# 1nc

## queer pess k

#### Heteronormativity and the hyperfocus on the future places the figurative child and queer people in opposition and demonizes queer people

Edelman 04 (Lee Edelman, Duke University Press, 2004, Durham and London, “No Future: Queer Theory and the Death Drive”, December 6, 2004, 978-0-8223-8598-1, [https:/](https://bagelabyss.files.wordpress.com/2012/02/no_future__queer_theory_and_the_death_drive.pdf)[bagelabyss.files.wordpress.com/2012/02/no\_future\_\_queer\_theory\_and\_the\_death\_drive.pdf](http://bagelabyss.files.wordpress.com/2012/02/no_future__queer_theory_and_the_death_drive.pdf), pg 20-22) SJ

Thus, while lesbians and gay men by the thousands work for the right to marry, to serve in the military, to adopt and raise children of their own, the political right, refusing to acknowledge these comrades in reproductive futurism, counters their efforts by inviting us to kneel at the shrine of the sacred Child: the Child who might witness lewd or inappropriately intimate behavior; the Child who might find information about dangerous ‘‘lifestyles’’ on the Internet; the Child who might choose a pro-vocative book from the shelves of the public library; the Child, in short, who might find an enjoyment that would nullify the figural value, itself imposed by adult desire, of the Child as unmarked by the adult’s adulterating implication in desire itself; the Child, that is, made to image, for the satisfaction of adults, an Imaginary fullness that’s considered to want, and therefore to want for, nothing. As Lauren Berlant argues force-fully at the outset of The Queen of America Goes to Washington City, ‘‘a nation made for adult citizens has been replaced by one imagined for fetuses and children.’’22On every side, our enjoyment of liberty is eclipsed by the lengthening shadow of a Child whose freedom to develop undisturbed by encounters, or even by the threat of potential encounters, with an ‘‘otherness’’ of which its parents, its church, or the state do not ap-prove, uncompromised by any possible access to what is painted as alien desire, terroristically holds us all in check and determines that political discourse conform to the logic of a narrative wherein history unfolds as the future envisioned for a Child who must never grow up. Not for nothing, after all, does the historical construction of the homosexual as distinctive social type overlap with the appearance of such literary creations as Tiny Tim, David Balfour, and Peter Pan, who enact, in an imperative most evident today in the uncannily intimate connection between Harry Potter and Lord Voldemort, a Symbolic resistance to the unmarried men(Scrooge, Uncle Ebenezer, Captain Hook) who embody, as Voldemort’s name makes clear, a wish, a will, or a drive toward death that entails the destruction of the Child. That Child, immured in an innocence seen as continuously under seige, condenses a fantasy of vulnerability to the queerness of queer sexualities precisely insofar as that Child enshrines, in its form as sublimation, the very value for which queerness regularly finds itself condemned: an insistence on sameness that intends to re-store an Imaginary past. The Child, that is, marks the fetishistic fixation of heteronormativity: an erotically charged investment in the rigid same-ness of identity that is central to the compulsory narrative of reproductive futurism. And so, as the radical right maintains, the battle against queers is a life-and-death struggle for the future of a Child whose ruin is pursued by feminists, queers, and those who support the legal avail-ability of abortion. Indeed, as the Army of God made clear in the bomb-making guide it produced for the assistance of its militantly ‘‘pro-life’’ members, its purpose was wholly congruent with the logic of reproductive futurism: to ‘‘disrupt and ultimately destroy Satan’s power to kill our children, God’s children.

#### Queer violence is constantly erased. Every moment that passes more lives are being purged from our history by heterosexual rejections of the notion of queer violence.

**Stanley 11** Eric Stanley (assistant professor in the Department of Gender and Sexuality Studies at the University of California, Riverside) “Near Life, Queer Death Overkill and Ontological Capture” *Duke University Press Vol 29 No 2* Summer 2011 p. 7 <https://queerhistory.files.wordpress.com/2011/06/near-life-queer-death-eric-stanley.pdf> DOA: 8.30.17 BAO

Where statistics fail, scars rise to tell other histories. From the phenomenological vault of growing up different, to the flickers of brutal details, one would not have to dig deep to uncover a corpse. Yet even with the horrific details, antiqueer violence is written as an outlaw practice, a random event, and an unexpected tragedy. Dominant culture’s necessity to disappear the enormity of antiqueer violence seems unsurprising. Yet I suggest that mainstream LGBT discourse also works in de-politicized collusion with the erasure of a structural recognition. Through this privatization the enormity of antiqueer violence is vanished. Thinking violence as individual acts versus epistemic force works to support the normative and normalizing structuring of public pain. In other words, privatizing antiqueer violence is one of the ways in which the national body and its trauma are heterosexualized, or in which the relegation of antiqueer violence, not unlike violence against women, racist violence, violence against animals (none of which are mutually exclusive), casts the national stage of violence and its ways of mourning as always human, masculinist, able-bodied, white, gender-conforming, and hetero- sexual. For national violence to have value it must be produced through the tangled exclusion of bodies whose death is valueless. To this end, as mainstream LGBT groups clambe for dominant power through attachment of a teleological narrative of progress, they too reproduce the argument that antiqueer violence is something out of the ordinary.

#### Cisheteronormativity actively constrains education and expression in debate - challenging it is key to accessing education. Thus, the role of the ballot is to vote for the debater who best combats structures of cisheteronormativity

**Farrell and Gupta 2004** (Farrell, Kathleen, Honors B.A. in sociology from Trinity College; M.A. and Ph.D. in sociology from Syracuse University. Professor Farrell's primary research and teaching interests include gender and sexualities, with an emphasis on inequality studies. In her courses, Professor Farrell focuses on the interdisciplinary and practical implications of sociology and Nisha Gupta, Assistant Proffessor of Psychology at University of West Georgia, "Interrupting heteronormativity: Lesbian, gay, bisexual, and transgender pedagogy and responsible teaching at Syracuse University." (2004)) SJ

Should discussions of sexuality be included in the classroom?1 The easy answer might be no: it is not ‘relevant’ to the subject matter of most courses except perhaps to those that explicitly engage with human sexuality, such as Child and Family Studies, Sociology, or Women’s Studies. Moreover, this reasoning might go, given estimates that within the general population less than ten percent identify as non-heterosexual, there’s a good chance that in a class of sixty students everyone is straight. It is this kind of perspective, however, that not only contributes to the invisibility of LGBT students, but it also constructs and reinforces heteronormativity in our classrooms and across campus.2 LGBT students (and teachers) ARE present in our classrooms—whether we choose to see them or not—and it is their very invisible presence that demonstrates the power of heteronormativity to mask that which does not conform, and to naturalize that which does. This is a problem for both LGBT and heterosexual students and teachers alike. Heteronormative assumptions and practices regulate the beliefs, behaviors, and desires of ALL of us, restricting the range of possibilities of identification and expression for ALL of us, to such an extent that even momentary and joyful expressions (e.g. the heterosexual man singing “I feel like a woman” in the Chevy commercial discussed by Susan Adams) become sources of discomfort and fear. Practices of regulation and restriction are integral to creating and maintaining hierarchies of power, which in turn limit the kinds of learning and teaching that can happen in our classrooms. As responsible teachers, we know that our pedagogical theories and practices need to expand the kinds of learning opportunities we provide students, not restrict them. In fact, the administration of this university recognizes the importance of this by emphasizing the link between a rich intellectual climate and a diversity of perspectives and people: “[. . .] diversity in our student body, faculty, and staff has far-ranging and significant educational benefits for all nonminorities and minorities alike” (Syracuse University Academic Plan, 2001). Particular strategies to create more inclusive curricula have been developed and implemented in programs and departments university-wide because “[s]tudents in diverse learning environments learn more, and have higher levels of satisfaction and greater degrees of civic engagements. They are better able to appreciate the ideas of others and they are better prepared to enter the world they will lead” (SU Academic Plan, 2001). This diversity of students, faculty, and ideas includes: “race, ethnicity, gender, age, religious beliefs, sexual orientation, and physical and mental ability” (Syracuse University Human Resources, emphasis added). In principle, then, SU values diversity. Taking a closer look at what diversity means and how it is “practiced,” however, exposes some gaps between these principles and actual, everyday classroom procedures, particularly when that “diversity” topic is sexual orientation. It’s important to note that sexual orientation is a term that does not reference a particular set of people; it’s not only about LGBT people, but also non-LGBT, or heterosexual, people. Why is this broader definition of sexual orientation important? Because the sexual orientation of heterosexuality is simultaneously institutionalized and naturalized to the extent that it becomes the invisible norm against which all other sexual orientations, identifications, or expressions are named “abnormal.” The issue of “invisibility,” then, isn’t just about LGBT students and teachers; it’s about the ways in which our assumptions about (hetero)sexuality are invisible to us. And we carry these assumptions into our classrooms. As a result, heteronormativity is reproduced, most often unconsciously, through our own everyday classroom practices. Rather than expanding the kinds of learning opportunities we create space for, we inadvertently reinforce a regulated and restrictive framework for understanding the complexity of human sexuality.

