### ADV 1

#### Probability – 0.1% chance of a collision.

Alexander William Salter, Economics Professor at Texas Tech, ’16, “SPACE DEBRIS: A LAW AND ECONOMICS ANALYSIS OF THE ORBITAL COMMONS” 19 STAN. TECH. L. REV. 221 \*numbers replaced with English words

The probability of a collision is currently low. Bradley and Wein estimate that the maximum probability in LEO of a collision over the lifetime of a spacecraft remains below one in one thousand, conditional on continued compliance with NASA’s deorbiting guidelines.3 However, the possibility of a future “snowballing” effect, whereby debris collides with other objects, further congesting orbit space, remains a significant concern.4 Levin and Carroll estimate the average immediate destruction of wealth created by a collision to be approximately $30 million, with an additional $200 million in damages to all currently existing space assets from the debris created by the initial collision.5 The expected value of destroyed wealth because of collisions, currently small because of the low probability of a collision, can quickly become significant if future collisions result in runaway debris growth.

#### They’re misreading the Kessler effect.

Donald J. Kessler, Retired Senior Scientist for Orbital Debris Research at NASA/JSC, ’10, Nicholas L. Johnson,† and J.-C. Liou,‡ and Mark Matney “THE KESSLER SYNDROME: IMPLICATIONS TO FUTURE SPACE OPERATIONS” http://aquarid.physics.uwo.ca/kessler/Kessler%20Syndrome-AAS%20Paper.pdf

However, a ring is not likely to ever form in low Earth orbit because atmospheric drag will remove dust particles long before their inclinations approach zero. Unfortunately, as has been 3 concluded by a number of investigations, atmospheric drag will not remove larger collision fragments at a rate faster than they can be generated by the current population of intact objects. Consequently, certain regions of low Earth orbit will likely see a slow, but continuous growth in collision fragments that will not stop until the intact population is reduced in number. The question becomes how much confidence should we have in these conclusions and what are our options for dealing with the issue. There are three independent components of the predictions that can be examined: (1) The frequency of collisions between catalogued objects. (2) The consequences of collisions. (3) The rate of atmospheric decay of collision fragments.

#### Spacefence solves debris

Wyatt Olson, 4-10-2017, "Space Fence on Kwajalein will allow Air Force to monitor debris, threats," Stars and Stripes, https://www.stripes.com/news/pacific/space-fence-on-kwajalein-will-allow-air-force-to-monitor-debris-threats-1.462904

Dana Whalley, the Air Force’s Space Fence program manager, compared the old system to using a flashlight to search a dark attic, while Space Fence will light up the entire room. Space Fence will be able to detect objects as small as marbles at the roughly 250-mile height of the International Space Station. Such a small speck of debris might sound benign, but NASA has replaced space shuttle windows damaged by flying paint flecks. Bruce Schafhauser, Lockheed Martin’s program director for space surveillance, called the project “a game changer of space situational awareness” during a recent tour of the radar site. “Space is becoming an increasingly congested environment,” he said. Space Fence will thoroughly catalog pertinent debris so that even subtle location changes can be detected. That will allow the U.S. to move satellites out of harm’s way.

#### Status quo solves – mitigation and remediation compliance growing.

Colombo et. al 18—Camilla Colombo, PhD, visiting academic in Spacecraft Engineering within Engineering and Physical Sciences at the University of Southampton; Francesca Letizia, PhD, Space Debris Engineer at ESA Space Debris Office; Mirko Trisolini, PhD, Postdoctoral researcher at the Politecnico di Milano Department of Aerospace Engineering; Hugh Lewis, PhD, Professor within Engineering and Physical Sciences at the University of Southampton (“Space Debris: Risk Mitigation,” from Frontiers of Space Risk: Natural Cosmic Hazards & Societal Challenges, Chapter 5, p 128-136)

