels of governance (Rothstein/Tannenber, 2015).

4.4. Looking Ahead: Climate Stability Post-Paris

Before concluding this case study by arguing that win-win cooperation and ambitious leadership are required for effective mitigation, I briefly assess whether Paris changes the prospects of producing climate stability. The 2015 Paris Agreement on climate change (henceforth “Paris”) marks a major political achievement after years of gridlock in climate diplomacy (Dimitrov, 2016). GPG dynamics capture the outcome of Paris: parties commit to an ambitious goal of warming well below 2°C. Yet, with the adoption of a flexible bottom-up approach, the sum of countries’ voluntary plans for mitigation (Intended Nationally Determined Contributions (INDCs)) falls short of that goal (Dokal, 2017). INDC implementation is estimated to produce warming of 3.2°C by 2100, only 0.4°C less than business-as-usual (UNEP, 2016). The world came together in Paris with a political desire for an agreement, but political impetus did not filter through to domestic implementation.

Paris’ bottom-up approach can foster win-win cooperation, by encouraging leadership and imitation. Indeed, advocating win-win solutions was central to Europe’s negotiation strategy, backed-up by evidence on the green economy and ambitious unilateral action (Dimitrov, 2016). Paris’ bottom-up approach shifts obligations to the national level, which is notable given that the above analysis shows that most barriers to mitigation are domestic. Paris, therefore, provides a platform for countries to pursue mitigation in a way that serves their national political economy (Hale, 2017). To influence national decision-making, Paris offers a lever for non-state actors to hold government and business to account using transparency commitments established by Paris (Kelley/Simmons, 2015; Rietig, 2016; Kaul, 2017). The impact of Paris depends on its effectiveness as a political tool for domestic actors to bring about costly mitigation (Keohane/Oppenheimer, 2016; Andonova et al, 2017).

Flexibility, in my view, comes at a price. Countries’ INDCs are independent of each other, voluntary and long-term (German Economic Council, 2017). Paris does not incentivise reciprocity, so the win-win dynamics of the negotiations are limited in production. Paris does not fundamentally change actors’ political economy of mitigation and lacks enforcement

mechanisms (Keohane/Oppenheimer, 2016). Climate stability, therefore, continues to depend on domestic and transnational political economies within and between countries, especially the biggest emitters (Andonova et al, 2017). Paris' language underscores this flexibility, using obligations of conduct rather than obligations of result (Linos/Pegram, 2016). In other words, Paris asks parties to mitigate as well as they can, calling into doubt the likelihood of commitments mapping onto outcomes (Voigt, 2016). This includes vague language on financing, whilst commitments on direct climate finance are limited compared to the scale of the challenge (Gore, 2017). Nevertheless, despite notable opposition, Paris principally supports market mechanisms and could help facilitate their development (Wolfe et al, 2017).

The challenge for GG remains re-framing climate issues in an incentive-compatible way, now leveraging Paris politically (Keohane, 2014). Unilateral action by different actors is the crucial starting point to move from a prisoner's dilemma to win-win cooperation (Young, 2012; Drahos/Downie, 2017). Technological innovation can alter political economies by reducing the cost-effectiveness gap between fossil-fuel reliance and sustainability. Investments in innovation, and "innovation clubs" advocated by Keohane/Victor (2011) provide ways to foster imitation by others and pave the way to win-win cooperation (Bosetti et al, 2017). Innovation, however, can only be one component of cooperation on successful mitigation. GG needs to incentivise mitigation efforts across economic spheres, fostering a belief system predicated on the net-benefits – both private and public – of mitigation (Keohane/Victor, 2011; Stern, 2015; Barrett/Dannenber, 2016). This must be initiated by leadership from states and non-state actors, facilitated by pro-compliance coalitions. The 2014 US-China agreement on emissions reduction, for example, induced a club dynamic of coordinated mitigation and helped pave the way to Paris (Dimitrov, 2016). Especially with the US retreating from mitigation efforts, leadership from the Global South is more important than ever (Galventa, 2017). This dynamic supports the development of different mitigation alliances, such as the Climate Vulnerable Forum or European-Chinese collaboration on decarbonisation (EU-China, 2017; Galventa, 2017; Gore, 2017). The US retreat still matters for aggregate emissions. Bottom-up climate leadership in the US, however, continues and the global response to President Trump's withdrawal from Paris shows that the positive-sum logic may be taking hold (Galventa, 2017; Hale, 2017).

