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To cite this article: Matthew Rendall (2021): Public debt and intergenerational ethics: how to fund a clean technology 'Apollo program'?, *Climate Policy*, DOI: [10.1080/14693062.2021.1935679](https://doi.org/10.1080/14693062.2021.1935679)

To link to this article: <https://doi.org/10.1080/14693062.2021.1935679>



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Published online: 11 Jun 2021.



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# Public debt and intergenerational ethics: how to fund a clean technology ‘Apollo program’?

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## ABSTRACT

If the present generation refuses to bear the burden of mitigating global heating, could we motivate sufficient action by shifting that burden to our descendants? Several writers have proposed breaking the political impasse by funding mitigation through public debt. Critics attack such proposals as both unjust and infeasible. In fact, there is reason to think that some debt financing may be *more* equitable than placing the whole burden of mitigation on the present generation. While it might not be viable for all countries to take this route simultaneously, a vanguard state, or group of states, could use public debt to fund an ambitious programme to develop inexpensive forms of clean low- or no-emission technology. This would ensure that vanguard actor or set of actors a leading role in those sectors while at the same time benefiting future generations around the world.

## Key policy insights:

- Debt-financed clean technology research can shift part of the burden of greenhouse gas mitigation to our descendants, breaking the political impasse of inaction or delayed action.
- Far from being an injustice to future generations, this could actually be fairer than expecting the present generation to bear the full burden of mitigation.
- Such an initiative may be most feasible if pursued by a vanguard actor.

## ARTICLE HISTORY

Received 22 August 2020  
Accepted 24 May 2021

## KEYWORDS

Mitigation; public debt;  
intergenerational justice;  
efficiency without sacrifice

## 1. Introduction

The COVID-19 pandemic and governments’ energetic efforts to contain it have raised widespread hopes of similar action on global heating. Recent progress toward low-emission technology has, moreover, been fast. This is seen not only in the falling cost of renewable energy, but also in the rapid development of plant- and lab-grown meat (Carrington, 2020; Choudhury et al., 2020; Kittner & Kammen, 2018). If innovation can render green technology attractive on the grounds of cost, it will spread whether or not governments and publics care about emissions (King, Browne, Layard, O’Donnell, Rees, Stern & Turner, 2015; Shue, 2013). But since the benefits from such research are in large part a public good, they are undersupplied (Barbier, 2020; Nordhaus, 2013). As a share of government outlays or GDP, US spending on clean technology research has fallen far short of efforts such as the Manhattan Project and Apollo Program (Kittner & Kammen, 2018; Stine, 2009). The same is true worldwide (King, Browne, Layard, O’Donnell, Rees, Stern & Turner, 2015). Despite valuable recent initiatives, such as Mission Innovation (Myslikova & Gallagher, 2020), more needs to be done.

How could funding for greenhouse gas (GHG) emissions reduction be stepped up? In recent years, the idea of financing GHG mitigation through public debt has attracted growing interest. Duncan Foley, John Broome and Jeffrey Sachs have argued that our emissions are economically inefficient. Future people would be glad to

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pay us to limit our emissions if this reduced their exposure to global heating. If we could shift the burden of a technological transition to future generations – a process Broome calls *efficiency without sacrifice* (hereafter EWS) – we could make them better off overall at no cost to ourselves. Debt-financed mitigation would be a mechanism for doing so. ‘Dealing with climate change can bring a great benefit to the world by removing the externality, and this benefit can be distributed to everyone’, writes Broome (2017), who adds ‘Nobody in any generation need suffer’. EWS can break the political logjam, defusing opposition to mitigation’s present-day costs (Broome, 2010, 2012, 2017, 2018; Broome & Foley, 2016; Foley, 2009; Sachs, 2015).

Through long-term debt, governments could support a shift to clean technology, while compensating industries and workers that suffer in the transition, all without raising taxes. Yet public borrowing may raise interest rates and crowd out other investments. For Foley and Broome, this is a feature of their proposals, not a bug. Funds for mitigation can come from either consumption or investment. Since their goal is to spare sacrifice to the current generation, Foley and Broome target the latter. They note that we are leaving future generations both natural resources and man-made goods. Borrowing to fund a transition to green technology will channel some of this legacy into environmental protection. They propose the creation of a ‘world climate bank’ to finance green investment through long term bonds (Broome, 2012; Broome & Foley, 2016; Foley, 2009; Rezai et al., 2012).