#### The alt is embracing queer negativity as a method of resistance against cisheteronormativity and a coping mechanism for queer people

Edelman 04 (Lee Edelman, Duke University Press, 2004, Durham and London, “No Future: Queer Theory and the Death Drive”, December 6, 2004, 978-0-8223-8598-1, [https:/](https://bagelabyss.files.wordpress.com/2012/02/no_future__queer_theory_and_the_death_drive.pdf)[bagelabyss.files.wordpress.com/2012/02/no\_future\_\_queer\_theory\_and\_the\_death\_drive.pdf](http://bagelabyss.files.wordpress.com/2012/02/no_future__queer_theory_and_the_death_drive.pdf), pg 6-7 ) SJ

Truth, like queerness, irreducibly linked to the ‘‘aberrant or atypical,’’ to what chafes against ‘‘normalization,’’ finds its value not in a good susceptible to generalization, but only in the stubborn particularity that voids every notion of a general good. The embrace of queer negativity, then, can have no justification if justification requires it to reinforce some positive social value; its value, instead, resides in its challenge to value as defined by the social, and thus in its radical challenge to the very value of the social itself.8 For by figuring a refusal of the coercive belief in the paramount value of futurity, while refusing as well any backdoor hope for dialectical access to meaning, the queer dispossesses the social order of the ground on which it rests: a faith in the consistent reality of the social—and by extension, of the social subject; a faith that politics, whether of the left or of the right, implicitly affirms. Divesting such politics of its thematic trappings, bracketing the particularity of its various proposals for social organization, the queer insists that politics is always a politics of the signifier, or even of what Lacan will often refer to as ‘‘the letter.’’ It serves to shore up a reality always unmoored by signification and lacking any guarantee. To say as much is not, of course, to deny the experiential violence that frequently troubles social reality or the apparent consistency with which it bears—and thereby bears down on—us all. It is, rather, to suggest that queerness exposes the obliquity of our relation to what we experience in and as social reality, alerting us to the fantasies structurally necessary in order to sustain it and engaging those fantasies through the figural logics, the linguistic structures, that shape them. If it aims effectively to intervene in the reproduction of such a reality—an intervention that may well take the form of figuring that reality’s abortion— then queer theory must always insist on its connection to the vicissitudes of the sign, to the tension between the signifier’s collapse into the letter’s cadaverous materiality and its participation in a system of reference wherein it generates meaning itself. As a particular story, in other words, of why storytelling fails, one that takes both the value and the burden of that failure upon itself, queer theory, as I construe it, marks the ‘‘other’’ side of politics: the ‘‘side’’ where narrative realization and derealization overlap, where the energies of vitalization ceaselessly turn against themselves; the ‘‘side’’ outside all political sides, committed as they are, on every side, to futurism’s unquestioned good. The rest of this book attempts to explain the implications of this assertion, but first, let me sketch some connections between politics and the politics of the sign by establishing the psychoanalytic context within which my argument takes shape.

**uv**

**Fiat is utopian – when the debate round is over, their aff won’t be passed in the real world – but how frame their impact spills over and affects their view of the world, which means their exaggerated impacts they obscure the systemic inequalities present in the status quo**

## Ptd t

#### Interpretation: the affirmative must only garner offense from PTD

#### Violation: they garner offense from [insert]

#### PTD is the simplest method + solves the majority of impacts

**Babcock 2019** (Hope M. Babcock, “The Public Trust Doctrine, Outer Space, and the Global Commons: Time to Call Home ET,” Syracuse Law Review, Vol. 69, No. 2, 2019, <https://scholarship.law.georgetown.edu/cgi/viewcontent.cgi?article=3219&context=facpub>) //neth

The doctrine also appears to be infinitely malleable. Original uses of the doctrine were restricted to only that “aspect of the public domain below the low-water mark on the margin of the sea and the great lakes, the waters over those lands, and the waters within rivers and streams of any consequence,”520 and covered only traditional uses of those lands, like fishing and navigation.521 Over time, the scope and application of the doctrine broadened to protect more public resources and different uses.522 Thus, the doctrine expanded to protect new trust resources, such as dry sand beaches, inland lakes, groundwater, dry riverbeds, and wildlife,523 and passive uses of those resources, like scientific study.524 The original link to navigable water and tidelands disappeared.525 Supporters of the doctrine successfully advocated that it be applied to “wildlife, parks, cemeteries, and even works of fine art,”526 while arguing more recently its application to the atmosphere.527 A doctrine that imposes a perpetual duty on the sovereign to preserve trust resources, prevents their alienation for private benefit, assures public access to them, and can be invoked by anyone seems particularly useful as a management tool in outer space.528 The fact that public access to trust resources is so central to the doctrine makes it reflective, not contradictory, of international space law’s bar against appropriation of outer space and of the principle of space being the “province of all mankind.”529 It avoids the problems of alienation and exclusion associated with any of the management approaches associated with some form of private property and requires neither the creation of a new administrative authority nor the presence of a close-knit group of like-minded people.530 Members of the public, both rich and poor, can invoke and enforce the doctrine as easily as the sovereign.531 It is cost effective to the extent that no separate apparatus is required to implement it, and the doctrine has shown itself to be highly adaptable and innovative as different needs arise.532 It could also fill the gap in international law with respect to managing celestial property. Therefore, of all the management approaches studied here, the PTD seems the most suited to keep order in space until a regulatory regime is imposed. However, the doctrine provides no incentives for development of trust resources; rather, it might be used to limit or curtail that development, making it an imperfect, perhaps even counter-productive solution by itself to the extent that such development might be beneficial.533 Modifying the doctrine to allow limited use of private property management approaches, like tradable development claims, might buffer that effect—a form of overlapping hybridity between one type of property, a commons, and a management regime from another, private property, enabled by application of the PTD. CONCLUSION “Only a legal system that accommodates both the human need for resources and the necessary preservation of mankind’s common heritage can fulfill these criteria.”534 The future is now with regard to the development of outer space and its resources—it is no longer a question of whether humans will engage in these activities, but how soon they will. Technically advanced countries and private commercial enterprises are probing outer space and preparing for landing on an asteroid or the moon to extract their resources.535 Speculators are selling deeds to the moon’s surface and preparing to exploit the tourism potential that space offers.536 But, the legal framework for managing these initiatives is almost nonexistent.537 International treaties came into being before all this activity began in earnest and national laws that might apply are stunted by jurisdictional quandaries like the absence of national boundaries in outer space.538 Thus, there is an urgency to figure out how to control what happens in outer space before its resources are irreparably damaged or permanently monopolized by powerful countries and individuals. In the absence of regulation, much of the current debate centers on what property regime should be applied in outer space.539 The assumption is that by only allowing private property rights in space, countries and commercial enterprises will undertake the risks and costs of space development.540 However, unless international space law changes, it may prevent this from happening. If it changes, strong management controls will be necessary to prevent destruction or over-consumption of celestial resources, as well as monopolization and competitive behavior by participants, which could lead to hostilities and inequities. This Article examines various private property regimes, including those of less than full fee ownership, to see if any would avoid the conflict with the international prohibition on appropriation of outer space and its resources. It concludes that none will because each retains the right to exclude and each is insensitive to the treaties’ equity concerns. In contrast, considering outer space to be common is consistent with international space law in both respects. Hypothesizing that private property in outer space may yet prevail, this Article investigates different private property management approaches, such as the right of first possession, lotteries, and tradable development rights, to see if any would be cost effective, easy to implement and equitable, and would also prevent over-consumption, monopolization or the slide into rivalrous behavior. The Article concludes that each comes up short in some respect. Social norms as a management tool for property held in common, although compliant with international law, are also not up to the task. Instead, although ancient, the PTD, with its malleability, easy and cost-effective implementation and enforcement, non-consumption principle, and consistency with the goals that animate international space treaties, seems best suited to the task of protecting the public’s interests in the global commons that is outer space as it has done for centuries in Earth-bound commons. But, as its principal terrestrial use has been to protect trust resources from development, the doctrine needs some modification to encourage development of celestial resources. Hence, this Article suggests that modifying the PTD to allow the application of private property management tools, like tradable development rights, will not only allow development, but also will assure that when it happens, it will not be just profitable for a few, but will also be sustainable and equitable.