This case study showcases the complexity of political economies of GPG production, but also demonstrates that GG can influence them. Initiatives that integrate different actors' political economies and tangible incentives, such as carbon pricing, are most likely to be effective. Win-win cooperation is not only feasible, but essential for effective mitigation. GG must create a virtuous circle of ambitious action by actors – a critical mass – capable and willing to invest in mitigation with a clear aim to affect the fundamental societal and economic

transformation necessary to deliver climate stability. This discussion highlights that further research is required to understand how political momentum can be leveraged to affect mitigation efforts and how GG can create effective win-win cooperation (Kaul, 2017).

5. Implications for GG: Critical Mass

This final section analyses the implications of GPG analysis for GG and proposes that a critical mass approach is most likely to enhance GPG production. GG and GPG scholarship agree that GG has not delivered effective GPG production at the pace necessary (Dadush/Shaw, 2011; Hale/Held/Young, 2013; Weiss, 2013; Hoffmann, 2015; Kaul, 2017). A different approach is, therefore, needed that complements existing institutions and mechanisms, but more effectively advances implementation (Loorbach et al, 2015; Held/Hale, 2017, forthcoming). GPG production for aggregate-effort GPGs requires actors to jointly produce a sum equal to the GPG outcome. The conclusion of my GPG analysis is that this is most likely when a critical mass of influential actors cooperates across levels of governance to deliver outcomes. Many scholars have analysed critical mass solutions on specific issues (e.g. Victor, 2006; Falkner, 2015, on climate stability, and Gallagher/Stoler, 2009; Narlikar, 2011, on international trade). GPG analysis enables generalisation for aggregate-effort GPGs, puts the emphasis on outcomes, and helps us understand what makes win-win cooperation possible in the first place. Scholars (see e.g. Dadush/Shaw, 2011; Falkner, 2016; Stevenson/Dryzek, 2015) frequently focus on minilateralism between states. A key contribution of GPG analysis is to underscore the importance of different types of actors.

The critical mass necessary for successful GPG production will vary between GPGs and over time. I do not suggest a formula to calculate the composition of critical mass, because output matters not input. Critical mass composition can vary to reflect changing dynamics in the international order and actors' influence on GPG production. The premise of critical mass GPG production is that ambitious actors' efforts are not held back by opposing interests and create win-win cooperation incentivising others to join (Dadush/Shaw, 2011; Barrett/Dannenber, 2016). The defining feature for participation should be ambition, not veto-power (Falkner, 2015). Effective GPG production requires winning coalitions combining different actors, for example NGOs, companies and cities (Lamy et al, 2013). I return to this point in the next sub-section.

The development of winning coalitions is an incremental challenge and requires leadership of actors willing to take unilateral action and spur others on (Drahos/Downie, 2017). Catalytic leadership facilitates cooperation and prioritisation of the long term (Borsetti et al, 2017). Leadership can come from many places, especially from outside formal state

structures. NGOs, for example, can play a crucial role in altering political incentives through public pressure in favour of implementation, influencing companies and states, and proposing innovative solutions (Brousseau et al, 2013; Weiss, 2013; Zürn, 2013; Kahler, 2016a). Critical mass efforts, nevertheless, remain prone to free-riding. The objective of win-win cooperation is to facilitate reciprocal ambition, instead of settling for the lowest common denominator (Dadush/Shaw, 2011; German Economic Council, 2017). GG should support winning coalitions by altering incentives in favour of implementation, discouraging free-riding within the critical mass and encouraging others to join (Falkner, 2015). Ultimately, this is how we can improve the (output) legitimacy of GG and 'restore faith in the power of international cooperation' (Lamy/Goldin, 2014).

