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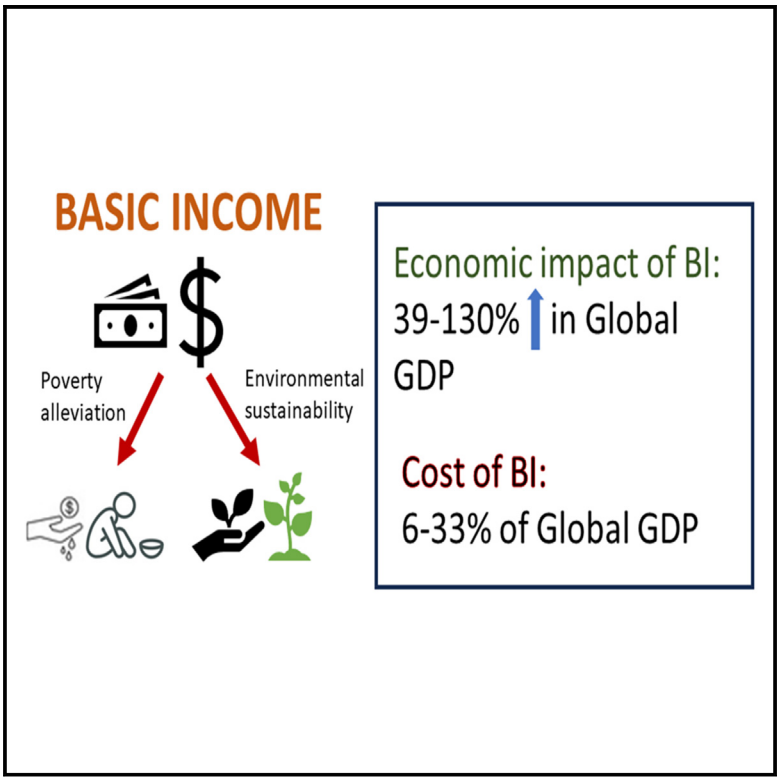
Utilizing basic income to create a sustainable, poverty-free tomorrow

Graphical abstract



Authors

U. Rashid Sumaila, Colette C.C. Wabnitz, Louise S.L. Teh, ..., Carl Folke, Sumeet Gulati, Stephen Polasky

Correspondence

r.sumaila@oceans.ubc.ca

In brief

Basic income (BI) can contribute to bolstering economies and improving environmental conditions. We conduct a global analysis examining the economic impacts and costs of BI. We find that BI implementation is feasible and could be a potential solution for addressing the dual challenges of decreasing worldwide poverty while reducing environmental degradation.

Highlights

- The COVID-19 pandemic underscored society's vulnerabilities to shocks
- Human activities have contributed to climate change and environmental degradation
- Highlights the potential of basic income to tackle sustainability and poverty
- With appropriate strategies, basic income can bolster economies during times of crisis

Sumaila et al., 2024, Cell Reports Sustainability *1*, 100104
June 28, 2024
https://doi.org/10.1016/j.crsus.2024.100104

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Please cite this article in press as: Sumaila et al., Utilizing basic income to create a sustainable, poverty-free tomorrow, Cell Reports Sustainability (2024), https://doi.org/10.1016/j.crsus.2024.100104

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Utilizing basic income to create a sustainable, poverty-free tomorrow

U. Rashid Sumaila,[1,2,3,13,*] Colette C.C. Wabnitz,[1,4] Louise S.L. Teh,[1] Lydia C.L. Teh,[1] Vicky W.Y. Lam,[1] Haske Sumaila,[5] William W.L. Cheung,[1] Ibrahim Issifu,[1] Kristen Hopewell,[2] Joshua E. Cinner,[6] Nathan J. Bennett,[1,2,7] Carl Folke,[8,9,10] Sumeet Gulati,[11] and Stephen Polasky[12]

