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# Is free-market capitalism more climate friendly than egalitarianism?

## An empirical test, 1970-2017

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### Introduction

Governments in both the rich and poor worlds debate whether more open free-market economic policies should be curbed for reducing environmental harm, or whether free-market dynamics might deliver both economic sustainability and investments in technological change required for greening economies and building resilience to climate change (Lomborg 2018, Stern 2015). Left-leaning parties argue, as Nobel laureate Joseph Stiglitz and several other celebrated academics do, that governments should impose greater *democratic* control over free markets, equalizing wealth for the sake of more egalitarian approaches to achieving communitarian goals, such as the

environment (Piketty 2021, Rodrik 2011, Stiglitz 2019a). Egalitarian values, they argue, foster "green" rather than "greed," and the populistic backlash against environmentalism is driven by disaffections stemming from rising inequalities (Norris and Inglehart 2019, Vidal 2011, Wilkinson and Pickett 2009). Yet, populations across the world also care about jobs and higher consumption, which often come at the expense of the environment (Arrow et al. 1996, Dryzek 1997). Asking poor countries in particular to forego higher consumption might indeed be morally wrong, and also perhaps counterproductive if indeed environmental harms might be mitigated with higher levels of development (Wending et al. 2020).[1] This study is the first to examine the relative effects of free-market capitalistic economic conditions, measured as economic freedom, and egalitarian governance, measured as egalitarian democracy, on environmental sustainability and the emissions of greenhouse gases. Since it is well established that free markets associated with economic freedom generate economic growth and other forms of human wellbeing, the question of the environmental efficiency of this growth is critical (Berggren 2003, Feldman 2017, Stroup 2007). This question is not just academic, but it carries heavy policy implications given the urgency of addressing climate change while ensuring healthy economic growth, not least for alleviating poverty (Griggs et al. 2013, Lomborg 2018, Milanovic 2016).

## What is sustainability?

The idea of environmental sustainability can be separated broadly into two main categories — *weak* and *strong* sustainability. Weak sustainability places man´s economic wellbeing at the center, evaluating success on the basis of the environmental efficiency of the production of wealth. Weak sustainability, in other words, places economic development first but with minimal damage to the natural environment, including the atmosphere. Strong sustainability, contrarily, places the natural environment first, where environmental pollution and resource depletion must cease, regardless of the economic costs to society (Atkinson, Dietz and Neumayer 2007). This position rejects the view that natural capital is substitutable with other forms of capital, such as physical capital and human capital. Wealth creation and human wellbeing must progress, in other words, with *zero* impact on the natural environment. If one were to hazard a guess, most people, and certainly most governments, work on the basis of weak sustainability goals, while adopting measures designed for achieving strong sustainability goals where *feasible*. For example, encouraging policies that have led to the adoption of zero-emission motor cars, or solar and wind power generation for replacing dirtier energy sources could be seen as paths to stronger sustainability but would occur only through investment in the new and the abandonment of the old. There are important trade-offs. Jobs may be lost, societies may have to become poorer, consumption may suffer etc. Technological solutions for reducing and eliminating climate-harming atmospheric pollution are preferred policy paths for most green parties and political groupings as the long-term win-win solution to economic regeneration and climate stability (Stern 2015). Yet, such investment may face opposition from vested interests, such as the oil and coal industries (Mildenberger 2020).

According to some indicators, such as the "Environmental Performance Index" (EPI), richer countries have indeed achieved greater levels of environmental protection than the poorer parts of the world due to reduced atmospheric pollution and higher levels of protection of vulnerable ecosystems, but per capita energy use and greenhouse gases emissions remain high despite gains in many

other areas (Wending et al. 2020). The EPI evaluates countries on the basis of investments in the protection of environmental and human health, which in itself forms a justification for why the poorer countries should catch up in wealth for making such investments in the future (Lomborg 2018). The question addressed here is how well countries use their physical, human, and environmental assets for producing wealth, which is the idea of weak sustainability. After all, achieving at least weak sustainable goals is perhaps the preliminary steps to achieving strong sustainability goals.

Weak sustainability is the foundation for the inclusion of natural capital in national accounting, which has led to the development of the concept known as *genuine savings.* Pearce and Atkinson (1993) developed genuine savings based on the idea that an economy is weakly sustainable if all forms of capital—physical, human, and natural—are non-declining over time. Since the traditional accounting system treated investment in human capital as a consumption and not a saving, the new way of thinking treats investment in human capital as a saving. The new accounting of sustainability, thus, adjusts traditional accounting to reflect savings in human and natural capital. These data now appear as 'adjusted net savings' in the World Bank datasets, such as the *World Development Indicators* (Hamilton and Ruta 2009, Pearce and Atkinson 1993, World Bank 2020). This study uses the adjusted net savings and its components, such as the pollution efficiency of production measured by $CO_2$ damage as well as natural resource depletion per GDP as measures of weak sustainability. Additionally, using the same indicators on a per capita basis, this study will assess how free-market capitalistic governance contrasts with more egalitarian governance on sustainability defined as strong sustainability because the denominator is now a country´s population rather than GDP (wealth). The indicators of sustainability are described in detail below, but first, I discuss theory relating economic and political governance with environmental sustainability.