5.4 MITIGATION MEASURES The space debris problem is nowadays internationally recognized, therefore mitigation measures are being taken and guidelines discussed. These can be divided into two classes: The avoidance or protection measures and the active and passive debris removal measures. The avoidance or protection measures include the design of satellites to withstand impacts by small debris, or the selection of safe procedures for operational spacecraft such as orbits with less debris, specific attitude configurations, or implementing active avoidance maneuvers to avoid collisions. On the other hand, measures for debris removal currently consist in limiting the creation of new debris (by prevention of in-orbit explosions and ensuring spacecraft subsystems reliability), to free some orbital implementing end-of-life disposal maneuvers protected regions, or to reenter in the atmosphere. Active debris removal is also being considered as a mean to stabilize the growth of space debris by removing from orbit some selected noncompliant objects. The e.Deorbit mission will target an ESA-owned derelict satellite in low orbit, capture it with a net or robotic arm technology, and reenter with a controlled atmospheric reentry (Biesbroek et al. 2014). Acknowledging the fact that the projected growth in the number of satellites orbiting the Earth will increase in the future, space agencies and international organizations have been discussing and building a set of guidelines to ensure the sustainability of future space activities. The InterAgency Debris Coordination Committee (IADC) was founded in 1993 by ESA (Europe), NASA (the United States), the Japan Aerospace Exploration Agency (JAXA, Japan), and the Roscosmos Russian Federation. As of January 2017, the IADC also includes the Italian Space Agency (ASI, Italy), the Centre National d'Études Spatiales (CNES, France), the China National Space Administration (CNSA, China), the Canadian Space Agency (CSA, Canada), the German Aerospace Centre (DLR, Germany), the Korea Aerospace Research Institute (KARI, South Korea), the Indian Space Research Organisation (ISRO, India), the National Space Agency of Ukraine (NSAU, Ukraine), and the UK Space Agency (UKSA, United Kingdom). This international cooperation decided a set of space debris mitigation measures (Inter-Agency Space Debris Coordination Commitee, 2002), which includes: 1. Limitation of debris released during normal operations. 2. Minimization of the potential for on-orbit breakups (resulting from stored energy after the completion of mission operations, or during the operational phases of the mission and by avoiding intentional destruction and other harmful activities). 3. Post Mission Disposal in particular in geosynchronous regions and for objects passing through the LEO region. 4. Prevention of on-orbit collisions. The IADC guidelines were presented to the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) and contributed to the creation of the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space to be considered for the mission planning, design, manufacture and operational phases of spacecraft and launch vehicle orbital stages” (United Nations Office for Outer Space Affairs 2010): 1. Limit debris released during normal operations. 2. Minimize the potential for breakups during operational phases. 3. Limit the probability of accidental collision in orbit. 4. Avoid intentional destruction and other harmful activities. 5. Minimize potential for post-mission breakups resulting from stored energy 6. Limit the long-term presence of spacecraft and launch vehicle orbital stages in the low Earth orbit region after the end of their mission. 7. Limit the long-term interference of spacecraft and launch vehicle orbital stages with the geosynchronous region after the end of their mission. 5.4.1 Mitigation Guidelines for Post Mission Disposal In this section we focus on the third of the measures dictated by the IADC, namely Post Mission Disposal. A “25-year rule” was defined to limit the presence of satellites in the LEO region to no more than 25 years after their decommissioning. The 25-year limit was selected to ensure that a reasonable reduction in lifetime could be achieved without greatly affecting satellite resources. After 25 years a satellite has to be removed from the LEO protected region by placing it in a graveyard orbit or by disposing of it through atmospheric reentry. According to the IADC Space Debris Mitigation Guidelines (Inter-Agency Space Debris Coordination Commitee 2002) if "a spacecraft or orbital stage is to be disposed of by re-entry into the atmosphere, debris that survives to reach the surface of the Earth should not pose an undue risk to people or property.” The low Earth orbit protected region (LEO region) is the spherical shell region that extends from the Earth's surface up to an altitude of 2000 km. The geosynchronous protected region (GEO region) is a segment of a spherical shell with a lower and upper altitude boundary of 200 km below and above the geostationary altitude of 35,786 km, and which is constrained by a latitude sector extending between plus and minus 15 degrees from south to north (Inter-Agency Space Debris Coordination Committee 2002; United Nations Office for Outer Space Affairs 2010). At altitudes below 600 kilometers, spacecraft with a conventional area-to-mass ratio (i.e., conventional satellites have a value of area-tomass ratio around 0.012 m?/kg) will reenter within a few years due to atmospheric drag. Intervention to remove and prevent further creation of debris above that altitude should therefore be the primary focus of passive mitigation measures. As described in the document on the “Requirements on Space Debris Mitigation for ESA Projects” (ESA 2008) and the "ESA Space Debris Mitigation Compliance Verification Guidelines” (ESA 2015), end-of-life measures can be distinguished in: (1) Disposal, (2) passivation, and (3) reentry. Required measures for disposal currently cover spacecraft in LEO and GEO through a series of Operational Requirements (OR) (ESA 2008): "OR-01. Space systems operating in the LEO protected region shall be disposed of by reentry into the Earth's atmosphere within 25 years after the end of the operational phase." "OR-02. Space systems operating in the GEO protected region shall be disposed of by permanently removing them from the GEO protected region.” The GEO disposal orbit should be almost circular (i.e., eccentricity less of equal to 0.005) and with a minimum perigee altitude above the geostationary altitude, which is given as a function of the solar radiation pressure coefficient of the space system at the beginning of its life and its cross-sectional area. This is done to take into account the eccentricity oscillation due to the effects of solar radiation pressure and to ensure that such oscillation would not make the orbit interfere with the GEO protected regions. "OR-03. Where practicable and economically feasible, space systems outside the LEO and GEO protected regions shall implement means of end-of-life orbit disposal to avoid long-term interference with operational orbit regions, such as the Galileo orbit." OR-04. Launcher stages shall also perform end-of-life disposal maneuvers by targeting "direct reentry as part of the launcher sequence.” Alternatively, they should be injected into a LEO orbit with a maximum reentry time of 25 years. As other space systems, they should be removed from LEO and GEO protecting region and orbit that interfere with other operational orbits such as the one of the Galileo orbit. OR-05. Passivation of the system (spacecraft or launcher stage) has to be completed within 2 months of the end of mission. End-of-life measures for reentry include: OR-06. "For space systems that are disposed of by reentry," an "analysis has to be performed to determine the characteristics of fragments surviving to ground impact, and assess the total casualty risk to the population on ground assuming an uncontrolled reentry.” OR-07. Such a casualty risk has to be lower than 10-4 if an uncontrolled reentry is targeted; otherwise if the casualty risk is higher than the threshold of 10-4, "a controlled reentry must be performed such that the impact footprint can be ensured over an ocean area, with sufficient clearance of landmasses and traffic routes." The rate of compliance of missions to the end-of-life mitigation guidelines was analyzed by the ESA Space Debris Office in 2017). Between 2006 and 2015, the rate of compliance of LEO missions (including naturally compliant missions and satellites performing end-of-life maneuvers) was 53.3% for the payloads (corresponding to 60.3% of the payload mass), reaching end of life in the LEO protected region (Frey and Lemmens 2017). The compliant objects, with a lifetime after decommissioning of less than 25 years, include naturally compliant objects due to their initial altitude well inside the Earth's atmosphere (this constitutes the biggest part of the compliant share), compliant objects after a deorbit maneuver, or spacecraft having performed a maneuver leading to a direct reentry. In terms of mass, this share is constantly sloping downward. Between 2007 and 2016, 71.6% of the rocket bodies reaching end of life in the LEO protected region was compliant, and this fraction has remained virtually unchanged for 8 years in a row despite an increase in end-of-life maneuver activity. 5.4.2 Passive End-of-Life Disposal In order to meet the mitigation guidelines LEO satellites at the end of their life would use the remaining propellant to perform either a perigeelowering maneuver (to decrease the orbit perigee well inside the Earth's atmosphere to guarantee a reentry within 25 years) or a direct reentry. Spacecraft in GEO are instead currently re-orbited to quasi circular orbits outside the GEO protected ring, with a perigee line aligned with the SunEarth direction (where possible) in order to bind the long-term oscillations in the eccentricity caused by solar radiation pressure. Recently, ESA funded projects on the design of disposal trajectories for medium Earth orbits (MEO) (Alessi et al. 2014; Rossi et al. 2015), highly elliptical orbits (HEO), and libration Earth orbits (LPO) (Armellin et al. 2014; Colombo et al. 2014; Colombo et al. 2015). These have demonstrated the possibility of exploiting natural orbit perturbations for designing passive mitigation strategies for debris disposal. Disposal strategies enhancing the effects of orbit perturbations have been further analyzed in LEO (Alessi et al. 2017), in MEO (Rosengren et al. 2015; Alessi et al. 2016; Armellin and San-Juan; Daquin et al. 2016; Gkolias et al. 2016), in GEO (Colombo and Gkolias 2017), and in HEO (Colombo et al. 2014; Armellin et al. 2015). Indeed, it was shown that, rather than performing an expensive maneuver to lower the perigee, the optimal maneuver should be given in a way to change the disposal orbit to another neighborhood orbit where the effect of orbit perturbations causes the orbit perigee to enter into the atmosphere. Indeed, the effects of luni-solar perturbation causes long-term oscillation on the eccentricity, which can be exploited so that the spacecraft's trajectory over a long period (from 5 to 70 years, depending on the initial orbit) could lead to natural reentry. This effect can be enhanced by solar radiation pressure, especially if considering a spacecraft equipped with large solar panels or a deployable reflective surface (Lücking et al. 2012, 2013). Moreover, resonances with the Earth's nonuniform potential can enhance the eccentricity growth effects. 5.4.2.1 An Example of End-of-Life Deorbiting Exploiting Luni-Solar Perturbations One of the most beautiful demonstrations of how natural dynamics can be enhanced is given by the INTEGRAL mission designed by ESA, the United States, Russia, the Czech Republic, and Poland. The INTErnational Gamma-Ray Astrophysics Laboratory, launched in 2002, gathered some of the most energetic radiation from space (Eismont et al. 2003). A reentry of this spacecraft with a pure impulsive maneuver would have not been possible due to the limited amount of propellant left onboard. In an ESA-funded study, the end-of-life disposal of INTEGRAL mission--expected to end in 2016-was designed with a time window for disposal between January 1, 2013 and January 1, 2029. Reentry solutions with a delta-velocity requirement below 40-50 m/s were found (Colombo et al. 2014). The main perturbations acting on the dynamics of the reentry were luni-solar perturbations, which affect the evolution of eccentricity, inclination, and anomaly of the perigee measured with respect to the Earth-Moon plane. It was shown that depending on the set of initial elements, which depends on the date the reentry maneuver is performed, the proposed maneuver would then aim at further increasing or decreasing the eccentricity. In particular, if we focus on the natural evolution of the eccentricity under luni-solar perturbation and Earth's oblateness, when the nominal eccentricity is low, the optimal reentry maneuver further decrease the eccentricity value; as a consequence, the following long-term propagation will reach a higher eccentricity, corresponding to a reentry. In this case, the maneuver is more efficient (i.e., lower delta velocity is required) (Colombo et al. 2014). Once the initial disposal maneuver is performed, the spacecraft evolves under natural perturbations and the reentry can then be semicontrolled. The high inclination of HEOs represents an advantage as the final reentry phase can target regions at higher latitudes on the Earth's surface thereby reducing the ground hazard. In the case of HEOs, reentry is caused by luni-solar perturbation (not air drag), therefore the orbit reenter with quite a high eccentricity (high apogee and low perigee) and does not circularize. Due to the oscillations in eccentricity, the next optimal window for injecting the spacecraft into a reentry trajectory is between 2013 and the first half of 2018 for a final reentry in 2028. After that, the required maneuver would increase until reaching a next window for performing the maneuver between the second half of 2021 and the first half of 2026, for a reentry in 2028. These analytical studies were used for high fidelity parametric analyses performed by the ESA (Merz et al. 2015) to investigate the effect of a maneuver at apogee to change the perigee altitude. The final maneuver sequence was given at the beginning of 2015 and split into three major burns plus a touch-up for final fine-tuning. The spacecraft is now on its course to reentry in 2028 (see Figure 5.11).