These might be proposals whose time has come. Governments’ desire to restart economies sputtering due to the COVID-19 pandemic has opened a window for deficit financing. So far, however, more stimulus spending has been channelled into polluting sectors than green ones (Finance for Biodiversity Initiative, 2021). The political incentives to address the two problems are different, involving ‘the clear psychological difference in how we treat an immediate emergency with one that we can dismiss as “for the future”’ (Colli, 2020). Some worry that the public debt now being incurred could handicap GHG mitigation in the long run (Colli, 2020; Elliott et al., 2020). EWS and similar proposals (Cseh, 2019; Rendall, 2011; Rozenberg et al., 2013) confront other objections. One is that they are morally dubious, exploiting the present generation’s position of power to extract advantages at future generations’ expense. They are, Stephen Gardiner (2017) charges, a kind of ‘intergenerational extortion’. Other critics question their feasibility. The worry here is that the present generation has already arranged the status quo to its maximum advantage. Rather than shifting the burden of mitigation to future generations, crowding out polluting investment in favour of green is likely to hurt the present generation (Lawlor, 2016; Maltais, 2015).

The first part of this paper mounts an ethical defence of EWS. The remainder addresses its feasibility. Crowding out presents less of a moral concern when government spending builds up the country’s capital stock (Makin & Layton, 2021). Moreover, even if it is impossible to shift the worldwide burden of mitigation to future generations, vanguard actors can finance research to develop alternative energy through foreign borrowing. Not all governments are heavily indebted, and some countries are net creditors. A single state or small group of states – such as the United States, South Korea or a consortium of Switzerland and Nordic countries – could use external borrowing to drive a programme of green innovation bringing great benefits both to those states themselves and to the world. In so doing, they would impose a burden of debt repayment on their future taxpayers, but leave them both a technologically advanced economy and a cleaner and safer planet.

## 2. Efficiency without sacrifice and its critics

In the worst-case climate scenarios, our emissions could kill billions and render much, if not all, of the earth uninhabitable (Broome, 2010; Lenton et al., 2019; Weitzman, 2009; Weitzman, 2011). Even if we escape the worst, global heating will cause enormous human and non-human suffering (Hsiung & Sunstein, 2007). It is morally imperative for us to address it. Broome and Foley argue that debt-financed mitigation will correct economic inefficiency. We pollute more than is optimal because the costs fall largely on future people. This allocation is inefficient since the latter would be willing to pay us to stop polluting. In principle, present and future generations could reach a bargain that would benefit all parties. Efficiency would be reached at the point that future generations’ willingness to pay matched the present generation’s desire to pollute (Foley,

2009).<sup>1</sup> However, framing the argument in this way makes borrowing sound suspiciously like a shakedown (Gardiner, 2017). Broome (2012) seems ready to concede this: ‘Receivers in effect bribe emitters not to harm them’.

In reality no bargaining, threats or bribery is taking place. The present generation can simply *take* what it wants (Gardiner, 2004b). The real question is how much we ought to take for ourselves, and what we ought to leave for the future. That requires an account of what future people deserve (Sunstein, 2007). Once this is the question, it is far from obvious that leaving debt, or a smaller capital base, would be wrong at all. We could, after all, leave much more for future generations by higher rates of investment. Is our failure to do so also an injustice (Mishan, 1963)? No judgment is possible without establishing the appropriate baseline of the legacy we should leave (Caney, 2014a). As James Tobin (1965) wrote more than fifty years ago,

Why single out debt finance to bear the whole burden of guilt? Is it not more to the point ... to ask what is intergenerational equity anyway? If some ‘burden’ of current public expenditure is shifted to the future, so what? Perhaps it should be ... It will depend on the nature of the public expenditure, and it will involve a judgment of the adequacy or over-adequacy of the provisions for the future the current generation is already making through private and public investment.

That a given generation must act against a threat need not mean it has the duty to bear the whole burden of doing so (Caney, 2014a). The case for public debt is least controversial when it will benefit multiple generations. The paradigmatic example is funding a major and justified war. Considerations both of fairness and of motivating the war effort speak for debt financing (Modigliani, 1961). The same is true here. Global heating was discovered only after economies, infrastructures and ways of life were already organized around the use of fossil fuels. It is not entirely our fault that the problem arrived on our watch, and we do not deserve to bear the full burden of confronting it (Malnes, 1995).