#### Standards

#### 1 – limits – there are infinite definitions of what private appropriations of outer space could. Your model justifies infinite affs and kills the neg’s ability to engage – we can’t be expected to prep for each of these affs – kills fairness bc big schools will always have access to more prep and kills education bc we wont be able to have substantive discussions on the aff.

#### 2 – **predictability** – PTD was a core aff when college policy debated a similar topic – proves that it’s at the core of the topic AND it’s what most debaters will prep against – teams use past instances of similar topics as a starting point for prep. And our model is better for small schools bc it means there’s already answers to the aff disclosed on the college policy wiki

#### Voters –

#### 1 -- Fairness – you need fairness to evaluate debate rounds – the judge needs to vote for the better debater not the better cheater. Unfair advantages in debate rounds make decisions illegitimate and hurt our ability to access real world skills.

#### 2 – education – it’s a voter because it’s the reason schools fund debate and the only portable skills we gain from debate are a result of education – knowing how to discuss the merits of broad policy options has more real world implications than knowing how to go for an rvi

#### Paradigm issues –

#### 1 – No RVIs

#### a] logic – you don’t get to win just for proving you’re topical

#### b] chilling effect – rvis disincentivize debaters from checking abuse

#### 2 – competing interpretations over reasonability

#### a] arbitrariness – reasonability is arbitrary and invites judge intervention

#### b] brightlines mean competing interps – it becomes a debate of whose brightline is best which is the same thing as competing interps – you’re debating about whose model is best

#### 3 – drop the debater

#### a] logic – drop the argument doesn’t make sense – the shell indics their entire advocacy

#### b] severance – if they go for drop the argument it’s severance and an independent reason to negate – kicking out of the aff no-links all neg offense and forces us to restart and finish the debate in the 2nr

## Case

### Fwk

Morality—ought isn’t in the rez

**queer violence is actively erased means that even if structural violence cares about queer violence it still doesn’t answer the question of if they even know it’s happening**

### Overview:

#### 1 – they don’t solve their impact – public space entities also create debris – no warrant for why private debris is uniquely worse – reason to vote neg on presumption because their impacts happen regardless

#### 2 – they don’t read a plan or solvency – even if they win their scenario they haven’t proven that they can solve it – negate on presumption. AND no new 1ar re-explanations – makes it impossible for the 2nr bc you can no-link all of our offense

#### Aff fails – nobody to administer

**Mirzaee 2017** (Siavash Mirzaee, “Outer Space and Common Heritage of Mankind: Challenges and Solutions,” RUDN Journal of Law – December 2017, <https://www.researchgate.net/publication/317121083_Outer_Space_and_Common_Heritage_of_Mankind_Challenges_and_Solutions> | DOI: 10.22363/2313-2337-2017-21-1-102-114) //neth

Given that common heritage of mankind resources belongs to the international community as a whole, the second common heritage of mankind element is an inter- national management regime incorporating “representatives from all nations”. Because developed states often have greater access to common heritage of mankind resources, international management is intended to provide developing states with a measure of control over exploitation [18. P. 231]. At the present time, there is no international entity to administer the legal status of outer space strongly or dispute settlements among States. Disagreement of developed countries' and inefficiency of current entities are the main reasons for this shortage in outer space.

#### Privatization is inevitable – 75% of space is already privatized

**Urrutia 2018** (Doris Elin Urrutia, October 12, 2018, “How Will Private Space Travel Transform NASA's Next 60 Years?” <https://www.space.com/42113-nasa-future-private-spaceflight.html>) //neth

First, people should understand that about 75 percent of the worldwide space enterprise is already commercial, said Scott Hubbard, an adjunct professor in the Department of Aeronautics and Astronautics at Stanford University. This includes the satellites belonging to DirecTV and Sirius XM radio. What's news is the extension of that into the human realm," said Hubbard, who also previously directed NASA's Ames Research Center in Silicon Valley. He served as the agency's "Mars czar," restructuring NASA's robotic Red Planet-exploration program after it suffered several failures in the 1990s. And if private companies can get the price of a suborbital flight down to about $50,000, "you get a lot of interest," Hubbard told Space.com. The highest-profile program currently in the works between NASA and the private sector is the agency's Commercial Crew Program, said Eric Stallmer, president of the nonprofit Commercial Spaceflight Federation. Commercial Crew is encouraging the development of U.S. spacecraft that will carry astronauts to and from the International Space Station (ISS). Toward this end, NASA has awarded multibillion-dollar contracts to both SpaceX and Boeing, which are building capsules called Crew Dragon and CST-100 Starliner, respectively. These craft are currently scheduled to start flying astronauts sometime next year. There's also the maturing commercial cargo program, which has given contracts to SpaceX and Northrop Grumman Corp. to fly robotic cargo missions to the ISS. Both of these companies have already completed numerous such flights. Both Hubbard and Stallmer said that NASA wins by relying on private industry to provide such services in low Earth orbit. Hubbard argued that this strategy allows the space agency to continue "exploring the fringe where there really is no business case."

### Debris adv –

#### SpaceX rockets are reusable

**Martin & Wason 2020** (Colin Martin and Elizabeth Wason, “Privatizing Space Exploration, Climate Risks for Forest Offsets, and More,” June 19, 2020, <https://www.resources.org/on-the-issues/privatizing-space-exploration-risks-forest-offsets-and-more/>) //neth

Last month, SpaceX made history by becoming the first private company to send humans into orbit. The launch also represents a major achievement for NASA, which—after retiring its shuttles in 2012—has paid tens of millions of dollars to Russia to deliver American astronauts to the International Space Station. NASA Administrator Jim Bridenstine has indicated that the agency no longer plans to “purchase, own, and operate rockets and capsules” and will instead partner with the private sector, which has led the way in funding cost-effective innovations. But amid a new “space race” between companies like SpaceX and Boeing, private companies may have little incentive to fund space research that isn’t profitable, and increased private sector activity beyond Earth could create more pollution. For its part, SpaceX has responded to the excess of space junk by constructing spacecraft that is partially reusable—and its “Starship” prototype aims to be fully reusable. This week on a new episode of the Resources Radio podcast, Michael Toman—lead economist on climate change for the World Bank’s Development Research Group—discusses SpaceX’s recent successes and why the private sector is increasingly pursuing space exploration. A former RFF senior fellow, Toman clarifies that, despite the burgeoning trend of private companies sending spacecraft into orbit, NASA continues to play an important role in tracking space travel and enforcing safety standards. He predicts that SpaceX’s recent breakthrough could portend a major shift in how space technology is funded and launched. “There was always this thought: Are we willing to trust a non-NASA entity to build and launch, when we're going to have human beings on board?” Toman says. “With SpaceX, we now see that when there's a mission, when there are standards of safety that have to be met—we don't have to have NASA do this.”