**Debri cleanup efforts solve**

**Weiner 21** [Chloee Weiner, “New Effort To Clean Up Space Junk Reaches Orbit”. 3-21-2021. NPR. https://www.npr.org/2021/03/21/979815691/new-effort-to-clean-up-space-junk-prepares-to-launch. Accessed 7-18-2021]

A demonstration mission to test an idea to clean up space debris launched Monday morning local time from the Baikonur Cosmodrome in Kazakhstan. Known as **ELSA-d**, the mission will **exhibit technology that could help capture space junk**, the millions of pieces of orbital debris that float above Earth. The more than 8,000 metric tons of debris threaten the loss of services we rely on for Earth-bound life, including weather forecasting, telecommunications and GPS systems. The spacecraft works **by attempting to attach itself to dead satellites and pushing them toward Earth to burn up in the atmosphere.** ELSA-d, which stands for End-of-Life Services by Astroscale, will be carried out by a "servicer satellite" and a "client satellite" that launched together, according to Astroscale, the Japan-based company behind the mission. Using a magnetic docking technology, the servicer will release and try to "rendezvous" with the client, which will act as a mock piece of space junk. The mission, which will be run from the U.K., will carry out this catch and release process repeatedly over the course of six months. The goal is to prove the servicer satellite's ability to track down and dock with its target in varying levels of complexity. The spacecraft is not designed to capture dead satellites already in orbit, but **rather future satellites that would be launched with compatible docking plates on them.** Space junk has been a growing problem for years as human-made objects such as old satellites and spacecraft parts build up in low Earth orbit until they decay, deorbit, explode or collide with other objects, fragmenting into smaller pieces of waste. In 2019, for example, India blew apart one of its satellites orbiting Earth, creating hundreds of pieces of debris that threatened to collide with the International Space Station. According to a recent report by NASA, at least 26,000 of the millions of pieces of space junk are the size of a softball. Orbiting along at 17,500 mph, they could "destroy a satellite on impact." More than 500,000 pieces are a "mission-ending threat" because of their ability to impact protective systems, fuel tanks and spacecraft cabins. And the most common debris, more than 100 million pieces, is the size of a grain of salt and could puncture a spacesuit, "amplifying the risk of catastrophic collisions to spacecraft and crew," the report said. According to NASA, cleaning up space — and addressing the risks associated with debris — depend on preventing the accumulation of more waste and actively removing it. Space Junk: How Cluttered Is The Final Frontier? SHORT WAVE Space Junk: How Cluttered Is The Final Frontier? The development of other cleanup technologies has been underway for years. **In 2016, Japan's space agency sent a 700-meter tether** into space to try **to slow down and redirect space junk**. **In 2018**, a device called **RemoveDebris successfully cast a net around a dummy satellite**. The **European Space Agency also plans to send a self-destructing robot into orbit in 2025,** which the organization's former director general has **referred to as a space "vacuum cleaner." These effort**s could prove increasingly **important as private space ventures like SpaceX continue to clutter** low Earth **orbit with** a "mega-constellation" of **satellites**.

### ADV 2

#### Their impacts are backwards – neoliberalism is awesome and sustainable

Brook, et al, 15—professor of environmental sustainability at the University of Tasmania (Barry, with John Asafu-Adjaye, University of Queensland, Linus Blomqvist, Breakthrough Institute, Stewart Brand, Long Now Foundation, Ruth DeFries, Columbia Univeristy, Erle Ellis, University of Maryland, Baltimore County, Christopher Foreman, University of Maryland School of Public Policy, David Keith, Harvard University School of Engineering and Applied Sciences, Martin Lewis, Stanford University, Mark Lynas, Cornell University, Ted Nordhaus, Breakthrough Institute, Roger Pielke, Jr., University of Colorado, Boulder, Rachel Pritzker, Pritzker Innovation Fund, Joyashree Roy, Jadavpur University, Mark Sagoff, George Mason University, Michael Shellenberger, Breakthrough Institute, Robert Stone, Filmmaker, and Peter Teague, Breakthrough Institute, “AN ECOMODERNIST MANIFESTO,” <http://www.ecomodernism.org/manifesto/>, dml)