Provided we avoid ecological catastrophe, future generations of human beings are likely to enjoy greater material wealth than the present one, a pattern we have followed since the Industrial Revolution (Brennan, 2007; N. Buchanan, 2011; cf. Tremmel, 2009). Even if one doubts that this trend will continue overall, it is likely to be true of vanguard states that pursue intensive research into clean technology. Should those countries fund research by borrowing on external markets, as proposed below, they will leave future taxpayers a burden that they should be rich enough to pay off. If we ask the rich to pay a greater share of public expenditure within a single generation, why not intergenerationally (J. Buchanan, 1958/1999; Budolfson, 2021)? Our duty is not to leave already rich people in the future still richer, but to avoid future generations’ impoverishment (Rendall, 2011; Rendall, 2019).

Some may object that public debt burdens future taxpayers without consulting them (J. Buchanan, 1987). Yet every generation leaves its successors some burdens as well as many benefits. The question to ask is not whether future citizens *have* agreed to accept public debt – which is impossible – or even whether they *would* agree to accept it (they might be selfish) but whether it could be justified to them on impartial grounds (Parfit, 2011; Scanlon, 1998). Nearly all philosophers agree that the world’s rich countries have a duty to take the lead in mitigating global heating (Gardiner, 2004a). They have hitherto fallen far short. Public debt would impose a burden on the world’s rich countries that it is widely accepted they should assume anyway – even if their citizens presently refuse (Rendall, 2011).

### 3. Can the burden of mitigation be shifted to the future?

Public borrowing to finance effective GHG mitigation would be morally justified. The more important worries about Foley’s and Broome’s proposals for debt financing of mitigation concern whether enough countries will adopt them, and whether we can shift the composition of investment without leaving the present generation worse off. During an economic downturn such as the present one, when there is substantial unused capacity, government borrowing does not compete for lenders’ money with private investors. Under these circumstances it might be preferable to finance mitigation simply by printing money (J. Buchanan, 1987; Nersisyan & Wray, 2019). When the economy is near capacity, government borrowing is usually thought to drive up interest rates and ‘crowd out’ private investment. That is precisely what Foley and Broome count on. Government borrowing for green investments will crowd out polluting ones, transforming the industrial base while maintaining the same level of consumption. People will need to consume a different package of goods. There

will be some winners and some losers. Not all losses will be fully compensated, as Simon Caney (2014b) notes. Nevertheless, Broome and Foley (2016) argue, so long as resources are drawn from investment, overall living standards can be maintained.

That crowding out imposes a burden on the future is uncontroversial. What is less clear, as Aaron Maltais (2015) and Rob Lawlor (2016) point out, is how much crowding out can take place before it starts to squeeze out things of value to the present generation for which it is hard to compensate. Private and public investments are largely aimed at existing people and their immediate descendants. If we allow debt-financed mitigation to lower investment in schools or libraries or medical research, the present generation will pay a price. If all countries borrow to fund mitigation, burdening the present generation may be unavoidable, and debt financing may fail to break the political logjam. But would this problem arise if one or a few states undertook such an effort on their own?

#### 4. Borrowing by a vanguard actor

Many economists have held that a single country can avoid crowding out in its own economy by borrowing on foreign markets. Whereas internal borrowing may crowd out private investment, with external borrowing, future generations can inherit more capital, though also debt to be serviced and eventually paid off (J. Buchanan, 1958/1999; cf. Ratchford, 1958). Foreign borrowing thus shifts the burden of repayment from present to future generations, allowing a country to consume or invest more today, at the price of having in the future to consume or invest less (Gaspard & Gosseries, 2007; Lerner, 1948; Nevin, 1969). Contradicting this traditional view, Philippe Darreau and François Pigalle (2013) argue that in an open economy, the crowding-out effects of either domestic or foreign borrowing are diffused throughout the international system. In their view, no matter where a state borrows, its citizens will bear only a fraction of this burden. Either way, a vanguard actor could finance a technological revolution with limited crowding out, at most, at home.