## Markets vs states, in brief!

Many suggest that the old fault lines of state versus market is now obsolete because capitalism itself will not exist without states capable of creating and enforcing rules that create free market competition (Collier 2018). The more relevant question might be: how do state policies enhance or retard markets in ways that either generate good versus bad outcomes for society? (Zingales 2021). Some argue quite clearly that states should lead the way on environmental issues by being entrepreneurial, much like the United States´ mission led by NASA to land humans on the moon because unlike private actors, states can take risks and drive technological change and innovation (Mazzucato 2015). Others argue that states, driven mostly by political concerns, will preface redistribution over free-market policies that ensure greater competition driven technological change that both increases economic wellbeing and leads to grass-roots solutions to social problems (Phelps 2013). Flanking these arguments, many others see egalitarianism as both the political and social path to greater environmental sustainability because inequality both hampers better (socially responsible) policy making and achieves higher redistribution (Stiglitz 2019b, Wilkinson and Pickett 2009). To briefly state the two broad positions: those in favor of free markets argue that Schumpeterian technological change required for solving environmental crisis requires free market competition driven by private sector incentives.[2] Markets can supply green alternatives and drive consumer behavior, or consumer demand is better supplied by the profit motives underlying markets. These scholars are likely to see governments captured by vested interests and other rent-seekers that constrain market choices. Their detractors see environmental harms

being driven by capitalist greed, and they see market failures rather than government failure as the problem. They call simultaneously for restraining free markets and focusing more on equity for achieving environmental goals. A series of empirical techniques are used to estimate a broad cross section of countries over roughly five decades for assessing the associations between these variables, including scrutiny of how such associations might be causal.

## Data & Method

As discussed above, first, I utilize indicators of weak sustainability to capture how most governments around the world seem to be approaching the future given the global need for poverty reduction and economic growth. Secondly, I use several measures of pollution intensity and resource depletion measured in per capita terms to capture strong sustainability (environmental quality assessed without considering economic impact). The main dependent variable measuring environmental (and economic) sustainability is the "adjusted net savings" (ANS) taken from the World Development Indicators (WDI) dataset. This indicator is essentially measured as:

> ANS = (investment in manufactured capital – net foreign borrowing + net official transfers – depreciation of manufactured capital + current education expenditures – net depreciation of natural capital + cost of atmospheric pollution) / Gross National Income (GNI)

Note that investment in manufactured capital minus foreign borrowing plus net official transfers minus depreciation of manufactured capital is equal to net national savings as reflected in traditional growth accounting. While the traditional national accounting treats government spending on education as consumption, genuine savings treats it as investment, which enters back into the savings. This is regarded as a first approximation to the full value of human capital investment, which is difficult to measure precisely. Capturing human capital investment is critical because it has a major impact on behaviour in general, and economic activity in particular. A more educated population engages in economic activities that draw less directly on natural resources and the environment, and their demands upon government may also change in a post-materialist direction.

Depreciation of natural capital covers non-renewable resource extraction, such as fossil fuels and minerals, as well as forestry, and is measured as price minus average cost times the amount of resources extracted. Cost of atmospheric pollution is approximated by the damage caused by carbon dioxide emissions and particulate emissions. $CO_2$ damage is measured by assigning a value of 100 USD per metric ton of $CO_2$.[3] It is apparent then, from the formula above, that negative genuine savings could be driven by high consumption (i.e. low investment in manufactured capital), high resource depletion and high pollution, while investment in human capital remains low, a clearly profligate, unsustainable path for a society. On the other hand, higher genuine savings are achieved via investment in manufactured capital with relatively lower depletion of the resource base, higher investment in human capital and lower damage to the environment. Savings of all forms of capital into the future, while increasing human capital, thus, is the essence of sustainable development (Atkinson et al. 1999).

Additionally, I also test two measures of strong sustainability that are based on per capita emissions

intensity of $CO_2$ and other greenhouse gases measured by the $CO_2$ equivalent amounts consisting of by-product emissions of hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulphur hexafluoride (SF6). $CO_2$ emissions per capita is defined by the WDI as:

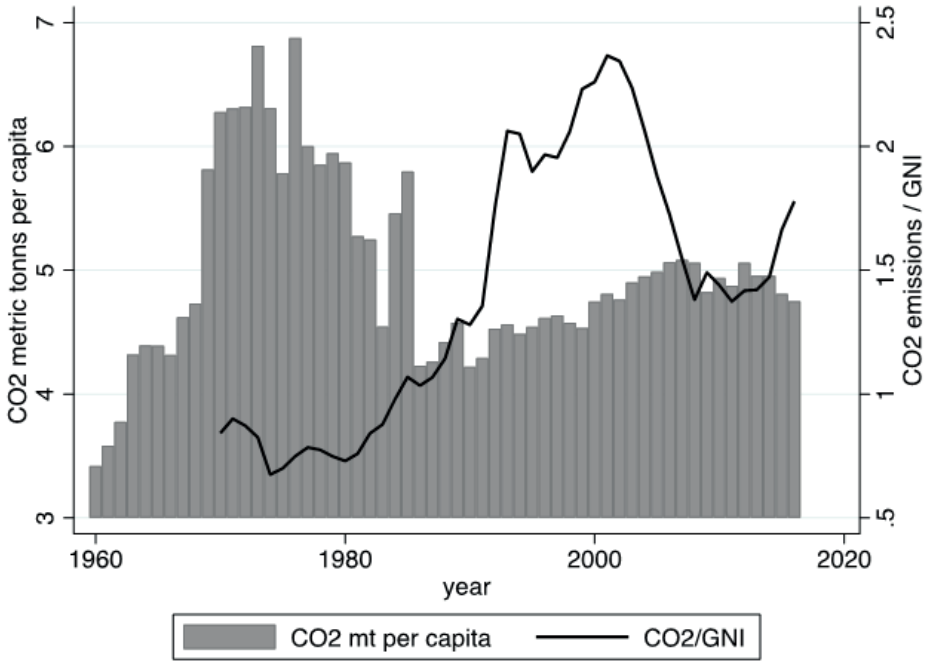
> Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.