Intensifying many human activities — particularly farming, energy extraction, forestry, and settlement — so that they use less land and interfere less with the natural world is the key to decoupling human development from environmental impacts. These socioeconomic and technological processes are central to economic modernization and environmental protection. Together they allow people to mitigate climate change, to spare nature, and to alleviate global poverty. Although we have to date written separately, our views are increasingly discussed as a whole. We call ourselves ecopragmatists and ecomodernists. We offer this statement to affirm and to clarify our views and to describe our vision for putting humankind’s extraordinary powers in the service of creating a good Anthropocene. 1. Humanity has flourished over the past two centuries. Average life expectancy has increased from 30 to 70 years, resulting in a large and growing population able to live in many different environments. Humanity has made extraordinary progress in reducing the incidence and impacts of infectious diseases, and it has become more resilient to extreme weather and other natural disasters. Violence in all forms has declined significantly and is probably at the lowest per capita level ever experienced by the human species, the horrors of the 20th century and present-day terrorism notwithstanding. Globally, human beings have moved from autocratic government toward liberal democracy characterized by the rule of law and increased freedom. Personal, economic, and political liberties have spread worldwide and are today largely accepted as universal values. Modernization liberates women from traditional gender roles, increasing their control of their fertility. Historically large numbers of humans — both in percentage and in absolute terms — are free from insecurity, penury, and servitude. At the same time, human flourishing has taken a serious toll on natural, nonhuman environments and wildlife. Humans use about half of the planet’s ice-free land, mostly for pasture, crops, and production forestry. Of the land once covered by forests, 20 percent has been converted to human use. Populations of many mammals, amphibians, and birds have declined by more than 50 percent in the past 40 years alone. More than 100 species from those groups went extinct in the 20th century, and about 785 since 1500. As we write, only four northern white rhinos are confirmed to exist. Given that humans are completely dependent on the living biosphere, how is it possible that people are doing so much damage to natural systems without doing more harm to themselves? The role that technology plays in reducing humanity’s dependence on nature explains this paradox. Human technologies, from those that first enabled agriculture to replace hunting and gathering, to those that drive today’s globalized economy, have made humans less reliant upon the many ecosystems that once provided their only sustenance, even as those same ecosystems have often been left deeply damaged. Despite frequent assertions starting in the 1970s of fundamental “limits to growth,” there is still remarkably little evidence that human population and economic expansion will outstrip the capacity to grow food or procure critical material resources in the foreseeable future. To the degree to which there are fixed physical boundaries to human consumption, they are so theoretical as to be functionally irrelevant. The amount of solar radiation that hits the Earth, for instance, is ultimately finite but represents no meaningful constraint upon human endeavors. Human civilization can flourish for centuries and millennia on energy delivered from a closed uranium or thorium fuel cycle, or from hydrogen-deuterium fusion. With proper management, humans are at no risk of lacking sufficient agricultural land for food. Given plentiful land and unlimited energy, substitutes for other material inputs to human well-being can easily be found if those inputs become scarce or expensive. There remain, however, serious long-term environmental threats to human well-being, such as anthropogenic climate change, stratospheric ozone depletion, and ocean acidification. While these risks are difficult to quantify, the evidence is clear today that they could cause significant risk of catastrophic impacts on societies and ecosystems. Even gradual, non-catastrophic outcomes associated with these threats are likely to result in significant human and economic costs as well as rising ecological losses. Much of the world’s population still suffers from more-immediate local environmental health risks. Indoor and outdoor air pollution continue to bring premature death and illness to millions annually. Water pollution and water-borne illness due to pollution and degradation of watersheds cause similar suffering. 2. Even as human environmental impacts continue to grow in the aggregate, a range of long-term trends are today driving significant decoupling of human well-being from environmental impacts. Decoupling occurs in both relative and absolute terms. Relative decoupling means that human environmental impacts rise at a slower rate than overall economic growth. Thus, for each unit of economic output, less environmental impact (e.g., deforestation, defaunation, pollution) results. Overall impacts may still increase, just at a slower rate than would otherwise be the case. Absolute decoupling occurs when total environmental impacts — impacts in the aggregate — peak and begin to decline, even as the economy continues to grow. Decoupling can be driven by both technological and demographic trends and usually results from a combination of the two. The growth rate of the human population has already peaked. Today’s population growth rate is one percent per year, down from its high point of 2.1 percent in the 1970s. Fertility rates in countries containing more than half of the global population are now below replacement level. Population growth today is primarily driven by longer life spans and lower infant mortality, not by rising fertility rates. Given current trends, it is very possible that the size of the human population will peak this century and then start to decline. Trends in population are inextricably linked to other demographic and economic dynamics. For the first time in human history, over half the global population lives in cities. By 2050, 70 percent are expected to dwell in cities, a number that could rise to 80 percent or more by the century’s end. Cities are characterized by both dense populations and low fertility rates. Cities occupy just 1 to 3 percent of the Earth’s surface and yet are home to nearly four billion people. As such, cities both drive and symbolize the decoupling of humanity from nature, performing far better than rural economies in providing efficiently for material needs while reducing environmental impacts. The growth of cities along with the economic and ecological benefits that come with them are inseparable from improvements in agricultural productivity. As agriculture has become more land and labor efficient, rural populations have left the countryside for the cities. Roughly half the US population worked the land in 1880. Today, less than 2 percent does. As human lives have been liberated from hard agricultural labor, enormous human resources have been freed up for other endeavors. Cities, as people know them today, could not exist without radical changes in farming. In contrast, modernization is not possible in a subsistence agrarian economy. These improvements have resulted not only in lower labor requirements per unit of agricultural output but also in lower land requirements. This is not a new trend: rising harvest yields have for millennia reduced the amount of land required to feed the average person. The average per-capita use of land today is vastly lower than it was 5,000 years ago, despite the fact that modern people enjoy a far richer diet. Thanks to technological improvements in agriculture, during the half-century starting in the mid-1960s, the amount of land required for growing crops and animal feed for the average person declined by one-half. Agricultural intensification, along with the move away from the use of wood as fuel, has allowed many parts of the world to experience net reforestation. About 80 percent of New England is today forested, compared with about 50 percent at the end of the 19th century. Over the past 20 years, the amount of land dedicated to production forest worldwide declined by 50 million hectares, an area the size of France. The “forest transition” from net deforestation to net reforestation seems to be as resilient a feature of development as the demographic transition that reduces human birth rates as poverty declines. Human use of many other resources is similarly peaking. The amount of water needed for the average diet has declined by nearly 25 percent over the past half-century. Nitrogen pollution continues to cause eutrophication and large dead zones in places like the Gulf of Mexico. While the total amount of nitrogen pollution is rising, the amount used per unit of production has declined significantly in developed nations. Indeed, in contradiction to the often-expressed fear of infinite growth colliding with a finite planet, demand for many material goods may be saturating as societies grow wealthier. Meat consumption, for instance, has peaked in