To do so, a leading state or group of states could use public debt to fund an ambitious research programme. The United States is best suited to mounting an initiative on the scale of the Apollo Program, which would cost something over US\$15 billion per year in today's dollars (King, Browne, Layard, O'Donnell, Rees, Stern & Turner, 2015; for a lower estimate, see Stine, 2009). In the absence of American leadership, a good candidate might be a consortium of Denmark, Norway, Sweden and Switzerland, which have well-developed R&D, control over their own currencies and favourable ratios of external assets to liabilities (Eurostat, 2020, 2021). Urging Switzerland to become a 'workshop for strategic, global climate solutions, a laboratory for testing and early deployment of climate-friendly technologies', Ivo Nicholas Scherrer notes that his country's low public debt would allow the initiative to be financed partly through borrowing (2020; see also Ammann, 2020). The same would be true of its Nordic counterparts. South Korea, with a larger economy compared to the Scandinavian countries and Switzerland, and an industrial policy already geared to exporting green technology (Barbier, 2020; Kalinowski, forthcoming), might be another candidate. The aim would be to boost investment to drive the price of clean forms of technology below that of dirty ones, making decarbonization less burdensome and more attractive worldwide (Karlsson, 2016; Karlsson & Symons, 2015; King, Browne, Layard, O'Donnell, Rees, Stern & Turner, 2015; Shellenberger Nordhaus, Navin, Norris & Van Noppen, 2008; Shue, 2013; Wilbanks, 2011). Like geo-engineering, this is an initiative that a small group of countries or even a single state could undertake without waiting for broad international agreement (Scherrer, 2020) – but far less controversial and dangerous than remaking the climate.

By financing this programme through public debt, the vanguard actor would impose a burden on its own future taxpayers. But if it mitigated climate change while expanding its own research base and capital stock, there is good reason to think that this burden would be manageable. Though the whole planet would benefit, it would give the vanguard actor a technological head start (Sarewitz & Pielke, 2008). If, moreover, the vanguard actor financed the initiative through external debt, it would bear the burden of only a fraction of any crowding out. Much of the burden of crowding out would fall on other countries, rendering the programme less onerous and more politically acceptable at home.

Would this be an injustice to other states? If borrowing caused crowding out in rich lenders, it would raise no fairness concerns. Most rich countries have failed to do as much as they could or should mitigate global heating.

An initiative funded by external debt would be a way for the vanguard actor to make lending countries assume some of a burden they should in any case be sharing. To the extent that the effort competed with poor countries for investment capital, on the other hand, it would externalize part of the burden to those who bear the least responsibility for the problem and could least afford it. This problem might be mitigated by directing some of the vanguard state's borrowed funds to assisting the South in making the transition to green technology (Rendall, 2011).

## 5. Conclusion

The moral case for EWS is strong. If states can agree to establish a world climate bank, as Broome and Foley propose, they should do it. Arpad Cseh's (2019) recent proposal for a debt-financed international climate fund, paying members in proportion to emissions cuts, is a promising suggestion for how states could be incentivized to take part. But governments differ greatly in their ability and willingness to cooperate and to take on public debt, all the more following the extraordinary expenditures of 2020–21 in response to the COVID-19 pandemic. Moreover, commentators disagree as to how much of the worldwide burden can be shifted from one generation to another. What is clear is that a vanguard actor could use borrowing to fund the search for cheap clean energy, and some states are in a position to do so. Technological breakthroughs may not be a panacea for global heating (Cafaro, 2014; Moriarty & Honnery, 2020; Mowery et al., 2010), but we are likely to be in deep trouble without them.

A programme of the kind described here would put the vanguard actor in the forefront of the green technological revolution. The proposal thus has the political advantage of working in tandem with national interest rather than against it. At the same time, since clean technology innovation is a public good, it would also be of great benefit to the rest of the world. States need have no reservations about financing a research programme to discover such technology through public debt, in part or in full. It will be better for future generations to share in the effort than for us to do too little, too late.

## Notes

1. Paul Kelleher (2015) points out that such thought experiments are complicated by the 'non-identity problem': the present generation's decisions will determine future people's identities. We can, however, imagine the future generation as disembodied souls who know that they will be born into whatever future they negotiate. See Reiman, 2007.

## Acknowledgements

For comments, suggestions and advice, I thank John Broome, Philippe Darreau, Rasmus Karlsson, Dominic Roser, Beatrice Schilling, Clara Schilling Mascarenhas, Lennart Stern, two anonymous referees, the editors of *Climate Policy*, and audiences at Oxford's Global Priorities Institute and Cambridge's Centre for the Study of Existential Risk.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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