#### Their models are old and don’t assume appropriate solar activity decay – debris is stable

**Wang and Liu 19** – Advances in Astronomy(Xiao-wei and Jing, PhDs, National Astronomical Observatories, Chinese Academy of Sciences, “An Introduction to a New Space Debris Evolution Model: SOLEM”, <https://www.hindawi.com/journals/aa/2019/2738276/>)

1. Introduction During the past decades, the number of space objects has been growing rapidly. Until now, the cataloged in-orbit space objects number has reached about 24,000, about 19000 of which are publicly listed at Space Track [1]. Uncataloged objects number with smaller size has approximately reached hundreds of millions. These space objects, mostly space debris, pose great threats to operational safety of in-orbit spacecraft. Adopting space debris mitigation measures is an important way to relieve the threats from space debris and prevent the number of resident space objects from growing. However, some studies indicated that the space debris environment would be stable for only 50 years under current mitigation measures, even without new launches in future [2]. This statement has aroused widespread concern over the world. In order to check and quantify the effectiveness of mitigation measures on controlling the growth of space debris in future, many space debris evolution models are established and compared to study the long-term stability of the future space environment. At present, the well-known space debris evolution models mainly include the LEGEND model from National Aeronautics and Space Administration (NASA) [3], DAMAGE model from United Kingdom Space Agency (UKSA) [4], MEDEE model from Centre National d’Etudes Spatiales (CNES) [5], DELTA model from European Space Agency (ESA) [6], LUCA model from Technische Universität Braunschweig [7], and NEODEEM model from Kyushu University and the Japan Aerospace Exploration Agency (JAXA)[8]. Some of these models have been used to study the stability of the future space environment in the joint research organized by Inter-Agency Space Debris Coordination Committee (IADC) [9, 10]. Besides, further work on the uncertainties affecting the long-term evolution of space debris is encouraged in international community to better assess the uncertainty induced by the modelling assumptions [11]. Therefore, more space debris evolution models are welcomed to participate in such research activities, which may provide the technical support for making new space debris mitigation guidelines as well as other related policies for space traffic management to guarantee the long-term sustainability of outer space activities. SOLEM (Space Objects Long-term Evolution Model) is a Low Earth Orbit (LEO) space debris long-term evolution model established by China. It has participated in the joint researches of IADC as a representative of China National Space Administration (CNSA). SOLEM is capable of predicting the **number evolution trends of space debris**, estimating the **rate of collision** events of space objects during the evolution in future, and analyzing the effects of different **mitigation and remediation measures** or other potential **uncertainties on the long-term evolution** of space debris. The reliability of SOLEM has been validated during the joint research of IADC. This paper introduces the components, algorithms, and workflow of SOLEM. After that, the effects of different mitigation measures based on SOLEM model are analyzed. 2. The SOLEM Model The space debris evolution model is expected to predict the evolution of space debris population and possible collision rates for a long period in future, usually for decades and even centuries. It can be used to study the evolution processes with various assumptions. The future evolution of space debris is affected by natural factors such as various perturbations, atmosphere evolutions, periodic solar activities, accidental explosions, and even the surface degradations. In fact, it could also be affected by human space activities such as launches, collision avoidance manoeuvres, mitigation and remediation measures. In space debris evolution model, usually the most important source and sink mechanisms are considered. Generally, a space debris evolution model is composed of orbital propagation model, collision probability estimation model, fragment generation model, future launch model, postmission disposal model, and active debris removal model (if the active debris removal measures are considered). These components will significantly affect the model evolution results if some key parameters are changed. The composition of space debris evolution model is illustrated in Figure 1. Figure 1: The general components of space debris evolution models. The left components are the main source mechanisms, and the right components are the main sink mechanisms. 3. Orbital Propagation Orbital propagation is to project the current orbits of space objects to the future. It is the core component of space debris evolution model. Through orbital propagation, the space debris evolution model is able to obtain the space objects orbital distribution at any moment in future. There are three basic orbital prediction algorithms: numerical method, analytical method, and semianalytical method. Numerical method has the highest precision but takes the most time in orbit propagation. Due to the long evolution time of space debris, usually from decades to hundreds of years, moreover, the high-precision position has no practical significance in long-term evolution; it is more appropriate to use analytical method or semianalytical method. SOLEM model adopts a simplified semianalytical orbital propagator, in which the integration is done on the perturbation functions with the short-periodic terms removed. Essentially, it is performed on the averaged orbital dynamic system. At present, SOLEM covers only LEO region, including objects residing in LEO with near-circular orbits and those crossing LEO with high eccentricity orbits. For near-circular orbits, the main perturbations considered include the Earth’s nonspherical gravity perturbation J2, J3, J4, J2,2, and atmospheric drag. For high eccentricity orbits, besides the Earth’s nonspherical gravity and atmospheric drag, the perturbations due to solar radiation pressure and gravity of the Sun and Moon are also considered. The atmosphere density model used for drag calculation is the NRLMSIS00 model. The values of solar radiation flux at 10.7 cm and the geomagnetic index can be read from a configuration file which can be replaced according to assumptions. In order to verify this orbital propagator of SOLEM, we conducted an experiment on the evolution of a small population. It is to compare the SOLEM propagation results with historical data for the number evolution of a small population in a statistical view. We used all the 1021 cataloged LEO-crossing objects on 1980.01.01 to do the experiment. It includes 38 objects with high eccentricity orbits () and 983 objects with near-circular orbits (). The area-to-mass ratio of these objects is calculated according to the UNW type of perturbed motion equation together with the method of least squares, using the orbital data for months previously. For SOLEM propagation, we used historical solar activities recorded in CelesTrak website [12] considering no collision avoidance and station keeping manoeuvres. The real decay information of the 1021 objects is drawn from SSR on the Space Track website [13]. The propagation result of SOLEM orbital propagator and the real data of historical evolution of the 1021 objects are compared in Figure 2, which shows a high consistency with a relative error of about 2%. Figure 2: The statistical results comparison of SOLEM propagation (denoted as test) and historical evolution (denoted as real). The semianalytical method has a limit precision in orbit propagation. However, comparing with the evolution of a single orbit, the space debris long-term evolution model cares more about the number evolution of the whole population in statistics. Considering the experiment above, we think the SOLEM orbital propagator is applicable to space debris long-term evolution model. 4. Fragment Generation Model In-orbit breakup is one important source of space debris growth. Therefore, the accuracy of fragment generation model simulating the breakup events has an important impact on the simulation results of space debris evolution model. The fragment generation model is to simulate the space debris collisions or explosions and give the instantaneous information of generated fragments which is necessary for the subsequent evolution prediction. The information includes the fragments number and each fragment’s mass, size, velocity, etc. In SOLEM, we adopt NASA’s standard breakup model to simulate the generation of fragments produced by in-orbit breakups. NASA’s standard breakup model is the most popular fragment generation model at present. The implementation is following the process presented in paper [14, 15]. 5. Collision Probability Estimation When considering the fragmentation due to in-orbit collisions, there is a key component in the space debris evolution model, that is, the collision probability estimation algorithm. In SOLEM, we adopt an Improved-CUBE (I-CUBE) model to do the calculation of collision probabilities. It is based on the CUBE method proposed by NASA [16, 17]. In CUBE model, the evolution system is uniformly sampled in time. At each sampling moment, the space around the Earth is discretized in small cubes in geocentric Cartesian coordinates. By obtaining updated orbital elements, the location of each space objects is calculated. CUBE model assumes that the collision probability only exists between objects residing in the same cube. And the collision probability is calculated by where and are the spatial densities of objects and in the cube, is the collision cross-section, is collision speed, is the volume of the cube, and is the time interval between two sampling moments. Actually, calculated by (1) is the mean number of collisions between objects and in the volume during the propagation time interval . The time interval is given as 5 days, i.e., seconds. As it does not approach 0, for some objects with collision cross-section large enough, will reach a value greater than 1. That is not reasonable. To avoid this, in I-CUBE model, we used (2) to express the collision probability with the consideration that the collision process follows a Poisson distribution. where represents the collision probability and is the mean number of collisions between objects and in the volume during the propagation time interval . According to Heiner Klinkrad [18], the approximation yields results with less than 10% error for . That means, for , the approximation will bring error bigger than 10%. For most space objects, the approximation is well suited. But for those with collision cross-sections large enough (dozens or even hundreds of square meters), the collision probability may be greatly overestimated if still using the approximation. Besides, CUBE model assumes that only the objects residing in the same cube are considered for collisions. For space debris evolution, the divided cube size is given as 10 km. However, it has been queried by CNES for the effects on evolution results from the divided cube size [19, 20]. In I-CUBE model, we assume that collision probability exists in all close approaches with a distance from the target satisfying the threshold. The distance threshold is the diagonal of the divided cube. Thus, the value of in (1) is no longer the volume of cube, but the volume of a sphere with radius equal to the distance threshold; i.e., where is the divided cube size. As relates to the spatial densities, and are now the spatial densities of objects and in the volume of the sphere. The two-dimensional representation is illustrated in Figure 3. Figure 3: Two-dimensional representation for considering possible collisions between debris residing in neighbouring cubes. In this approach, the divided cube size will never influence the evolution result of space debris evolution models. The comparison results using CUBE and I-CUBE model running by SOLEM are presented in Figure 4. The divided cube size varies from 5 km to 50 km. Except for the divided cube size, all the other configurations are the same. Every curve is the average result of 50 Monte Carlo runs. Figure 4: Comparison of simulation results with different cube size. (a) Using CUBE model. (b) Using I-CUBE model. 