many wealthy nations and has shifted away from beef toward protein sources that are less land intensive. As demand for material goods is met, developed economies see higher levels of spending directed to materially less-intensive service and knowledge sectors, which account for an increasing share of economic activity. This dynamic might be even more pronounced in today’s developing economies, which may benefit from being late adopters of resource-efficient technologies. Taken together, these trends mean that the total human impact on the environment, including land-use change, overexploitation, and pollution, can peak and decline this century. By understanding and promoting these emergent processes, humans have the opportunity to re-wild and re-green the Earth — even as developing countries achieve modern living standards, and material poverty ends. 3. The processes of decoupling described above challenge the idea that early human societies lived more lightly on the land than do modern societies. Insofar as past societies had less impact upon the environment, it was because those societies supported vastly smaller populations. In fact, early human populations with much less advanced technologies had far larger individual land footprints than societies have today. Consider that a population of no more than one or two million North Americans hunted most of the continent’s large mammals into extinction in the late Pleistocene, while burning and clearing forests across the continent in the process. Extensive human transformations of the environment continued throughout the Holocene period: as much as three-quarters of all deforestation globally occurred before the Industrial Revolution. The technologies that humankind’s ancestors used to meet their needs supported much lower living standards with much higher per-capita impacts on the environment. Absent a massive human die-off, any large-scale attempt at recoupling human societies to nature using these technologies would result in an unmitigated ecological and human disaster. Ecosystems around the world are threatened today because people over-rely on them: people who depend on firewood and charcoal for fuel cut down and degrade forests; people who eat bush meat for food hunt mammal species to local extirpation. Whether it’s a local indigenous community or a foreign corporation that benefits, it is the continued dependence of humans on natural environments that is the problem for the conservation of nature. Conversely, modern technologies, by using natural ecosystem flows and services more efficiently, offer a real chance of reducing the totality of human impacts on the biosphere. To embrace these technologies is to find paths to a good Anthropocene. The modernization processes that have increasingly liberated humanity from nature are, of course, double-edged, since they have also degraded the natural environment. Fossil fuels, mechanization and manufacturing, synthetic fertilizers and pesticides, electrification and modern transportation and communication technologies, have made larger human populations and greater consumption possible in the first place. Had technologies not improved since the Dark Ages, no doubt the human population would not have grown much either. It is also true that large, increasingly affluent urban populations have placed greater demands upon ecosystems in distant places –– the extraction of natural resources has been globalized. But those same technologies have also made it possible for people to secure food, shelter, heat, light, and mobility through means that are vastly more resource- and land-efficient than at any previous time in human history. Decoupling human well-being from the destruction of nature requires the conscious acceleration of emergent decoupling processes. In some cases, the objective is the development of technological substitutes. Reducing deforestation and indoor air pollution requires the substitution of wood and charcoal with modern energy. In other cases, humanity’s goal should be to use resources more productively. For example, increasing agricultural yields can reduce the conversion of forests and grasslands to farms. Humans should seek to liberate the environment from the economy. Urbanization, agricultural intensification, nuclear power, aquaculture, and desalination are all processes with a demonstrated potential to reduce human demands on the environment, allowing more room for non-human species. Suburbanization, low-yield farming, and many forms of renewable energy production, in contrast, generally require more land and resources and leave less room for nature. These patterns suggest that humans are as likely to spare nature because it is not needed to meet their needs as they are to spare it for explicit aesthetic and spiritual reasons. The parts of the planet that people have not yet profoundly transformed have mostly been spared because they have not yet found an economic use for them — mountains, deserts, boreal forests, and other “marginal” lands. Decoupling raises the possibility that societies might achieve peak human impact without intruding much further on relatively untouched areas. Nature unused is nature spared. 4. Plentiful access to modern energy is an essential prerequisite for human development and for decoupling development from nature. The availability of inexpensive energy allows poor people around the world to stop using forests for fuel. It allows humans to grow more food on less land, thanks to energy-heavy inputs such as fertilizer and tractors. Energy allows humans to recycle waste water and desalinate sea water in order to spare rivers and aquifers. It allows humans to cheaply recycle metal and plastic rather than to mine and refine these minerals. Looking forward, modern energy may allow the capture of carbon from the atmosphere to reduce the accumulated carbon that drives global warming. However, for at least the past three centuries, rising energy production globally has been matched by rising atmospheric concentrations of carbon dioxide. Nations have also been slowly decarbonizing — that is, reducing the carbon intensity of their economies — over that same time period. But they have not been doing so at a rate consistent with keeping cumulative carbon emissions low enough to reliably stay below the international target of less than 2 degrees Centigrade of global warming. Significant climate mitigation, therefore, will require that humans rapidly accelerate existing processes of decarbonization. There remains much confusion, however, as to how this might be accomplished. In developing countries, rising energy consumption is tightly correlated with rising incomes and improving living standards. Although the use of many other material resource inputs such as nitrogen, timber, and land are beginning to peak, the centrality of energy in human development and its many uses as a substitute for material and human resources suggest that energy consumption will continue to rise through much if not all of the 21st century. For that reason, any conflict between climate mitigation and the continuing development process through which billions of people around the world are achieving modern living standards will continue to be resolved resoundingly in favor of the latter. Climate change and other global ecological challenges are not the most important immediate concerns for the majority of the world's people. Nor should they be. A new coal-fired power station in Bangladesh may bring air pollution and rising carbon dioxide emissions but will also save lives. For millions living without light and forced to burn dung to cook their food, electricity and modern fuels, no matter the source, offer a pathway to a better life, even as they also bring new environmental challenges. Meaningful climate mitigation is fundamentally a technological challenge. By this we mean that even dramatic limits to per capita global consumption would be insufficient to achieve significant climate mitigation. Absent profound technological change **there is no credible path to meaningful climate mitigation**. While advocates differ in the particular mix of technologies they favor, we are aware of no quantified climate mitigation scenario in which technological change is not responsible for the vast majority of emissions cuts. The specific technological paths that people might take toward climate mitigation remain deeply contested. Theoretical scenarios for climate mitigation typically reflect their creators’ technological preferences and analytical assumptions while all too often failing to account for the cost, rate, and scale at which low-carbon energy technologies can be deployed. The history of energy transitions, however, suggests that there have been consistent patterns associated with the ways that societies move toward cleaner sources of energy. Substituting higher-quality (i.e., less carbon-intensive, higher-density) fuels for lower-quality (i.e., more carbon-intensive, lower-density) ones is how virtually all societies have decarbonized, and points the way toward accelerated decarbonization in the future. Transitioning to a world powered by zero-carbon energy sources will require energy technologies that are power dense and capable of scaling to many tens of terawatts to power a growing human economy. Most forms of renewable energy are, unfortunately, incapable of doing so. The scale of land