The other greenhouse gases are defined in the following way:

> Derived as residuals from total GHG emissions, $CO_2$ emissions, CH4 emissions, and N2O emissions in kt of $CO_2$ equivalent. Other greenhouse gases covered under the Kyoto Protocol are hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride. Although emissions of these artificial gases are small, they are more powerful greenhouse gases than carbon dioxide, with much higher atmospheric lifetimes and high global warming potential. The emissions are usually expressed in carbon dioxide equivalents using the global warming potential, which allows the effective contributions of different gases to be compared.

Figure 2 displays the global trend in the weak sustainability variable on atmospheric pollution ($CO_2$ per GNI) as well as the strong sustainability indicator of $CO_2$ per capita emissions.

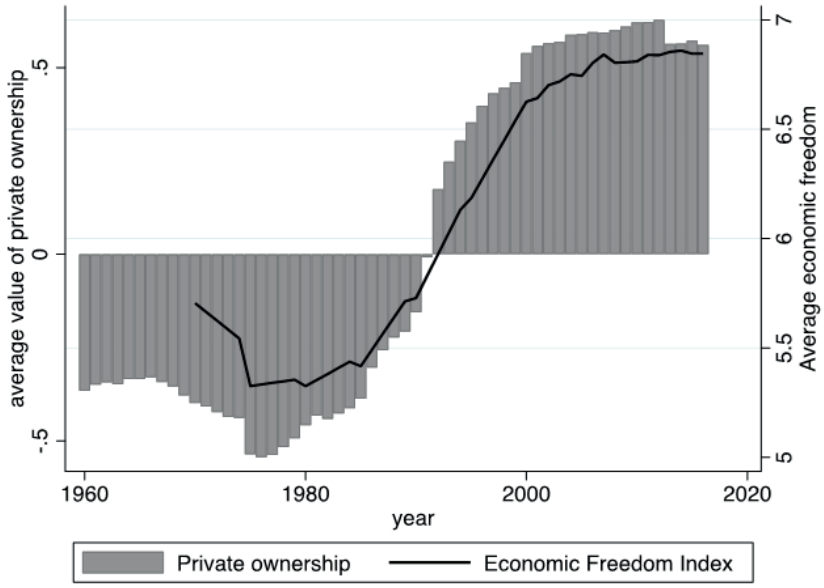
**Figure 2. Global average trends in CO2 per capita emissions & CO2 emissions/GNI, 1960-2018**




As seen there, $CO_2$ emissions per capita and $CO_2$ as a share of total economic output show somewhat diverging patterns. Emissions as a share of output has soared in the late 1990s and dropped drastically since about the mid-2000s, presumably because of the massive rise in fossil-fuel prices or due to the financial crisis of 2008 (thick line).

As the main independent variable, I use the Economic Freedom Index (EFW) obtained from the Fraser Institute (Gwartney, Lawson and Hall 2011).[4] These data are presented in quintiles until 2000, and then annually. I linearly interpolate the values between each of the quintiles covering the gaps between 1990 and 1995 until 2000, after which annual data are available. In robustness tests, the basic results were tested with the un-interpolated EFW and the results remain unchanged. The economic freedom index is made up of 5 essential areas; namely, 1) limited government 2) the rule of law and property rights protection 3) access to sound money 4) freedom to trade internationally 5) minimal regulation of business in terms of labour regulation. The 5 components of the index are made up of roughly 45 subjective and objective indicators which are then aggregated to form a single value for each country for each year. Secondarily, I also contrast the results using the Fraser Institute´s measure with the VDEM data´s measure of "state ownership" of the economy, defined and measured as the extent to which "private" ownership of economic activity exists in any given country, which is expert coded. Figure 3 displays the degree of correspondence between these two measures that are differently conceptualized and defined. As seen there, the global trend between the EFW and VDEM´s measure is uncannily close, suggesting excellent internal validity.

**Figure 3. The global trend in the Economic Freedom Index (Fraser Institute) & private ownership of the economy (VDEM), 1970-2018**