6. Future Launch Activities The launch of spacecraft in future is another important source of space debris increase. However, it is highly related to technical development and space policies which cannot be predicted. Therefore, the future launch model usually takes the current launch level as a reference. The data of a launch model includes all the characteristics of launched objects, such as the launched number, each object’s type, mass, area, or/and size, target orbit, and launch time. In SOLEM model, we adopt the launch traffic during the last 8 years, from September 1, 2009, to August 31, 2017, as future launch model. It will be repeated during the overall simulation time. The traffic data is collected mainly from websites of Space Launch Report [21], Space Track [22], and Union of Concerned Scientists [23]. It is prepared previously as a configuration file containing the information of launched numbers, types (including satellites, rocket bodies, and mission-related objects), each object’s mass, area (or/and size), target orbit, launch date, etc. 7. Postmission Disposal Postmission Disposal (PMD) is an important mitigation measure to stop space debris population from growing. In SOLEM model, PMD measures are implemented on nonfunctional satellites and rockets launched during the evolution time. For newly launched satellites, the mission life is uniformly set as 8 years by default. It can also be set as other values by user. For rockets, the mission life will end at once when the carried satellites are sent into the target orbits. When the mission life of a satellite or rocket ends, the natural orbital lifetime will be estimated. If the natural orbital lifetime exceeds 25 years, the satellite or upper stage of the rocket will be deorbited to a disposed orbit that will naturally decay within 25 years, complying with the 25-year rule. The PMD success rate in SOLEM can be set freely by users. Currently this value is estimated to be lower than 20% for region above 600 km. The procedure of PMD is shown in Figure 5. Figure 5: The procedure of PMD. For mission ended satellites or rockets (R/Bs), if the evaluated natural orbital lifetime exceeds 25 years, it will be disposed to a new orbit complying with the 25-year rule. 8. Active Debris Removal To better limit the growth of LEO space debris populations, measures of active debris removal (ADR) are suggested. Although the ADR has not become practical due to the technical difficulties and high costs, its effects on space debris evolution have been proved through computer simulations. Considering the developing technology, ADR will be another important measure in stopping the growth of the space debris population in future. As suggested, ADR measure is to remove existing large and massive objects from regions where high collision activities are expected [24]. The selection criterion that should be used in choosing which objects to remove has also been researched, and the criterion based on the mass and collision probability of each object has been proposed [25–27]. By annually removing several targets, the space environment can be stabilized according to computer simulations. In SOLEM model, the selection criterion is implemented as follows: where is the mass of object and is the cumulated collision probabilities between object and object , where during the last year. Their product is the selection index for ADR. The larger the value of , the more dangerous the object . At the beginning of each projection year, all objects in orbit are sorted in descending order by the value of . A predefined number of space debris objects with the largest s will be immediately removed from orbits. Only the operating satellites and objects with high eccentricity orbits are excluded. The beginning year of implementing ADR measures is set by users. In SOLEM, it is set as 2030 by default. 9. The Initial Population Space objects initial population is the baseline of space debris evolution model. It is the description of current space environment. For SOLEM, the population data on 2017.09.01 is used as initial population. Just like the future launch model, the information of space objects is obtained from Space Track, Space Launch Report, and Union of Concerned Scientists. The orbital distribution and the area-to-mass ratio (A/M) versus size distribution are shown in Figures 6 and 7. Figure 6: The semimajor axis versus eccentricity distribution of population data of 2017.09.01. Figure 7: The A/M versus size distribution of population data of 2017.09.01. 10. The Workflow of SOLEM Model The workflow of SOLEM model is simply represented by Figure 8. As presented, before projection, initialization will be done first by setting key parameters which are based on simulated assumptions, taking prepared initial population data as input. All space objects contained in the initial population are propagated after initialization. As time evolves, the newly launched objects from future launch model will also be propagated. If the newly launched active satellite or rocket ends its mission, the PMD measure will be done. All space objects with size over 10 cm are included for collision consideration. Once a collision happens, the breakup model will be used to generate new fragments. And the population for next propagation step will be updated. Figure 8: The workflow of SOLEM model. 11. Model Application As key parameters of each module are flexible to users, SOLEM model is able to simulate the evolution of space debris under various assumptions with **high flexibility**. Since 2015, SOLEM, as a representative of CNSA, has participated in a joint research of IADC. With uniform input data and assumptions, SOLEM has achieved results consistent with other space debris evolution models (IADC internal reports). In this paper, the effects of different mitigation measures on space debris evolution are analyzed with the SOLEM model. 11.1. Input Data The initial input data and relevant assumptions are shown in Table 1. Three scenarios are performed with PMD rate set as 30%, 60%, and 90%, and the other input data and assumptions are all the same. For each scenario, 50 Monte Carlo simulation runs are performed to obtain the averages. Table 1: Assumptions of scenarios simulated by SOLEM model. The solar activity used in SOLEM for future evolution is shown in Figure 9. It is generated according to the monthly fit formula offered by CelesTrak website [12]. The geomagnetic index is set as a constant median value of Ap=9. Figure 9: The solar activity recorded in history (green line, denoted as real) and the solar activity model adopted in SOLEM (purple line). 11.2. Simulation Results In the evolution results, space objects are classified into three types: intact objects include all satellites, R/Bs, and mission-related objects; old fragments are all the DEB already existing in the initial population; new fragments are all the DEB generated during the evolution time. Separating new fragments from old fragments can help us have a clear view of the increasing process of space debris population. The space debris evolution results of the scenario setting PMD rate as 30% is presented in Figure 10. It is the average result of 50 Mont-Carlo runs by SOLEM. As Figure 10 shows, the total number of objects in LEO shows a decrease in the first two decades, then turns into increase throughout the evolution time, and finally reaches more than 115% of the initial population. This scenario predicts 34 catastrophic collisions and 25 noncatastrophic collisions in average in future 200 years. Figure 10: The evolution results of scenario 1, with PMD rate of 30%. (a) The population evolution. The line of total is plotted with the error bar of 1 σ standard deviation. (b) The cumulative number of collisions. Figure 11 shows the evolution results of the scenario setting PMD rate as 60%. The reinforcement of such mitigation measure makes the final effective number of LEO objects in future 200 years decrease greatly comparing with the baseline scenario. The final total effective number of LEO objects is only 23% more than the initial population. And the cumulative number of collisions also decreases greatly in both collision types. Figure 11: The evolution results of scenario 2, with PMD rate of 60%. (a) The population evolution. The line of total is plotted with the error bar of 1 σ standard deviation. (b) The cumulative number of collisions. In Figure 12, the evolution result shows, with PMD rate of 90%, there is a clear decrease by approximately 30% in the total effective number of space objects crossing LEO orbits for the next 50 years, and then the population remains at a **long-term stable level**. The decrease in the first 50 years is mainly due to the natural decay of old fragments. The number of new fragments generated by breakup events increases in nearly the whole evolution time with a low rate and finally seems to stop increasing at the end of evolution. The cumulative number of catastrophic collisions is decreased down to 15, and for noncatastrophic collisions the number is only 7. Generally, this scenario predicts a space debris environment **becoming better** with PMD rate as high as 90%. Figure 12: The evolution results of scenario 3, with PMD rate of 90%. (a) The population evolution. The line of total is plotted with the error bar of 1 σ standard deviation. (b) The cumulative number of collisions. Simulation results of the three scenarios are quantified in Table 2. It can be seen that, with PMD rate increasing, the space debris population after 200 years will greatly decrease, as well as the average catastrophic collision rates. High PMD rates will make the current space environment better and safer. Table 2: Quantification of evolution results of the three scenarios simulated by SOLEM model. Taking the IADC comparison study about “Stability of the Future LEO Environment” [9, 10] as a reference, the evolution results shown above look rather optimistic. The IADC comparison study predicted about +30% changes in population after 200 years and one catastrophic collision every 5 to 9 years with PMD rate of 90%. And we predict -30% change in population and one catastrophic collision every 13 years with the same PMD compliance level. That might be mainly due to the differences in solar activity model and the input initial population used for simulation. The solar activity used in this paper (Figure 9) is in a higher level than those used in [9, 10], which is shown in Figure 13. This will make **more objects decay during the evolution.** Besides, the initial population we used in this paper is obtained from the public data on 2017.09.01, which is about 13000 space objects. While the initial population used in [9, 10] is the reference population of MASTER2009 on 2009.05.01, which is about 17000 space objects, the difference in initial population is as high as about 24%. Additionally, the area-to-mass ratio distribution of the initial population in this paper (Figure 7) is also different from [9, 10], which is shown in Figure 14. From the area-to-mass ratio distribution of the initial population, it can be seen that the initial population we used does not exclude those objects with high area-to-mass ratio. Figure 13: Solar flux projections used in IADC comparison study. Figure 14: Area-to-mass ratio distributions of the initial population used in IADC comparison study. The differences in solar activity projection and initial population including both the number and area-to-mass ratio finally lead to a very different evolution result. 12. Summary and Future Work This paper mainly introduced the composition, submodel algorithm, and workflow of SOLEM, the space debris long-term evolution model of China. The reliability of SOLEM has been validated during the joint research of IADC. After that, the application work of SOLEM model on analyzing the effects of different mitigation measures on the evolution of space environment is presented. The result shows, with higher PMD rate, the current space environment will become **better and safer.** SOLEM is a LEO space debris evolution model with high flexibility. It is capable of simulating the space environment evolution with various assumptions. Therefore, it can be used to simulate and analyze the uncertainties affecting the space debris evolution, such as the future launches, solar activities, manual collision avoidance measures, and mitigation and remediation measures. Through simulation and analysis, SOLEM can help us to deeply understand the evolution process of space environment and provides technical support for making space policies and laws to guarantee the sustainability of space activities in future. At present, the orbital range covered by SOLEM is limited to LEO region from 200 km to 2000 km. In the next step, the orbital range covered by SOLEM will be expanded from LEO region to GEO (Geostationary Earth Orbit) region. Besides, the postmission disposal model will be optimized, including the disposed orbit selection process and the computation time.