[1]Institute for the Oceans and Fisheries, University of British Columbia, Vancouver, BC, Canada
[2]School of Public Policy and Global Affairs, University of British Columbia, Vancouver, BC, Canada
[3]Department of Agricultural Economics and Rural Development, University of Pretoria, Pretoria, South Africa
[4]Center for Ocean Solutions, Stanford University, Stanford, CA, USA
[5]Integrated Engineering, Faculty of Applied Sciences, University of British Columbia, Vancouver, BC, Canada
[6]Thriving Oceans Research Hub, School of Geosciences, University of Sydney, NSW, 2006, Australia
[7]Global Science, WWF, Washington, DC, USA
[8]Global Economic Dynamics and the Biosphere, Royal Swedish Academy of Sciences, Stockholm, Sweden
[9]Stockholm Resilience Centre, Stockholm University, Stockholm, Sweden
[10]Beijer Institute of Ecological Economics, Royal Swedish Academy of Sciences, Stockholm, Sweden
[11]Food and Resource Economics, Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC, Canada
[12]Department of Applied Economics, Department of Ecology, Evolution and Behavior, University of Minnesota, St. Paul, MN, USA
[13]Lead contact
*Correspondence: r.sumaila@oceans.ubc.ca
https://doi.org/10.1016/j.crsus.2024.100104

SCIENCE FOR SOCIETY Basic income (BI) involves unconditional, regular cash disbursements to either a segment or to the total population. In this study, the authors conduct a global analysis examining the potential impact of BI as a two-pronged solution to both environmental sustainability and social resilience. The authors show that BI can potentially bolster economies. To lower BI implementation costs, the authors suggest a range of strategies aimed at financing BI, strategically designed to concurrently alleviate economic insecurity while fostering nature conservation. The authors argue that BI implementation is feasible and could be a potent tool in addressing the twin challenges of decreasing worldwide poverty while reducing environmental degradation.

SUMMARY

The coronavirus disease 2019 (COVID-19) pandemic of 2020 was a reminder of society's vulnerability in the face of natural upheavals, leading to widespread unemployment and increased poverty. Simultaneously, human activities have precipitated large-scale environmental degradation and catastrophic climate change. Here, we conduct a global-scale, 186-country analysis examining the potential impact of basic income (BI) as a two-pronged solution to both sustainability and social resilience. We reveal BI's potential to bolster economies, particularly in times of crisis. To lower the huge barrier imposed by implementation costs, we suggest a diverse array of strategies aimed at financing BI, strategically designed to concurrently alleviate economic insecurity while fostering nature conservation. We suggest that BI implementation is feasible and could be a potent tool in addressing the twin challenges of decreasing worldwide poverty while reducing environmental degradation—a nexus that arguably constitutes the paramount global challenge of our times.

INTRODUCTION

In the wake of the unforeseen upheaval caused by the coronavirus disease 2019 (COVID-19) pandemic in 2020, the vulnerabilities inherent in societal structures were starkly laid bare.[1–4] This global crisis not only rendered millions jobless but also plunged numerous households into poverty (Table S1).[2,5,6] At the same time, humanity's impact on the environment has resulted in widespread ecological degradation and declines in biological diversity, the very foundation for human well-being.[7,8] These events forcefully revealed the need for simultaneous action: to alleviate poverty while staunching the relentless tide of environmental degradation and decay.[3,4] Preceding the disruptions of COVID-19, environmental stressors—ranging from

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rampant overexploitation and pollution[9] to the devastating impacts of climate change[10]—had already cast a long shadow, disproportionately affecting the most economically marginalized segments of society.[11] The pandemic, marked by its staggering toll on human life, global health, and socio-economic infrastructures, prompted governments worldwide to institute ad hoc measures to shield populations and economies from collapse (Note S1). Yet, these reactive responses risk being insufficient, exacerbating existing disparities, and jeopardizing hard-earned developmental strides.[6] In this landscape of adversity and urgent need for resilience, the concept of basic income (BI) may emerge as a potential beacon of hope. Advocating for unconditional, regular cash disbursements to either a segment or the total population, BI offers the promise of sustained financial security[12]—a foundational buffer against the tragic impacts of crises such as COVID-19.[5,13] Moreover, by addressing poverty due to the lack of income, BI fosters more robust, healthier societies.[14]