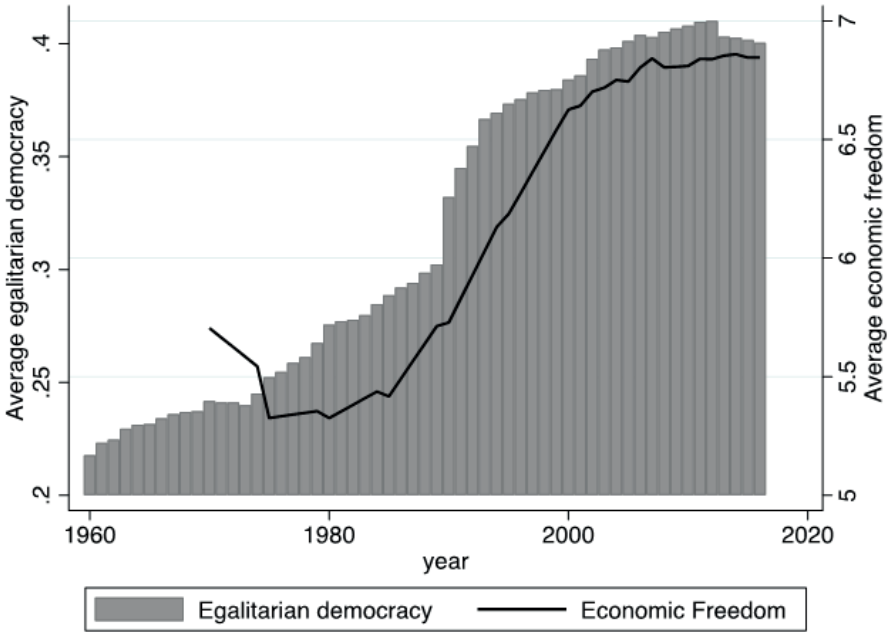



For examining the relative effects of economic versus political freedoms, I use democracy conceptualized and measured as "egalitarian democracy" by the VDEM data project. There are many conceptualizations of democracy, some of which relate to the rule of law essential to economic freedom. I choose to focus on egalitarian democracy because in the most general arguments, economic freedoms and free-market processes are supposedly constrained in more "egalitarian" processes of governance because of higher levels of regulation of market forces, more active public sectors, and state-sponsored social insurance requiring higher taxes and tariffs. Egalitarian democracies, in other words, have less inequality in terms of outcome and in terms of access.

According to the VDEM researchers, an egalitarian democracy builds on the theorized notion that individuals from all social groups ought to be equally capable of exercising their political rights and freedoms, and of influencing political and governing processes.

Underlying this broad principle are two main sub-components: equal protection and equal distribution of resources and income protection respectively. Equal protection implies that the state grants and protects rights and freedoms evenly across social groups (Sigman and Lindberg 2019). According to them, "an equal distribution of resources ensures that individuals have the basic necessities enabling them to exercise those rights and freedoms, leading towards an equal potential to influence decision making" (Sigman and Lindberg 2015: 1). An egalitarian democracy must also assure equal access to political power for all social groups, so that there is inclusivity in political decision making. They argue that greater egalitarian processes make the democratic polity more effective. Equality among groups would produce lower levels of polarization, allowing smoother resolution of tough political choices and compromises (Sigman and Lindberg 2015). Thus, egalitarian democracy includes several indicators capturing equal access to power, political resources, liberties and political inclusion, plus the degree of electoral democracy, or polyarchy, indicated by free and fair elections without coercion or violence in a competitive processes (VDEM 2021). These data are generated by a number of country, regional, and subject-based experts, and the coding undergoes rigorous reliability tests, such as item response theory analyses. A single value for each state is generated by minimizing the influence of any coding bias (Sigman and Lindberg 2019). Figure 4 graphically displays the trends in egalitarian democracy and the EFW over time.

**Figure 4. Average global trends in egalitarian democracy (VDEM) and the economic freedom (Fraser Institute), 1970-2018**




As discussed above, since at least the mid to late 1980s, egalitarian democracies and the degree of economic freedoms have converged, with the gap between the two narrowing since the late

1990s and early 2000s. Despite this, careful empirical study of the industrialized democracies shows that left-leaning governments still follow policies that are state-centric and redistributive compared with more right-leaning governments (Jäger 2017).

Finally, a host of appropriate statistical techniques are used on these data to tease out the associations between the sustainability outcomes and the emission of greenhouse gases. The statistical techniques assess the relative effects in terms of the direction and statistical significance of the main variables of interest—economic freedom and egalitarian democracy—on each of the sustainability outcomes. These effects can be interpreted in terms of their substantive impacts and their robustness based on several formal tests that allows one to make judgements about how well these variables predict the outcomes, and whether or not one might interpret the results as causal or simply associational. The main import of extensive analyses is summarized below.

## Results

The main variables are tested on *weak* sustainability first. Recall that weak sustainability is environmental degradation relative to economic production. In other words, the question is: how environmentally efficiently is wealth produced? Table 1 displays the results.

**Table 1. OLS fixed & random effects estimations of economic freedom and egalitarian democracy on weak sustainability measured as adjusted net savings, 1970-2017**

| Dependent variable | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Adjusted net savings rate | Driscoll-Kraay | Driscoll-Kraay | Driscoll-Kraay | Driscoll-Kraay | Newey-West |
| | Fixed effects | Random effects | Fixed effects | Random effects | Two-way fixed effects |
| | 1970-2017 | 1970-2017 | 1990-2017 | 1990-2017 | 1970-2017 |
| Economic Freedom | 0.674 | 0.784* | 1.765*** | 1.729*** | 0.674** |
| | (0.444) | (0.465) | (0.315) | (0.324) | (0.333) |
| Egalitarian democracy | -4.958 | -7.182** | -15.84*** | -15.92*** | -4.958** |
| | (3.272) | (2.806) | (3.967) | (2.840) | (1.992) |
| Income per capita (log) | 8.523*** | 4.761*** | 9.614*** | 5.169*** | 8.523*** |
| | (1.048) | (0.690) | (1.587) | (0.527) | (1.022) |
| Natural Resource Rents/GDP (log) | -0.822 | -0.821 | -0.101 | -0.276 | -0.822 |
| | (0.529) | (0.770) | (0.679) | (0.867) | (0.660) |
| Population density (log) | 7.657** | 1.336 | 12.16*** | 1.312 | 7.657*** |
| | (2.944) | (0.925) | (3.558) | (0.808) | (1.914) |
| Urban Population % (log) | -4.635* | -3.469 | -11.82*** | -6.279*** | -4.635* |
| | (2.652) | (2.328) | (3.395) | (1.519) | (2.532) |
| Constant | -66.63*** | -19.42*** | 0 | 0 | -61.75*** |
| | (10.45) | (4.763) | (0) | (0) | (10.76) |
| Observations | 3,978 | 3,978 | 2,859 | 2,859 | 3,978 |
| Number of countries | 145 | 145 | 145 | 145 | 145 |
| Standard errors in parentheses | | | | | |
| *** p<0.01, ** p<0.05, * p<0.10 | | | | | |
| Year fixed effects | YES | YES | YES | YES | YES |
| Country fixed effects | - | - | - | - | YES |