### cap adv

#### Squo is good – public-private model curtails billionaire space power

**Nguyen-Le 2021** (July 19, 2021, Hanh Nguyen-Le, “Billionaire private investment is good for the space industry, whether we like it or not,” <https://blogs.lse.ac.uk/usappblog/2021/07/19/billionaire-private-investment-is-good-for-the-space-industry-whether-we-like-it-or-not/>) //neth

Without the government, the private sector cannot thrive in space. The government supports the private sector by adopting regulatory reforms or creating contracts and awards. Early attempts to invigorate the commercial space industry include the 1984 Commercial Space Launch Act, which was unsuccessful as US launch firms were unable to compete against NASA’s Space Shuttle. President Reagan’s 1986 US Space Launch Strategy reduced NASA’s ability to provide commercial launches, which led to the re-emergence of commercial space activities. The limitations provided by the 1986 policy led to the first commercial space launch by Space Services, Inc. in 1989. The US government under the Obama administration made policy reforms such as introducing fixed price contracting to support development of commercial services. An example of this was a request for over $6 billion to subsidize commercial crew vehicles to visit the International Space Station for the Commercial Crew Resupply (CRS) program. Congressional appropriators in the Senate created a “Dual-track” approach, exemplified by the 2010 NASA Authorization Act, which calls for commercial cargo development. The bill shows that policymakers were willing to compromise on certain aspects of the space program such as CRS to support private space launch companies. By 2010, commercialization was well underway with Obama’s National Space Policy that emphasized supporting a “competitive US commercial space sector.” As of 2011, NASA had paid SpaceX $181 million for 14 Commercial Resupply Missions and $298 million under the Commercial Orbital Transportation Services Demonstration Agreement. The Trump Administration increased public investment in private space actors further and established a series of Space Policy Directives that were meant to bolster the commercial sector. Government support to the private sector further comes in the form of NASA- approved loans, loan guarantees, and tax credits. Firms can also receive tax exemptions through facility constructions, discounted loans, and environmental credits. It is estimated that all of Musk’s ventures, not limited to SpaceX, received at least $4.9 billion in government support through tax breaks, factory construction, discounted loans, environmental credits, facility loans, and rebates to product buyers.