The positive impact of BI extends beyond economic upliftment—it also helps with the concern for societal welfare and sustainability.[15] Empirical evidence underscores its transformative potential in enhancing social welfare, reducing inequality, and fortifying sustainability.[16] Further, BI initiatives have correlated with improved sanitation, nutrition, expanded educational access, diminished hospitalizations, and reduced poverty-related crimes as well as substance abuse among beneficiaries.[16–18] Moreover, the transformative potential of BI in environmental conservation has become evident in instances such as the "family of hope" program in Indonesia, contributing to a substantial decline in deforestation rates,[19] or the BI grant in Namibia, markedly reducing illegal hunting and trespassing.[20] What is more, recent studies hint at a correlation between a nation's gross domestic product (GDP) and its environmental performance index scores,[21] signifying BI's potential to systematically lower poverty levels, thereby advancing established environment-development policy targets, including the United Nations' Sustainable Development Goals (SDGs).[22,23] These potential benefits of BI are probably the reason that universal BI has received so much support by a cross section of people over time (Note S2).

Within the context outlined above, this paper initiates a more comprehensive, multi-country assessment to demonstrate the potential role of BI in addressing these pressing challenges. We undertake an analysis of possible economic impacts and associated costs across 186 nations, examining diverse levels of BI coverage. Our findings reveal the potential economic stimulus that can be provided by BI, particularly in times of recession, juxtaposed against the significant hurdles posed by implementation costs. In addition, we chart a course toward a viable portfolio of strategies for funding BI. These approaches are engineered to yield dual benefits: mitigating economic vulnerability while at the same time bolstering initiatives for nature conservation and sustainable resource utilization. As we stand on the threshold of the decade for action dedicated to realizing global targets associated with the SDGs, the Kunming-Montreal Global Biodiversity Framework,[24] and the Paris Agreement,[25] our study highlights the plausibility of global BI implementation and its potential to decisively confront what may be the paramount global challenge, i.e., addressing escalating poverty (and inequality) alongside the relentless degradation of our environment. We posit that BI can be a pivotal instrument in the global pursuit of poverty alleviation and "nature-positive" sustainable development. Crucially, its execution must be designed to yield a dual triumph: assuaging economic insecurity, especially among the world's low-income populations, while also ensuring intergenerational equity by safeguarding the environment for posterity.[26,27]

We computed the likely economic impacts (defined as a measure of the extent to which fiscal expenditures boost GDP, i.e., it is a measure of the efficacy of expansionary fiscal policy[28]) to be generated by providing a BI (= the national poverty line income at purchasing power parity) to a segment or all of a nation's population. We relied on the macroeconomic insight that a country's implementation of a discretionary fiscal measure through spending normally results in a boost to that country's GDP,[28] which we captured through fiscal multipliers (a measure of the impact of fiscal spending on a country's GDP; experimental procedures).

BI cost is defined as the total spending needed to implement it. This includes the direct cost plus the marginal cost of raising the necessary funds (experimental procedures). We calculate cost ranges, with lower and upper limits depicting how funds are raised (Table 1). If funds are raised through countries' standard portfolio of distorting income and consumption taxes, then the upper-cost limit applies. If, on the other hand, funds are raised through a carbon dioxide (CO_2) emissions tax, as in our illustrated example below, the lower end of our cost estimates is more relevant. It is worth noting that the cost of implementing BI has been calculated at national or regional levels. For instance, in the past decade, different BI proposals for India have been estimated to cost from USD 42 to USD 217 (i.e., Rs 3,500 to Rs 18,000) per person per year.[29] An annual cost of USD 356 to USD 361 (i.e., GBP 280 to GBP 284) billion was estimated for BI for the UK,[30] while the estimated cost for providing USD 10,000 a year to each American was calculated to be about USD 3 trillion a year,[31] and the cost of a guaranteed BI program for Canada was estimated at USD 68.4 (i.e., CAD 93) billion for 2025–2026.[32] Also, the IMF calculated the cost of BI in eight developed and emerging markets and found that it would cost around 6.5% and 3.75% of GDP on average for advanced and emerging market economies, respectively.[33]