5.1. GPG Production in a Polycentric World

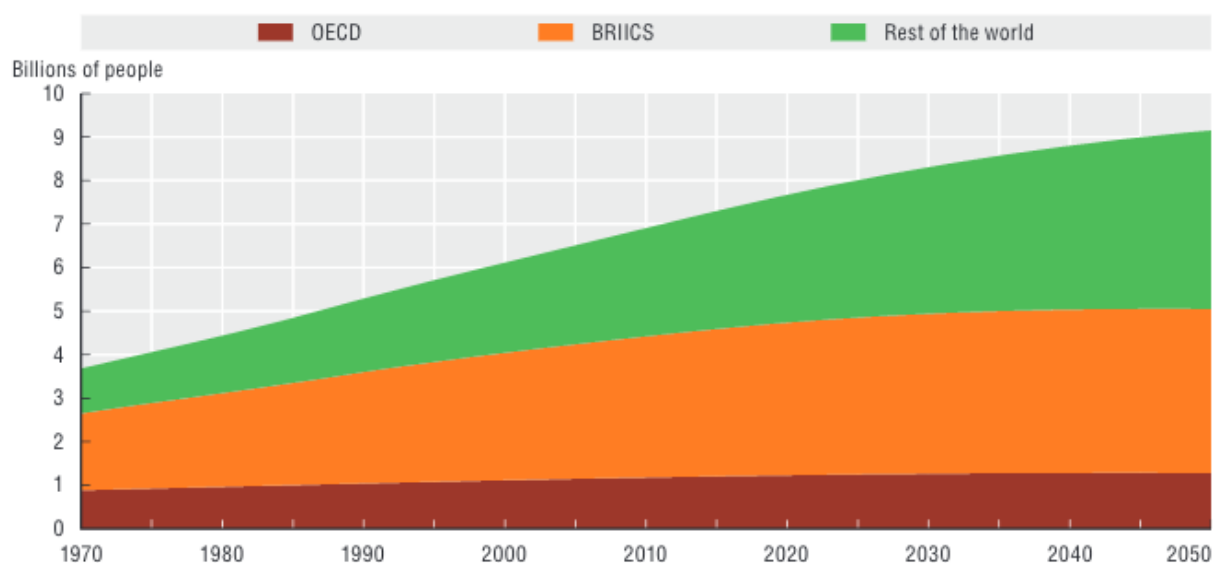
What type of actors are crucial to build the critical mass necessary for GPG production? There are two general implications for GG. GPG production is most likely to be effective when GG leverages polycentricity institutionally, moving away from state-centric thinking to involve different actors across levels of governance, and geographically, moving away from Western-centric thinking to involve the Global South (Acharya, 2014). Both points underscore the complexity of GG. Integrating them in the analytical perspective is crucial to account for the increasing diffusion of power (Paris, 2015). I discuss the institutional and then the geographic point, but focus on the latter given extensive existing literature on the importance of non-state actors.

The relative importance of states and non-state actors in GG has been analysed widely (e.g. Keohane, 2001; Ruggie, 2004; Lake, 2010; Kahler, 2016a). I merely highlight the key conclusions of GPG analysis to support GG scholarship's emphasis of institutional polycentricity. Actors able to make major contributions to critical mass efforts often include large states without which implementation is more difficult. The state remains the pivotal entity of interest aggregation, control and financing – all of which are crucial for GPG production (Held, 2009; Sell, 2014; Kahler, 2016a). States hold significant regulatory powers to alter incentives and foster domestic implementation (Roger et al, 2017). States are, however, unable to deliver GPGs (bar single-best effort) unilaterally or in small clubs (Kaul et al, 2003; Weiss, 2013; Finnemore, 2014). One critique of states' unilateralism is that it is unlikely to overcome diverging interests and tackle domestic barriers to GPG production (Falkner, 2015). The development of winning coalitions able to produce GPGs, therefore, requires cooperation of different actors across levels of governance (Lamy et al, 2013; Sell, 2014; Hameiri/Jones,

2016; Keohane/Victor, 2016). GG must embrace institutional polycentricity to navigate the full complexity of GPG production (Rothstein/Tannenber, 2015).

Paris (2015, p. 412) argues that GG scholarship underplays the impact of the rise of emerging powers on GG. I agree, but highlight some notable exceptions (e.g. Hurrell, 2007, 2013b; Zürn/Stephen, 2010; Kahler, 2016b). Across international relations, the importance of the Global South is rising (Zoellick, 2010; Ocampo, 2016; PWC, 2017; Wolf, 2017). The World Bank estimates that, by 2050, the economies of former developing countries will be twice the size of today's industrial countries' economies (Loorbach et al, 2015). Demographics underpin this politico-economic shift: by 2050, 88% of the world's population will live outside of the OECD club of developed economies (OECD, 2012; UNDESA, 2015, see figure below). A clear majority of GPGs' beneficiaries are in the Global South. This is where the significant part of GPGs are produced and enjoyed. Emerging powers, therefore, must play central roles in GG to make effective GPG production possible (Zürn/Stephen, 2010). Emerging powers' priorities, their ability to realise them, and the response from advanced economies is changing GG (Keohane, 2001; Lake, 2010; Dadush/Shaw, 2011; Kahler, 2013). Notwithstanding globalising pressures, old powers are unlikely to relent influence easily (Stiglitz, 2008). How this transformation is managed is likely to determine the effectiveness of GG and its ability to foster the win-win cooperation of a critical mass necessary for GPG production (Kaul, 2013b). For now, I can assert that geographical polycentricity increases the complexity of cooperation by multiplying the number of influential actors. Recognising this changing reality – of both geopolitical power and beneficiaries' geography – is crucial for analysing the political economy of GPGs (Kaul, 2017).