#### Squo solves monopolies – contracts increasingly awarded to smaller companies

**Urrutia 2018** (Doris Elin Urrutia, October 12, 2018, “How Will Private Space Travel Transform NASA's Next 60 Years?” <https://www.space.com/42113-nasa-future-private-spaceflight.html>) //neth

And there are more players within that private spaceflight "pie" now than there used to be, Stallmer said. Aerospace giants llike Lockheed Martin, Boeing and Northrop Grumman Corp. build hardware for NASA and the U.S. National Oceanic and Atmospheric Administration (NOAA), but they'll likely also continue pursuing big-dollar defense contracts. These standard government contractors are no longer the only options NASA can choose from. "I see in the future," Stallmer said, "the contracts that historically went to the big three or the big four are going elsewhere. And you're seeing smaller, more-nimble companies entering the marketplace and competing for a lot of this work. So, it won't be just your standard government contractors … it's a much larger pool … to choose from." McAlister also said there's now a big shift in who owns and operates spacecraft, as a result of nongovernment spaceflight customers. "I think the emergence of nongovernment customers only really occurred in the last 10 or 15 years in the space industry," he said. "Prior to that, it was pretty much only NASA and governments [that] were the customers, and when you have that kind of scenario ... [it] makes sense for [NASA] to own and operate the hardware." But, McAlister added, "when you have the opportunity for other customers, then it makes sense to shift some of that responsibility of development to the companies, to the private sector. Allow them to own and operate their hardware, and then they can sell it to other customers, and that brings the cost down for NASA and for everybody, because they can advertise their fixed cost over a larger customer base." He called this "kind of a win-win scenario." Who will these future spaceflight customers be? The rich, at least in the near term. After all, human space travel, even to the nearby suborbital realm, will likely remain quite expensive for a while, experts have said. But that doesn't mean the rest of us have no role to play in the ongoing private-spaceflight revolution. "I think we're going to need a lot of creative people," Stallmer said. "We're going to need a lot of builders ... not just aerospace engineers anymore. It's artisans, people that can use their hands."

#### Capitalism is inevitable and has adapted and survived similar shocks – this one is no different

**Emmott 9** (Bill Emmott is an English journalist, author and consultant best known for his period as Editor-in-Chief of The Economist. “The future of capitalism,” billemmott.com, <http://billemmott.com/article.php?id=250)//SL>

Writing as he was in the mid 19th century, Marx could not have envisaged a third potential capitalist contradiction, or cause of crises, namely environmental degradation. In that era, with the industrial revolution only just getting under way, the filthy air and water of the great industrial cities of London and Manchester was just thought to be inevitable, and probably unimportant compared with all the other causes of disease, death and misery that existed at the time. Yet a modern Karl Marx would certainly include the environment. He would argue that the logic of capitalist profit-seeking requires companies to deplete the world´s finite resources, to keep on filling the planet´s atmosphere with carbon dioxide and other "greenhouse gases" and to exploit society by imposing the environmental costs of capitalist production on the lives of ordinary people. The whole idea of "sustainable development", which is so popular now with environmentalists, is based on the idea that if capitalism is left to proceed on its own course then planet´s development will not be sustainable: it will collapse, in a series of crises, just as Marx foresaw. Fortunately for all of us, Karl Marx was a better theorist than he was a forecaster. Today, many economists are criticized for having failed to predict the global financial crisis that began in August 2007, or the global economic crisis that began with the collapse of the Lehman Brothers investment bank in September 2008. During the past 150 years, there have been many such crises, most notably the crisis of the 1930s and its Great Depression, or the bursting of Japan´s bubble economy in 1990-92. Karl Marx, however, forecast a much bigger, more fundamental crisis that has never yet occurred: the complete collapse of capitalism under the weight, as he wrote, of its own contradictions. Despite that failure, the ideas of Marx still have some resonance with economists and other thinkers today. Memories of communism in the Soviet Union and Mao Zedong´s China are still fresh, but also fears of a capitalist collapse remain strong. Capitalism, based as it is on greed and selfishness, has never actually been popular. That may well be why the events of 2007-09 have not just been described as a recession, or even just a financial or banking crisis: they have been described as a crisis of capitalism itself. Karl Marx lives on, at least in our minds. The reason why Marx has been proved wrong, so far, is that capitalism is a very adaptive and resilient system. After each crisis, after each dramatic change in the circumstances of the world or of any specific country, capitalism has been able to find new forms, to find new ways to prosper and make progress. The ingenuity and ambition of entrepreneurs and corporate managers enables them not just to invent new technologies and products but also whole new ways of organizing themselves and, in particular, new ways of positioning themselves in relation to government and society. They have been assisted in finding those new forms by government itself, the growth of which in all the rich, developed economies has softened the impact of capitalism´s crises. Government spending now is much larger compared with overall Gross Domestic Product (GDP) than it was during the 1930s, for example, in America, Europe and Japan, allowing that spending to help dampen the severity of economic cycles. That is exactly what governments have been doing since the current economic crisis began in 2007-08, with their big fiscal stimulus packages. Central banks, too, play a bigger role in economies than before, and their expansionary monetary policies have also helped to prevent the 2007-08 crisis from turning into a catastrophe. From the point of view of capitalism, government fiscal and monetary policies help to buy time for companies to plan their own adaptations, their own restructuring in response to the recession. But the adaptation still has to occur. Another economist, Joseph Schumpeter, writing in the 20th century, called this adaptation process "creative destruction". He was describing the way in which old and inefficient companies and even whole industries may be destroyed, especially during recessions, and are replaced by new companies and new industries, with new ideas and with balance sheets that were not so encumbered by debts. In fact, Schumpeter believed, without the destruction of the old, the process of creation and adaptation could not happen properly or vigorously. Now, amid our current global economic troubles, it has become common to ask what will be, what can be, the future of capitalism after this crisis. The first assumption behind this question is that the events surrounding the collapse of Lehman Brothers can, in truth be considered as a true crisis for capitalism as a system, rather than just a normal part of the economic cycle. Capitalism must change, following this crisis: that is the underlying thought. The second assumption, however, is a more positive one: it is that capitalism will adapt to its new circumstances, to the new rules governments may lay down for it, to the new attitudes people will hold towards it, even to the new balance of economic and political power in the world. After the destruction, there will be creation. But creation of what? That is what everyone is wondering. Inequality, stability, sustainability Let us be clear: **capitalism is the only successful system** yet invented **for organizing human beings to achieve** economic and technological **progress**. The idea that somehow we could **move beyond capitalism is pure fantasy**. To believe that we could do so would require us to ignore the fact that competition is inherent in the human species, even if we are also able to co-operate when it is in our interests to do so. And the period of human history during which capitalism has been most free to operate—basically, the past two centuries—has also been the period during which humanity has achieved the most rapid and sustainable advances in living standards and life-opportunities. But let us also be clear about the weaknesses of capitalism. During these past two highly successful centuries, capitalism has shown that it has a tendency to increase levels of inequality inside societies and between different societies in different parts of the world. That rising inequality can lead to social tension and even to conflict, which ends up disrupting capitalism itself. Moreover, as Karl Marx said, capitalism has always been unstable. It produces booms and busts, periods of growth and recession, bubble economies and then times of stagnation or even depression. And finally it does cause environmental damage, because the essence of industrial activity is the conversion of resources, using energy, into newly manufactured goods, and because the direct costs born by companies making those goods do not include any price for pollution or other environmental consequence. Most of all, the vast increase in humanity´s use of fossil fuels—mainly oil, gas and coal—has led to the rise in global temperature that we now know as global warming. Until recently, the scientific evidence on this point was unclear: now it has been proven beyond any reasonable scope for doubt. We can and should debate about what would be the appropriate policies to try to reduce the quantity of carbon dioxide emissions and to control the rise in global temperature. But there is no longer any point is disputing whether the rise has been influenced by human industrial activity. Following the shocks of the past two years, these weaknesses of capitalism have come sharply back into focus. It has been popular, since the collapse of Lehman Brothers, to attack something the critics call "market fundamentalism": Yukio Hatoyama made just such an attack in the pages of Voice magazine when he was campaigning to become prime minister. It is also popular for politicians to claim that an era of free-market, neo-liberal capitalism that began with Ronald Reagan and Margaret Thatcher at the start of the 1980s has now come to an end. A new direction is needed. But no one seems to agree on what it is. Well, perhaps that is unfair. Some commentators have argued that they have seen the future of capitalism and that they know it works: for the future, in their view, lies in Chinese-style capitalism, led and controlled by the state. Ian Bremmer, the owner and president of a Washington-based political-risk consultancy, the Eurasia Group, argued in an article in the journal Foreign Affairs in May/June 2009 (which he is now expanding into a book) that American-style capitalism is going to face fierce competition from state capitalism, and that many countries will now be tempted to try to emulate China. Previously, they tried to emulate the United States, but the global economic crisis has discredited that effort. Can that be correct? Does China now offer the new model, a "Beijing Consensus" to replace the "Washington Consensus" that became dominant in the 1990s? Is that the future of capitalism? Personally, I think this is very unlikely to be true. Certainly, capitalism needs to change. But not as drastically as this idea of a Chinese model would suggest. After all, the "Chinese model" of capitalism is not so very different from the forms of capitalist development that have been seen all over Asia during the past half century, in Japan, South Korea, Taiwan, Malaysia, Singapore and elsewhere. In all those countries, state intervention, both as a provider of guidance and finance, and as a direct owner of companies, has played a big role. China has not invented anything new. The last time Americans were worrying that their "model" faced a severe, even existential challenge was the 1980s, when scholars and lobbyists such as Chalmers Johnson, Clyde Prestowitz and James Fallows argued that America needed to learn from the Japanese model of a government-led industrial policy. That idea soon faded. And in all the Asian economic success stories, the role of the state has declined as the economy has grown more mature and complex. The same will surely occur in China. The framework for how capitalism needs to change comes, in my view, not from Chinese success but rather from the three weaknesses that I outlined earlier: inequality, instability and sustainability. Thanks to the global economic crisis, and thanks to the scientific evidence about climate change, reforms are needed to address all these three weaknesses. This, however, is nothing really new**.** The same sort of reforms were necessary after previous crises and slumps, and similar environmental reforms have been necessary in many countries during the past 50 years, at times when pollution reached intolerable and politically unpopular levels. These reforms can only be done by governments, for they consist of the setting of new rules of the game. Only government can do that, for only it has the legitimacy to set rules and to enforce them. But sensible, far-sighted companies should also try to participate in the formation of those rules, not to block them but to shape them in such a way as to make the new rules both economically and socially constructive. Companies, after all, do not exist separately from society. They are integral parts of society itself. Indeed, most citizens in modern economies devote much of their adult lives to working in companies and so they consider companies to be their main forms of social organization. They get much of their training and practical education from their companies, as well as their sense of self-esteem, of belonging to a social group. Moreover, companies typically take the lead in bringing changes to our social interactions by the way in which they invent or exploit new technologies: from the motor car to the telephone, from the mobile phone to the internet and to today´s social networking, capitalist companies have always operated in the heart of society. Companies thus have a powerful interest in working to ensure that society as a whole is in a healthy and positive condition, and that the right rules are set and followed, because that society is companies´ own market, and because society itself reaches deep inside the companies themselves. The gap between the rich and the poor The practical starting point for how capitalism needs to be changed, to be reformed, as a result of the global economic crisis comes from its weakness of instability. After all, that is what the language of the financial crash, of the collapse of Lehman Brothers, of the crisis implies straight away: an unstable system. All the present talk of reviewing and tightening financial regulation is a reaction to that instability, an attempt to find new ways to cope with this old problem. But despite all the immediate attention, instability is, in reality, a secondary issue the salience of which will decline once economic recovery gets strongly underway. The true political starting point for changing capitalism is not instability but inequality. Inequality is inherent in capitalism, just as it is inherent in society. But Marx was wrong to forecast that capitalist societies would always become more unequal. In fact, the degree of inequality within those societies has both risen and fallen many times during the past century, whether in the United States, Western Europe or Japan. This is a complex issue, so it cannot easily be summarized in a brief generalization. Still, I will attempt to do so: the degree of inequality seems to have been most influenced by the level of unemployment, by the evolution of education, and by politics. Periods of full employment tend to narrow the gap between the richest and the poorest. There is no surer path to poverty than being out of a job. Access to well-paid, productive jobs, however, depends in the long-term on education, which enables the poorer citizens to acquire skills and to take on more complex tasks. Karl Marx would be astonished at the fact that the developed countries chose to provide education, at taxpayers´ expense, to the whole of their population. That decision, though prompted by political pressure from the working classes, was also eventually accepted by the rich and by capitalists as being in their interests too, for they came to realize that a well educated population is more socially stable and more productive. The benefits of publicly financed mass education have even increased as our economies have come to be more and more dominated by knowledge-intensive industries and services.