The contribution of the current paper lies in the fact that it is one of the few studies that attempts to provide a comprehensive global analysis of the benefits, costs, and financing of BI. A recent example of a global study is De Lange et al.[34]; however, although global in geographical coverage, the population receiving BI was limited to those living close to biodiversity conservation areas. Gray Molina and Ortiz-Juarez[35] is another global study, which estimated the cost of temporary BI (TBI) provided to poor and vulnerable people in 132 developing countries in response to COVID-19. Although this study is global in geographical scope, it was not universal in terms of the number of people covered. On the other hand, Ortiz et al.[36] is a study that provided BI to the global population in 130 countries worldwide. Our study differentiates itself from Ortiz et al. in at least two ways: our cost estimates include both direct cost and the marginal cost of raising the required funds, and it covers 186, not 130, countries.

The policy world is looking for measures that can build resilience against shocks, systemic risks, and pandemics while simultaneously transforming development toward combining

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Table 1. Economic impact and cost of basic income

Country groupings	Economic impact in discounted USD billions (% of global GDP)				Cost in USD billions (% of global GDP)				Economic-impact-to-cost ratio			
	BPL		Entire population		BPL		Entire population		BPL		Entire population	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
LHDI	1,043 (0.83)	74	1,455 (1.2)	103	216 (0.17)	26	442 (0.35)	57	4.8	0.2	3.3	0.2
MHDI	9,813 (7.8)	694	33,196 (26.3)	2,347	1,598 (1.3)	318	9,427 (7.5)	2,923	6.1	0.8	3.5	0.9
HHDI	37,750 (30.0)	2,669	128,732 (102.3)	9,103	5,256 (4.2)	1,364	31,698 (25.2)	8,230	7.2	1.4	4.1	0.8
Africa	2,946 (2.3)	208	5,181 (4.1)	366	641 (0.51)	77	1,583(1.3)	206	4.6	0.2	3.3	0.2
Asia	11,175 (8.9)	790	47,970 (38.1)	3,392	2,157 (1.7)	568	14,961 (11.9)	4,717	5.2	1	3.2	0.8
Europe	19,056 (15.1)	1,347	58,732 (46.7)	4,153	2,373 (1.9)	621	13,414 (10.7)	3,512	8.0	1.6	4.4	0.9
North America	12,497 (9.9)	884	39,519 (31.4)	2,794	1,550 (1.2)	382	9,001 (7.2)	2,334	8.1	1.5	4.4	0.9
Oceania	1,520 (1.2)	107	5,209 (4.1)	368	177 (0.14)	30	1,101 (0.87)	185	8.6	0.8	4.7	0.5
South America	1,412 (1.1)	100	6,773 (5.4)	479	173 (0.14)	31	1,507 (1.2)	257	8.2	0.9	4.5	0.5
Global	48,606 (38.6)	3,437	163,383 (129.8)	11,553	7,070 (5.6)	1,708	41,567 (33.0)	11,211	6.9	1.2	3.9	0.8

Economic impact of basic income (BI), cost of BI (both in USD billions and % of global gross domestic product [GDP] in brackets), economic-impact-to-cost ratio for each country grouping, and UBI coverage inclusive of individuals below the poverty line (BPL) only and the entire population. SD, standard deviation. LHDI includes countries with low human development index (HDI) (HDI $\leq$ 0.5); MHDI countries with medium HDI (0.5 $<$ HDI $<$ 0.8); and HHDI countries with high HDI (HDI $\geq$ 0.8). Regions defined following the UN definition.