In column 1, economic freedom has a positive, statistically non-significant relationship with the adjusted savings rate. Egalitarian democracy shows a negative effect, but one that is also statistically not different from zero. In column 2, when random effects are estimated, the effect of economic freedom is positive and now statistically significant at the 1% level. Egalitarian democracy, however, is negative and also statistically highly significant. These results taken together, thus far, suggest that egalitarianism is associated with on a non-sustainable path of development compared with countries that are more friendly to free-market capitalism, independently of each other.

Importantly, these effects are far more pronounced in the post-Cold War period (Columns 3 & 4). Economic freedom increases sustainable development, while egalitarian democracy reduces it, results that are statistically highly significant. Substantively, a standard deviation increase in economic freedom increases the adjusted savings rate by roughly 16% of a standard deviation, holding all the other variables at their mean values. Contrarily, a standard deviation increase in egalitarianism reduces sustainable wealth production by 33% of a standard deviation (of the adjusted net savings). These effects, thus, are not just statistically significant but carry some substantive import. Concretely, if a country, such as Nigeria, increases its 2016 economic freedom score of 6.87 to that of Botswana´s in 2016 (7.5), Nigeria could increase its adjusted net savings by an extra 9% on average of the within standard deviation (6.85) on an annual basis. Alternatively, if Nigeria adopts economic freedom to the level of Denmark (8.01), it increases sustainability by 17% of a standard deviation annually. Clearly, these gains over time are likely to be substantial, but the main issue is that economic freedoms seem to increase greater environmental efficiency and human capital accumulation as a share of total wealth produced, while egalitarian governance shows the opposite effect, independently of all the controls.

The control variables are also interesting. Greater levels of income per capita increase sustainable development as do more densely populated countries. Higher shares of urban populations, however, seem to reduce it. I ran the basic model (column 4) with a quadratic term for income per capita to model the environmental Kuznets curve. This relationship is mostly positive and linear but flattening out at very high levels, but it does not follow the Kuznets curve. Estimating a quadratic effect for egalitarian democracy shows a linear negative effect that accelerated downwards roughly after the mid-point of egalitarian democracy (not shown). I continue the rest of the empirical tests using the most conservative estimating method, which is the Driscoll-Kraay method with fixed effects for the entire time period from 1970 as shown in column 1 where the results show the least statistical significance for the main variables.

Table 2 displays estimations of economic freedom and egalitarian democracy on components of the adjusted net savings disaggregated as $CO_2$ damage per GNI and the depletion of natural resources per GNI produced (weak sustainability).

**Table 2. OLS fixed effects estimations with Driscoll-Kraay standard errors of economic freedom and egalitarian democracy on weak sustainability measured as CO2 pollution and resource depletion, 1970-2017**

| Dependent variables | (1) CO2/GNI | (2) Resource depletion/GNI | (3) Forest depletion/GNI |
|---|---|---|---|
| Economic Freedom | -0.0666*** | 0.00136 | -0.0123 |
| | (0.0201) | (0.0151) | (0.00973) |
| Egalitarian democracy | 0.177*** | 0.172*** | 0.204*** |
| | (0.0444) | (0.0553) | (0.0375) |
| GDP per capita (log) | -0.170*** | 0.0562 | -0.124*** |
| | (0.0321) | (0.0391) | (0.0156) |
| Total Resource Rents/GDP (log) | 0.101*** | 0.628*** | 0.0863*** |
| | (0.0195) | (0.0351) | (0.0140) |
| Population density (log) | 0.756*** | 0.194*** | 0.121*** |
| | (0.0865) | (0.0546) | (0.0322) |
| Urban population % (log) | 0.669*** | 0.173** | 0.127*** |
| | (0.0685) | (0.0793) | (0.0354) |
| Constant | 0 | 0 | 0.184 |
| | (0) | (0) | (0.183) |
| Observations | 4,876 | 4,710 | 4,763 |
| Number of groups | 154 | 153 | 153 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10
Year fixed effects estimated