Figure 2: World population by major regions (OECD, 2012, p. 50, BRIICS stands for Brazil, Russia, India, Indonesia, China)



GPG production will, in part, depend upon emerging powers exhibiting global leadership both in decision-making (input) and, most importantly, in implementation (output) (Wolf, 2009; Ocampo, 2016). The Chinese President's Davos speech (Xi, 2017) supporting globalisation and proclaiming climate leadership is an encouraging signal. The key issue is whether and how Global South leadership will translate into GPG outcomes. Influence of emerging powers will not necessarily lead to better outcomes for the Global South, if they prioritise private interests of their elites or their national interest over collective action on GPGs. Warren et al (2015) and Nayyar (2016) analyse the different preferences amongst emerging powers, indicating mixed prospects for international cooperation. The extent of access to GPGs' benefits that beneficiaries in the Global South achieve is a decisive issue for the success of GPG production and output legitimacy. GPG analysis can help GG scholarship interrogate how GG needs to adapt to foster cooperation amid this historic power transition. A crucial research agenda within GG going forward needs to interrogate – quite apart from international development scholarship – how pro-compliance coalitions can effectively facilitate GPG production in emerging powers.

6. Conclusion

To conclude, I summarise the main contributions of GPG analysis and how its insights can help GG enhance GPG production. I also propose areas for further research. GPG analysis clarifies that some of the world's biggest challenges originate beyond national borders and, depending on production technologies, can only be addressed through international cooperation. Framing GG as GPG production can provide a clear goal that legitimises investment in global public policy. To date, GG has often struggled to affect the transformation of behaviour required for effective GPG production (Weiss, 2013). GPG analysis demonstrates that a nimbler approach is feasible; GG can accelerate ambitious and effective action through leadership that mobilises a critical mass of actors across levels of governance. GPG analysis does not lead to radical reform, but rather tries to change the approach to international cooperation, challenging GG to foster win-win cooperation that delivers implementation on the ground. My analysis points to several considerations for GG to improve GPG production:

1. GPG production technologies inform whether and how issues can be addressed internationally through GG;
2. GG can influence actors' political economies of GPG production by altering political incentives and re-framing GPG production as win-win cooperation;

3. GG can use financial incentives to support GPG production by aligning private goods with GPG production;
4. GG can leverage domestic pro-compliance coalitions to facilitate implementation, considering different political economies across levels of governance and recognising that barriers to GPG production are often located domestically; and
5. GG is most likely to effectively support GPG production by fostering leadership of polycentric winning coalitions that create the critical mass necessary for GPG production.

GPG analysis tries to understand how powerful interests inhibit resource allocation and implementation. To overcome prisoners' dilemmas, feasible solutions are often unlikely to be best-case, but rather second-best solutions that navigate political economies of GPG production. The task is not simple. GPG production in our polycentric world takes extraordinary creativity (Wolf, 2009; Kahler, 2016a). In my view, we – the global public – have every incentive to live up to that challenge and make the world great again. The stakes could not be higher; social progress and planetary survival depend upon it (Keohane, 2001; Hoffman, 2015).

In facilitating GPG production, GG has a responsibility to manage the tension between private and public goods and, in the context of vast inequalities in the world, enable equitable beneficiary access to GPGs. Global governors may proclaim political goals that signify GPG production, but ultimately the global public determines output legitimacy in personal, local contexts. International agreements, like Paris, remain important politically but, focusing on output legitimacy, GG must urgently concentrate on implementation. The conclusion of GPG analysis must galvanise concrete pathways to GPG production. The key questions for each GPG are what strategies achieve effective implementation globally and with what trade-offs and for whom. Further research to enhance our understanding of GPG production should explore how GG can directly influence domestic implementation, especially in the Global South, and how GG can facilitate win-win cooperation. This research is important to enable GG to bridge the disconnect between global problems and the political structures to address them (Zürn, 2010, 2013; Weiss/Wilkinson, 2012; Held/Hale, 2017). The aim of this research should be to directly inform strategic leaders of all types of institutions and levels of governance to facilitate GPG production based on win-win cooperation.

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