use and other environmental impacts necessary to power the world on biofuels or many other renewables are such that we doubt they provide a sound pathway to a zero-carbon low-footprint future. High-efficiency solar cells produced from earth-abundant materials are an exception and have the potential to provide many tens of terawatts on a few percent of the Earth’s surface. Present-day solar technologies will require substantial innovation to meet this standard and the development of cheap energy storage technologies that are capable of dealing with highly variable energy generation at large scales. Nuclear fission today represents the only present-day zero-carbon technology with the demonstrated ability to meet most, if not all, of the energy demands of a modern economy. However, a variety of social, economic, and institutional challenges make deployment of present-day nuclear technologies at scales necessary to achieve significant climate mitigation unlikely. A new generation of nuclear technologies that are safer and cheaper will likely be necessary for nuclear energy to meet its full potential as a critical climate mitigation technology. In the long run, next-generation solar, advanced nuclear fission, and nuclear fusion represent the most plausible pathways toward the joint goals of climate stabilization and radical decoupling of humans from nature. If the history of energy transitions is any guide, however, that transition will take time. During that transition, other energy technologies can provide important social and environmental benefits. Hydroelectric dams, for example, may be a cheap source of low-carbon power for poor nations even though their land and water footprint is relatively large. Fossil fuels with carbon capture and storage can likewise provide substantial environmental benefits over current fossil or biomass energies. The ethical and pragmatic path toward a just and sustainable global energy economy requires that human beings transition as rapidly as possible to energy sources that are cheap, clean, dense, and abundant. Such a path will require sustained public support for the development and deployment of clean energy technologies, both within nations and between them, though international collaboration and competition, and within a broader framework for global modernization and development. 5. We write this document out of deep love and emotional connection to the natural world. By appreciating, exploring, seeking to understand, and cultivating nature, many people get outside themselves. They connect with their deep evolutionary history. Even when people never experience these wild natures directly, they affirm their existence as important for their psychological and spiritual well-being. Humans will always materially depend on nature to some degree. Even if a fully synthetic world were possible, many of us might still choose to continue to live more coupled with nature than human sustenance and technologies require. What decoupling offers is the possibility that humanity’s material dependence upon nature might be less destructive. The case for a more active, conscious, and accelerated decoupling to spare nature draws more on spiritual or aesthetic than on material or utilitarian arguments. Current and future generations could survive and prosper materially on a planet with much less biodiversity and wild nature. But this is not a world we want nor, if humans embrace decoupling processes, need to accept. What we are here calling nature, or even wild nature, encompasses landscapes, seascapes, biomes and ecosystems that have, in more cases than not, been regularly altered by human influences over centuries and millennia. Conservation science, and the concepts of biodiversity, complexity, and indigeneity are useful, but alone cannot determine which landscapes to preserve, or how. In most cases, there is no single baseline prior to human modification to which nature might be returned. For example, efforts to restore landscapes to more closely resemble earlier states (“indigeneity”) may involve removing recently arrived species (“invasives”) and thus require a net reduction in local biodiversity. In other circumstances, communities may decide to sacrifice indigeneity for novelty and biodiversity. Explicit efforts to preserve landscapes for their non-utilitarian value are inevitably anthropogenic choices. For this reason, all conservation efforts are fundamentally anthropogenic. The setting aside of wild nature is no less a human choice, in service of human preferences, than bulldozing it. Humans will save wild places and landscapes by convincing our fellow citizens that these places, and the creatures that occupy them, are worth protecting. People may choose to have some services — like water purification and flood protection — provided for by natural systems, such as forested watersheds, reefs, marshes, and wetlands, even if those natural systems are more expensive than simply building water treatment plants, seawalls, and levees. There will be no one-size-fits-all solution. Environments will be shaped by different local, historical, and cultural preferences. While we believe that agricultural intensification for land-sparing is key to protecting wild nature, we recognize that many communities will continue to opt for land-sharing, seeking to conserve wildlife within agricultural landscapes, for example, rather than allowing it to revert to wild nature in the form of grasslands, scrub, and forests. Where decoupling reduces pressure on landscapes and ecosystems to meet basic human needs, landowners, communities, and governments still must decide to what aesthetic or economic purpose they wish to dedicate those lands. Accelerated decoupling alone will not be enough to ensure more wild nature. There must still be a conservation politics and a wilderness movement to demand more wild nature for aesthetic and spiritual reasons. Along with decoupling humankind’s material needs from nature, establishing an enduring commitment to preserve wilderness, biodiversity, and a mosaic of beautiful landscapes will require a deeper emotional connection to them. 6. We affirm the need and human capacity for accelerated, active, and conscious decoupling. Technological progress is not inevitable. Decoupling environmental impacts from economic outputs is not simply a function of market-driven innovation and efficient response to scarcity. The long arc of human transformation of natural environments through technologies began well before there existed anything resembling a market or a price signal. Thanks to rising demand, scarcity, inspiration, and serendipity, humans have remade the world for millennia. Technological solutions to environmental problems must also be considered within a broader social, economic, and political context. We think it is counterproductive for nations like Germany and Japan, and states like California, to shutter nuclear power plants, recarbonize their energy sectors, and recouple their economies to fossil fuels and biomass. However, such examples underscore clearly that technological choices will not be determined by remote international bodies but rather by national and local institutions and cultures. Too often, modernization is conflated, both by its defenders and critics, with capitalism, corporate power, and laissez-faire economic policies. We reject such reductions. What we refer to when we speak of modernization is the long-term evolution of social, economic, political, and technological arrangements in human societies toward vastly improved material well-being, public health, resource productivity, economic integration, shared infrastructure, and personal freedom. Modernization has liberated ever more people from lives of poverty and hard agricultural labor, women from chattel status, children and ethnic minorities from oppression, and societies from capricious and arbitrary governance. Greater resource productivity associated with modern socio-technological systems has allowed human societies to meet human needs with fewer resource inputs and less impact on the environment. More-productive economies are wealthier economies, capable of better meeting human needs while committing more of their economic surplus to non-economic amenities, including better human health, greater human freedom and opportunity, arts, culture, and the conservation of nature. Modernizing processes are far from complete, even in advanced developed economies. Material consumption has only just begun to peak in the wealthiest societies. Decoupling of human welfare from environmental impacts will require a sustained commitment to technological progress and the continuing evolution of social, economic, and political institutions alongside those changes. Accelerated technological progress will require the active, assertive, and aggressive participation of private sector entrepreneurs, markets, civil society, and the state. While we reject the planning fallacy of the 1950s, we continue to embrace a strong public role in addressing environmental problems and accelerating technological innovation, including research to develop better technologies, subsidies, and other measures to help bring them to market, and regulations to mitigate environmental hazards. And international collaboration on technological innovation and technology transfer is essential in the areas of agriculture and energy.