As seen in column 1, the effect of economic freedom is to lower $CO_2$ emissions per GNI produced, while egalitarian democracy increases it. These effects are statistically highly significant. Substantively, a standard deviation (within) increase in economic freedom reduces $CO_2$ emissions per GNI by roughly 15% of a standard deviation of $CO_2$/GNI (within). Comparatively, a similar increase in egalitarian democracy increases $CO_2$ per GNI by roughly 4% of a within standard deviation of $CO_2$/GNI, which is fairly small. Nevertheless, the relative effect of economic freedom compared with egalitarian democracy is favourable for achieving weak sustainability, or put another way, for generating wealth that is more environmentally efficient. When it comes to natural resource depletion (non-renewable and renewable), economic freedom is not statistically significantly related, whereas egalitarian democracy is again positively associated with resource depletion. Using the results in column 2, I compute the substantive impact. Raising egalitarian democracy by one within standard deviation increases the depletion of mineral and energy resources by roughly 4% of a standard deviation (within) of resource depletion per GNI. A similar calculation for forest depletion (column 3) suggests that raising egalitarian democracy by 1 standard deviation increases forest depletion by roughly 11% of a standard deviation of forest depletion, which is not negligible. Once again, I estimated a curvilinear effect of income on $CO_2$/GNI, and in this case, the results suggested a

clear inverted U-shape. As income increases, $CO_2$/GNI rises and then after a point subsides to a level below initial levels when income is at higher levels (see Appendix Figure 1). Interestingly, these same effects exist for both economic freedom and egalitarian democracy, where initial increases are offset at very high levels of economic freedom and egalitarian democracy (see Appendix Figures 2 & 3).

Thus far, I have only examined the notion of weak sustainability, which only measures the *economic* efficiency of environmental use, including atmospheric pollution. I turn next to examining strong sustainability measured as the degree to which nature is degraded on a per capita basis rather than as a share of wealth produced. Table 3 provides the comparative results using the disaggregated measures of resource use and atmospheric pollution, estimated for the post-cold war period.

**Table 3. OLS fixed effects estimations with Driscoll-Kraay standard errors of economic freedom and egalitarian democracy on strong sustainability measured as atmospheric pollution per capita & resource depletion on per capita basis, 1990-2017**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Dependent variables | CO2 emissions per capita | GHG emissions per capita | CO2 emissions mt per capita | Energy depletion per capita | Mineral depletion per capita | Forest depletion per capita |
| Economic Freedom | -0.0258*** | 0.0195 | -0.0243** | 0.104*** | 0.141*** | 0.115*** |
| | (0.00847) | (0.0124) | (0.00882) | (0.0202) | (0.0276) | (0.0142) |
| Egalitarian democracy | 0.265*** | 0.0181 | 0.276*** | -0.281 | 0.0740 | 0.703*** |
| | (0.0678) | (0.136) | (0.0625) | (0.198) | (0.234) | (0.135) |
| GDP per capita (log) | 0.782*** | 0.304*** | 0.737*** | 0.844*** | 0.614*** | 0.293** |
| | (0.0240) | (0.0374) | (0.0275) | (0.0620) | (0.0679) | (0.122) |
| Total Resource Rents/GDP (log) | 0.0192 | 0.0773*** | 0.0233 | 0.699*** | 0.762*** | 0.177*** |
| | (0.0225) | (0.0211) | (0.0194) | (0.0666) | (0.0976) | (0.0411) |
| Population density (log) | 0.580*** | 0.00729 | 0.514*** | 0.302* | 0.525*** | 0.668*** |
| | (0.0550) | (0.130) | (0.0532) | (0.152) | (0.127) | (0.0468) |
| Urban population % (log) | 0.645*** | 0.522*** | 0.591*** | -0.673*** | -0.148 | 0.538*** |
| | (0.119) | (0.0639) | (0.109) | (0.138) | (0.144) | (0.114) |
| Constant | 0 | -9.928*** | -9.945*** | 0 | 0 | -8.078*** |
| | (0) | (0.794) | (0.652) | (0) | (0) | (1.528) |
| Observations | 3,314 | 2,619 | 3,310 | 3,314 | 3,314 | 3,241 |
| Number of groups | 154 | 143 | 154 | 154 | 154 | 152 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10
Year fixed effects estimated

As seen across the columns in Table 3, economic freedom reduces $CO_2$ pollution per capita, it is statistically not significantly associated with all greenhouse gas pollution, but it remains negative and statistically highly significantly related to $CO_2$ pollution per capita measured in metric tonnes. Economic freedom is positive and statistically significantly related to energy, minerals, and forest depletion. These results taken together suggest that while economic freedom reduces atmospheric pollution relating to $CO_2$ from both weak and strong sustainability perspectives, it increases natural resource use in terms of per capita depletion. In so far as strong sustainability is the goal, then higher economic freedoms increase natural resource depletion rates. Comparatively, looking across the columns for egalitarian democracy, the effects on atmospheric pollution are positive and statistically highly significant, and egalitarian democracy associates positively with forest depletion.

Clearly, economic freedoms seem to produce better outcomes for sustainability from the point of view of atmospheric pollution. Substantively, a standard deviation (within) increase in economic freedom reduces $CO_2$ per capita pollution by roughly 3% of a standard deviation of $CO_2$ per capita, which interestingly is roughly the same amount in increased $CO_2$ pollution if egalitarian democracy was to be increased by a 1 standard deviation (within). Testing a quadratic term of income per capita on CO2 emissions per capita shows a linear effect that is monotonic, rather than the curvilinear effect (see Appendix Figure 4). Richer countries, thus, produce higher levels of $CO_2$ per person, which flattens out slightly at the very top. The quadratic effects of economic freedom and egalitarian democracy on $CO_2$ emissions per capita (strong sustainability) both follow a curvilinear shape independently of each other, but the effect of economic freedom´s negative effect seems stronger (see Appendix figures 5 & 6).