#### Capitalism is self-correcting and sustainable – war and environmental destruction are not profitable and innovation solves their impacts

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Democratic capitalism is a system built for survival. It has adapted successfully to shocks of every kind, to upheavals in technology and economics, to political revolutions and world wars. Capitalism has been able to do this because, unlike communism or socialism or feudalism, it has an inner dynamic akin to a living thing. It can adapt and refine itself in response to the changing environment. And it will evolve into a new species of the same capitalist genus if that is what it takes to survive. In the panic of 2008—09, many politicians, businesses, and pundits forgot about the astonishing adaptability of the capitalist system. Predictions of global collapse were based on static views of the world that extrapolated a few months of admittedly terrifying financial chaos into the indefinite future. The self-correcting mechanisms that market economies and democratic societies have evolved over several centuries were either forgotten or assumed defunct. The language of biology has been applied to politics and economics, but rarely to the way they interact. Democratic capitalism’s equivalent of the biological survival instinct is a built-in capacity for solving social problems and meeting material needs. This capacity stems from the principle of competition, which drives both democratic politics and capitalist markets. Because market forces generally reward the creation of wealth rather than its destruction, they direct the independent efforts and ambitions of millions of individuals toward satisfying material demands, even if these demands sometimes create unwelcome by-products. Because voters generally reward politicians for making their lives better and safer, rather than worse and more dangerous, democratic competition directs political institutions toward solving rather than aggravating society’s problems, even if these solutions sometimes create new problems of their own. Political competition is slower and less decisive than market competition, so its self-stabilizing qualities play out over decades or even generations, not months or years. But regardless of the difference in timescale, capitalism and democracy have one crucial feature in common: Both are mechanisms that encourage individuals to channel their creativity, efforts, and competitive spirit into finding solutions for material and social problems. And in the long run, these mechanisms work very well. If we consider democratic capitalism as a successful problem-solving machine, the implications of this view are very relevant to the 2007-09 economic crisis, but diametrically opposed to the conventional wisdom that prevailed in its aftermath. Governments all over the world were ridiculed for trying to resolve a crisis caused by too much borrowing by borrowing even more. Alan Greenspan was accused of trying to delay an inevitable "day of reckoning” by creating ever-bigger financial bubbles. Regulators were attacked for letting half-dead, “zombie” banks stagger on instead of putting them to death. But these charges missed the point of what the democratic capitalist system is designed to achieve. In a capitalist democracy whose raison d’etre is to devise new solutions to long-standing social and material demands, a problem postponed is effectively a problem solved. To be more exact, a problem whose solution can be deferred long enough is a problem that is likely to be solved in ways that are hardly imaginable today. Once the self-healing nature of the capitalist system is recognized, the charge of “passing on our problems to our grand-children”—whether made about budget deficits by conservatives or about global warming by liberals—becomes morally unconvincing. Our grand-children will almost certainly be much richer than we are and will have more powerful technologies at their disposal. It is far from obvious, therefore, why we should make economic sacrifices on their behalf. Sounder morality, as well as economics, than the Victorians ever imagined is in the wistful refrain of the proverbially optimistic Mr. Micawber: "Something will turn up."