#### Developments in capitalism have helped create solutions to environmental problems

Pinker 18 – (Steven Pinker, Johnstone Family Professor in the Department of Psychology at Harvard University, “Enlightenment Now: The Case for Reason, Science, Humanism, and Progress,” Viking, Chapter 10: The Environment, 2018)

Not only have the disasters prophesied by 1970s greenism failed to take place, but improvements that it deemed impossible have taken place. As the world has gotten richer and crested the environmental curve, nature has begun to rebound.23 Pope Francis’s “immense pile of filth” is the vision of someone who has woken up thinking it’s 1965, the era of belching smokestacks, waterfalls of sewage, rivers catching fire, and jokes about New Yorkers not liking to breathe air they can’t see. Figure 10-3 shows that since 1970, when the Environmental Protection Agency was established, the United States has slashed its emissions of five air pollutants by almost two-thirds. Over the same period, the population grew by more than 40 percent, and those people drove twice as many miles and became two and a half times richer. Energy use has leveled off, and even carbon dioxide emissions have turned a corner, appoint to which we will return. The declines don’t just reflect an offshoring of heavy industry to the developing world, because the bulk of energy use and emissions comes from transportation, heating, and electricity generation, which cannot be outsourced. Rather, they mainly reflect gains in efficiency and emission control. These diverging curves refute both the orthodox Green claim that only degrowth can curb pollution and the orthodox right-wing claim that environmental protection must sabotage economic growth and people’s standard of living. Many of the improvements can be seen with the naked eye. Cities are less often shrouded in purple-brown haze, and London no longer has the fog—actually coal smoke—that was immortalized in Impressionist paintings, gothic novels, the Gershwin song, and the brand of raincoats. Urban waterways that had been left for dead—including Puget Sound, Chesapeake Bay, Boston Harbor, Lake Erie, and the Hudson, Potomac, Chicago, Charles, Eine, Rhine, and Thames rivers (the last described by Disraeli as “a Stygian pool reeking with ineffable and intolerable horrors”)—have been recolonized by fish, birds, marine mammals, and sometimes swimmers. Suburbanites are seeing wolves, foxes, bears, bobcats, badgers, deer, ospreys, wild turkeys, and bald eagles. As agriculture becomes more efficient (chapter 7), farmland returns to temperate forest, as any hiker knows who has stumbled upon a stone wall incongruously running through a New England woodland. Though tropical forests are still, alarmingly, being cut down, between the middle of the 20th century and the turn of the 21st the rate fell by two-thirds (figure 10-4).24 Deforestation of the world’s largest tropical forest, the Amazon, peaked in 1995, and from 2004 to 2013 the rate fell by four-fifths.25 The time-lagged decline of deforestation in the tropics is one sign that environmental protection is spreading from developed countries to the rest ofthe world. The world’s progress can be tracked in a report card called the Environmental Performance Index, a composite of indicators of the quality ofair, water, forests, fisheries, farms, and natural habitats. Out of 180 countries that have been tracked for a decade or more, all but two show an improvement. The wealthier the country, on average, the cleaner its environment: the Nordic countries were cleanest; Afghanistan, Bangladesh, and several sub-Saharan African countries, the most compromised. Two of the deadliest forms of pollution—contaminated drinking water and indoor cooking smoke—are afflictions of poor countries.27 But as poor countries have gotten richer in recent decades, they are escaping these blights: the proportion of the world’s population that drinks tainted water has fallen by five-eighths, the proportion breathing cooking smoke by a third.28 As Indira Gandhi said, “Poverty is the greatest polluter.” The epitome of environmental insults is the oil spill from tanker ships, which coats pristine beaches with toxic black sludge and fouls the plumage of seabirds and the fur of otters and seals. The most notorious accidents, such as the breakup of the Torrey Canyon in 1967 and the Exxon Valdez in 1989, linger in our collective memory, and few people are aware that seaborne oil transport has become vastly safer. Figure 10-5 shows that the annual number of oil spills has fallen from more than a hundred in 1973 to just five in 2016 (and the number of major spills fell from thirty-two in 1978 to one in 2016). The graph also shows that even as less oil was spilled, more oil was shipped; the crossing curves provide additional evidence that environmental protection is compatible with economic growth. It’s no mystery that oil companies should want to reduce tanker accidents, because their interests and those of the environment coincide: oil spills are a public-relations disaster (especially when the name of the company is emblazoned on a cracked-up ship), bring on huge fines, and of course waste valuable oil.

**Cap solves environment, data proves. This card answers every warrant**

Daniel Fernández **Méndez 18** (Daniel FernáNdez MéNdez, Daniel Fernández Méndez is lecturer in economics at Francisco Marroquín University in Guatemala and is Director of UFM Market Trends, an economics/finance newsletter. He is a PhD candidate in economics at King Juan Carlos University, and is a former Mises Institute fellow., 1-12-2018, "The Real Relationship Between Capitalism and the Environment," Mises Institute, https://mises.org/wire/real-relationship-between-capitalism-and-environment, Accessed: 7-1-2018 /)

"Capitalism is incompatible with the conservation of nature. Only the places with a strong state and restricted economic freedom can achieve high environmental quality ratings." These statements have been repeated so often that most people consider them true without giving them a slightest thought. Although these theories usually only explain one side of the coin, there are at least two opposing theories: More development and greater consumption levels put pressure on environmental variables. There can’t be infinite growth in a world of limited resources. Economic freedom also means that companies do not take into account the ecosystems that they are destroying in order to grow their market share and profits. These views relate to political ecology and eco-socialism. Greater economic freedom entails greater development, which in turn leads to greater environmental quality because consumers demand it. Furthermore, the protection of property rights ensures that environmental externalities are minimized. This view relates to economics and study programs that combine economics and environmentalism. **To find out which group’s theory is closest to reality, we analyze data on economic freedom and environmental quality. What Does the Data Tell Us?** When we combine environmental quality data with economic freedom data, we see **that the story is very different from what we are usually told.** The **countries with the most freedom are those with the highest environmental quality. There does not seem to be a trade-off between environmental quality and economic development — rather, it shows the opposite**. If we rank the countries from most to least free (by quartiles), we observe how **the countries with the highest economic liberty ranking are the same countries with the highest scores in the Environmental Performance Index.** fern1.png Source: Heritage Foundation. Yale.edu. There are no countries with a score lower than 35 points in the Environmental Quality Index. The scatter plot shows how the relationship between economic freedom and environmental performance is positive. Each point in the diagram represents a different country. fern2.png Source: Heritage Foundation. Yale.edu The regression analysis shows that for **every one point increase in the Index of Economic Freedom, there is a 0.96 point increase in the Environmental Performance Index. The positive correlation could not be clearer.** However, **the relationship between these variables is not static.** In the end**, environmental quality could deteriorate as a result of laissez faire policies in the long-term. To whether this is true, we examined the Environmental Performance Index with the average of the Index of Economic Freedom for the last 15 years. Once again, each point in the diagram represents a different country.** fern3.png Source: Heritage Foundation. Yale.edu We can observe how **countries with greater economic freedom, throughout time, have a better environmental performance.** Exporting Pollution One possible criticism of the argument presented here could be the following: **the countries with greater economic freedom — and the most prosperous ones — are “exporting” their polluting industries to the less free third world**, while keeping non-polluting industries in their country. **Large companies based in the first world would take advantage of the failed governments of the developing world, polluting there what they are not able to back home.** To see whether this is true, we would expect that the countries with a large influx of foreign direct investment to have a bad score on the Environmental Performance Index. However, this is not the case. fern4.png Source: World Bank. Yale.edu **The criticism seems to lack evidence.** **The relationship between both variables is non-existent, the level of foreign direct investment fails to determine the level of environmental performance. We cannot confirm that free — and rich — countries export their pollution by relocating companies to less free countries**. However, **we can confirm that greater foreign direct investment “exports” good environmental practices to developing countries.** If we analyze foreign direct investment from countries **with a very high environmental performance — above 85 points in the index — and countries with a very poor environmental performance** —below 50 points in the index — we see that the former hardly invests in the latter**. Less than 0.1% of foreign direct investment from “cleaner” countries goes to “dirtier” countries.** Of the 25 “clean” countries, 14 do not have a single investment in “dirtier” countries. Out of the remaining 11, only one exceeds 5% of its investments towards “dirty” countries. **Only two countries allocate more than 1% of their foreign direct investment to the “dirtiest” countries.** fern5.png Source: OECD. ONU (Unctad.org) In short, **countries that destroy the environment do so alone or with the investment of countries that also destroy their environment**. Most of the investment of “clean countries” goes towards other “clean” countries. **Pollution is not “exported” from rich countries to poor ones. What About Investment in Mining & Extraction**? **It is often said that extraction industries tend to pollute and degrade the environment** more than other sectors. Furthermore, these sectors tend to have bad press. Therefore, it could be that total foreign direct investment has no relation to environmental quality, but **it could also be that foreign direct investment has a stake in extraction industries, having a negative impact on the environment.** fern6\_0.png Source: World Bank. Investmentmap.org. This time we see a line with a slight negative trend. However, **if we perform a regression analysis (which is what this trend line is based on) the relationship between the variables is not statistically significant** — **in other words, there is no relationship between the variables**. **Even if there is greater economic freedom in the recipient country, a large investment in extraction industries does not degrade the environment. Correlation Is Not Causality The best criticism to this article could read as follows: “very well, but the data exposed here does not prove anything, it only shows correlations and does not show causality.”** Indeed, causality is explained by a theory or a set of logical relationships that aim to unite different events and give shape to a complex world that is perceived as chaotic. In other words, data does not speak for itself, it is interpreted through theories. **There are theories explaining how the freest countries, besides being the most prosperous, tend to take better care of the environmen**t. In the same way, there are theories that expose the contrary relationship: the greater the economic freedom, the more degraded the environment. **Both theories are based on opposing world views, what makes it interesting is comparing these theories with the available data. With the data at hand, it seems that the theory closest to reality is the one that claims that better economic freedom generates better environmental results.** This relationship is not irrefutable; good environmental quality depends on many other variables. However, it is clear that **as capitalism advances, so does the quality of the physical environment.** Conclusion **With the data analyzed, we can see that capitalism suits the environment. The greater the economic freedom, the better the environmental quality indexes.** The “cleaner” countries do not export their pollution by relocating companies. In fact, “cleaner” countries do not even invest in the “dirtiest” countries.