## Conclusion

Democracy, equity, and equality are all societal goods in their own right. Expecting these features to also lead to policies and processes that favour climate-change-mitigating outcomes might be more wishful than real. Many blame free-market capitalism for destroying both equitable outcomes and the climate. The evidence garnered from the examination of hard data on weak and strong sustainability, however, suggests just the opposite. Free-market capitalistic policies increase weak sustainability and reduce greenhouse gas emissions, whereas a measure of egalitarianism consistently works in the opposite direction. The basic results reported above are robust and consistent. They uphold despite a barrage of formal tests, including instrumental variables analyses that adjust the results for potential endogeneity bias resulting from both omitted variables and reverse causality.

As many studies show, economic freedom increases economic growth, promotes human capital development, and increases human wellbeing, not to mention higher government respect for human rights and societal peace (Berggren 2003, Bjørnskov 2015, de Soysa and Vadlamannati 2013, de Soysa 2020, Feldman 2017, Stroup 2007). Since economic freedom increases overall sustainability and reduces atmospheric pollution, its relative impact is more poverty- and environmentally friendly than critics claim. Naturally, both forms of freedoms are ultimately valuable on many other grounds, and they may generally go together. However, the results reject the view that free markets destroy the global commons while egalitarianism potentially provides the solutions for addressing climate change. It seems that the aversion to free market freedoms shown by many communitarians and environmental groups might be misplaced. As some argue, while free markets may have won out, governments may still reflect ideological biases (Jäger 2017). Addressing environmental sustainability may require governments to pragmatically harness the power of free markets and private sector actors for driving investments in environmentally friendly technologies and forging the markets that produce positive change. Simply resting on arguments that suggest that greater egalitarian values will generate the groundswell for positive change are likely to be mistaken given that government policies and regulations incentivize rent-seeking rather than meaningful investment in the green transition. Governments intent on political survival are likely to succumb either to rent-seeking by vested interest or populistic policies of consumption and spending that harm environmental causes. Moreover, policies that do not generate meaningful economic

development among the vast majority of this globe´s population will be unable to elicit the global cooperation required for long-term environmental cooperation if indeed climate objectives are to be achieved (Lomborg 2018). If economic freedom increases development and does so in ways that are environmentally efficient, then governments will do well to encourage it. Paradoxically, history has shown that social justice and equity, which are desirable in their own right, are best obtained by ensuring greater economic freedom (Friedman 1962, Hayek 1944, Otteson 2021).



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## Endnotes

1 See the Environmental Performance Index (EPI) generated by Yale University (https://epi.yale.edu).

2 For a good discussion of how Schumpeterian technological change occurs, see Stern (2015).

3 The economist William Nordhaus proposes 50$ as an appropriate price on carbon. Note, however, that since the price is the same for all countries, it is the amount emitted that is captured in the estimations over time. See https://carbon-price.com/william-nordhaus/.

4 For annual reports and access to data, see https://www.fraserinstitute.org/studies/economic-freedom-of-the-world-2020-annual-report?language=en (last accessed June 19, 2020).

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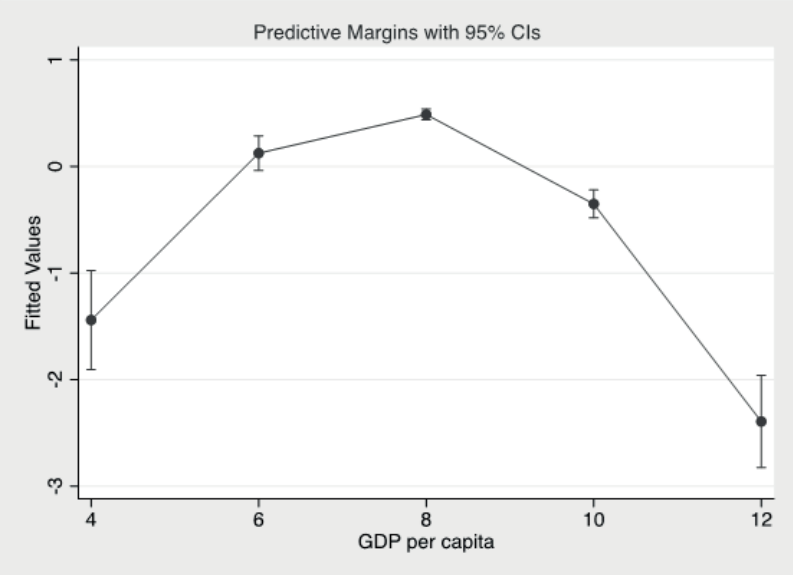
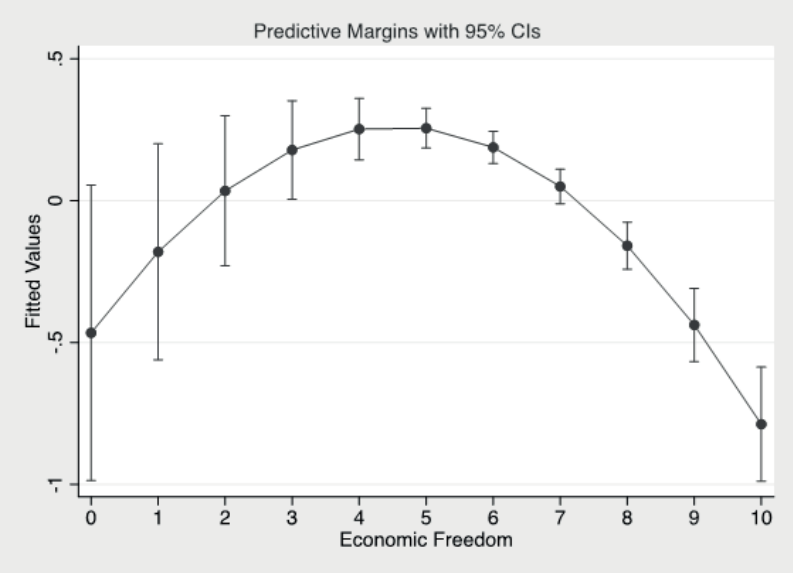
## APPENDIX