#### Cap solves inequality – prefer a global scale

Cowen 14 (Tyler, professor of economics at George Mason University, 7/19/14, “Income Inequality Is Not Rising Globally. It's Falling.”, https://www.nytimes.com/2014/07/20/upshot/income-inequality-is-not-rising-globally-its-falling-.html, AZG)

Income inequality has surged as a political and economic issue, but the numbers don’t show that inequality is rising from a global perspective. Yes, the problem has become more acute within most individual nations, yet income inequality for the world as a whole has been falling for most of the last 20 years. It’s a fact that hasn’t been noted often enough. The finding comes from a recent investigation by Christoph Lakner, a consultant at the World Bank, and Branko Milanovic, senior scholar at the Luxembourg Income Study Center. And while such a framing may sound startling at first, it should be intuitive upon reflection. The economic surges of China, India and some other nations have been among the most egalitarian developments in history. Of course, no one should use this observation as an excuse to stop helping the less fortunate. But it can help us see that higher income inequality is not always the most relevant problem, even for strict egalitarians. Policies on immigration and free trade, for example, sometimes increase inequality within a nation, yet can make the world a better place and often decrease inequality on the planet as a whole. International trade has drastically reduced poverty within developing nations, as evidenced by the export-led growth of China and other countries. Yet contrary to what many economists had promised, there is now good evidence that the rise of Chinese exports has held down the wages of some parts of the American middle class. This was demonstrated in a recent paper by the economists David H. Autor of the Massachusetts Institute of Technology, David Dorn of the Center for Monetary and Financial Studies in Madrid, and Gordon H. Hanson of the University of California, San Diego. At the same time, Chinese economic growth has probably raised incomes of the top 1 percent in the United States, through exports that have increased the value of companies whose shares are often held by wealthy Americans. So while Chinese growth has added to income inequality in the United States, it has also increased prosperity and income equality globally. The evidence also suggests that immigration of low-skilled workers to the United States has a modestly negative effect on the wages of American workers without a high school diploma, as shown, for instance, in research by George Borjas, a Harvard economics professor. Yet that same immigration greatly benefits those who move to wealthy countries like the United States. (It probably also helps top American earners, who can hire household and child-care workers at cheaper prices.) Again, income inequality within the nation may rise but global inequality probably declines, especially if the new arrivals send money back home. From a narrowly nationalist point of view, these developments may not be auspicious for the United States. But that narrow viewpoint is the main problem. We have evolved a political debate where essentially nationalistic concerns have been hiding behind the gentler cloak of egalitarianism. To clear up this confusion, one recommendation would be to preface all discussions of inequality with a reminder that global inequality has been falling and that, in this regard, the world is headed in a fundamentally better direction. The message from groups like Occupy Wall Street has been that inequality is up and that capitalism is failing us. A more correct and nuanced message is this: Although significant economic problems remain, we have been living in equalizing times for the world — a change that has been largely for the good. That may not make for convincing sloganeering, but it’s the truth. A common view is that high and rising inequality within nations brings political trouble, maybe through violence or even revolution. So one might argue that a nationalistic perspective is important. But it’s hardly obvious that such predictions of political turmoil are true, especially for aging societies like the United States that are showing falling rates of crime. Furthermore, public policy can adjust to accommodate some egalitarian concerns. We can improve our educational system, for example. Still, to the extent that political worry about rising domestic inequality is justified, it suggests yet another reframing. If our domestic politics can’t handle changes in income distribution, maybe the problem isn’t that capitalism is fundamentally flawed but rather that our political institutions are inflexible. Our politics need not collapse under the pressure of a world that, over all, is becoming wealthier and fairer. Many egalitarians push for policies to redistribute some income within nations, including the United States. That’s worth considering, but with a cautionary note. Such initiatives will prove more beneficial on the global level if there is more wealth to redistribute. In the United States, greater wealth would maintain the nation’s ability to invest abroad, buy foreign products, absorb immigrants and generate innovation, with significant benefit for global income and equality. In other words, the true egalitarian should follow the economist’s inclination to seek wealth-maximizing policies, and that means worrying less about inequality within the nation. Yes, we might consider some useful revisions to current debates on inequality. But globally minded egalitarians should be more optimistic about recent history, realizing that capitalism and economic growth are continuing their historical roles as the greatest and most effective equalizers the world has ever known.