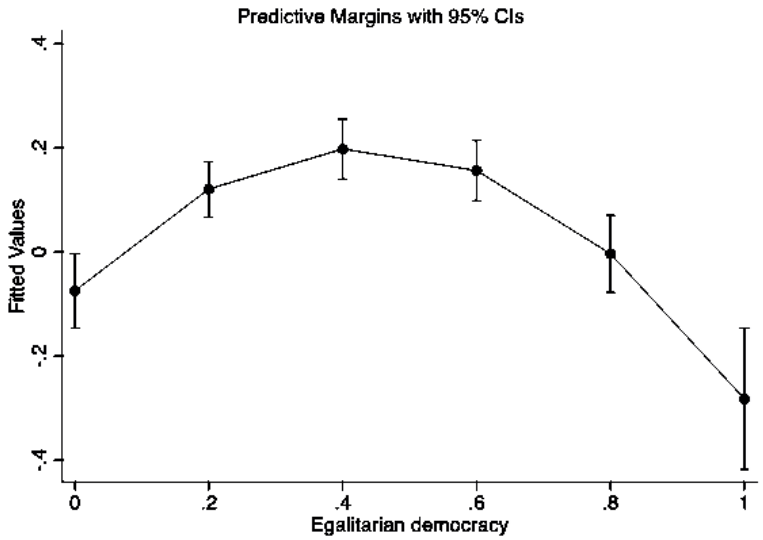
**Appendix Figure 1. The quadratic effect of Income per capita on CO2 emissions per GNI (weak sustainability)**



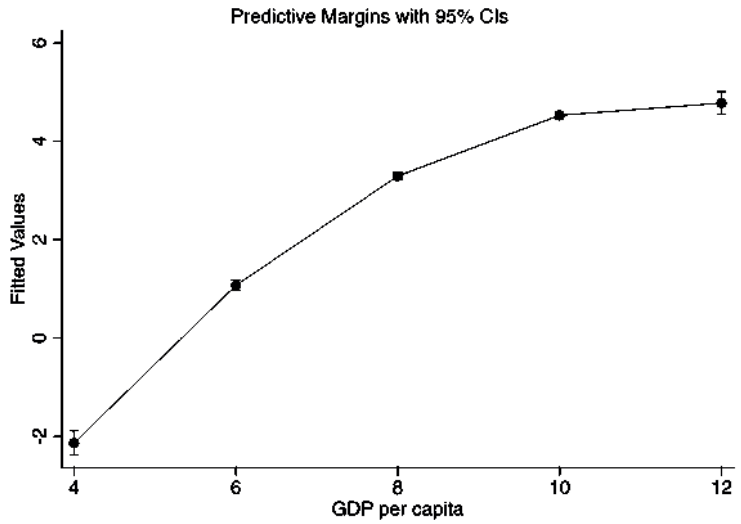

**Appendix Figure 2. The quadratic effect of economic freedom on CO2 emissions per GNI (weak sustainability)**



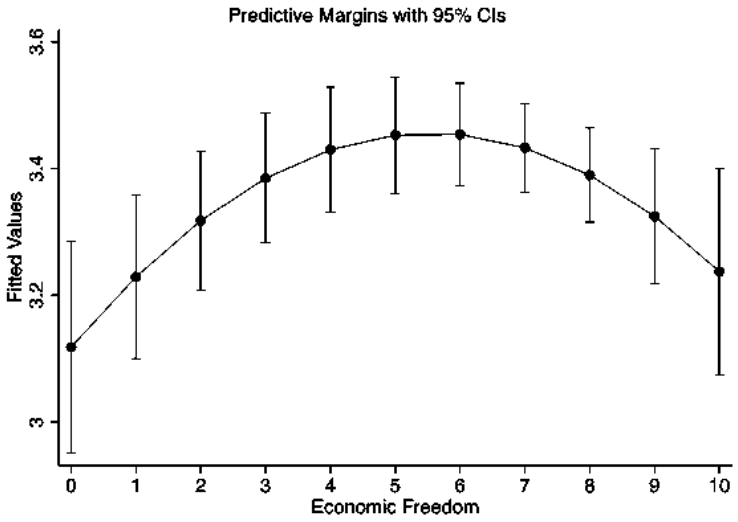
**Appendix figure 3: The quadratic effect of egalitarian democracy on CO2 emissions per GNI (weak sustainability)**




**Appendix figure 4: The quadratic effect of Income per capita on CO2 emissions per capita (strong sustainability)**



**Appendix Figure 5. The quadratic effect of Economic Freedom on CO2 emissions per capita (strong sustainability)**




**Appendix Figure 6. The quadratic effect of Egalitarian democracy on CO2 emissions per capita (strong sustainability)**