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Table 2. Potential sources of funding to finance basic income, as well as a brief description of purposes and examples

Funding source	Purpose	Examples
Environmental pollution tax	they seek to increase the price of activities and products that generate pollutants that are harmful to the environment	e.g., CO_2 emission taxes, plastic pollution tax, discharges into water bodies, and soil contamination
Environmental and natural resource overexploitation tax	designed to increase the price of activities and products that over-exploit natural resources such as fish, forests, top soils, etc.	taxes on fishing or hunting, forestry, and water abstraction; revenue from auctioning of individual transferable quotas for fisheries
Environmentally damaging subsidies	repurposing of current fossil fuel, agricultural, and fisheries subsidies that harm the environment	e.g., harmful subsidies to agriculture, fisheries, and fossil fuel

just (inclusive) and sustainable futures. Within this framing, we argue that BI financing has to be designed to ensure that the interests of both current (intra-) and future (inter-) generations are adequately balanced and considered. The greater income and economic stability provided by BI could lead to increased consumption and associated rising greenhouse gas emissions and environmental degradation generally,[37] thereby reducing the ability of future generations to also meet their own needs. Thus, we frame the funding of BI around the concepts of positive and negative externalities. Basic economic theory argues for society to tax or subsidize economic activities that generate negative or positive externalities, respectively. Table 2 provides an overview of a portfolio of financing options that meet the "double dividend" hypothesis in environmental economics (i.e., implementing taxes that both reduce environmental degradation, the first dividend, and reduce poverty by using the revenue generated, the second dividend),[38] including, for example, taxes on CO_2 emissions (Table 3, experimental procedures).

The ultimate contribution of this article is to make the case for BI as a policy to solve the dual issues of poverty and environmental damage. We do this by estimating the positive impact that BI could have on GDP using fiscal multipliers on government spending. We then estimate revenue from a flat tax on global carbon emissions to demonstrate that it is possible to raise the funds needed to implement BI while reducing environmental degradation.

RESULTS AND DISCUSSION

Economic impacts

Our findings indicate that implementing BI programs could potentially increase global GDP by a significant amount. Specifically, our analysis suggests that BI initiatives could lead to an increase in GDP ranging from USD 1,043 billion to USD 48,606 billion, equivalent to 0.82% and 38.6% of global GDP, respectively, when considering only individuals living below poverty lines in low human development index (HDI) countries (949 million people) and the entire global population (7.7 billion people) (Table 1), respectively.

Moreover, the economic impact is amplified, with projections showing a potential boost to GDP ranging from USD 1,445 billion to USD 163,383 billion, equivalent to 1.16% and 129.8% of the current global GDP, respectively, when BI coverage extends to encompass all individuals residing in low HDI countries and the entire global population (Table 1), respectively.

Costs and affordability of BI

We have determined that the costs associated with implementing BI programs vary, ranging from USD 216 billion (0.17% of global GDP) to USD 7,070 billion (5.6%), depending on whether BI coverage is limited to individuals living below the poverty line in low HDI countries or extended to encompass the entire global population, respectively (Table 1). When considering BI coverage for all individuals in low HDI countries and the entire world, the estimated costs amount to USD 442 billion (0.35% of global GDP) and USD 41,567 billion (33%), respectively (Table 1). For context, according to the Stockholm Peace Research Institute's 2013 report, health expenditures ranged from 2% (Africa) to 8% (North America) of GDP, while military expenditures ranged from 1% (Latin America and Caribbean) to 5% (Middle East) of GDP.[39] Therefore, providing BI to those living below the poverty line appears financially feasible.

Furthermore, our analysis reveals that for every dollar invested in implementing BI, approximately USD 7 and USD 4 of economic impacts are generated when considering coverage solely for individuals living below the poverty line and the entire population, respectively. This ratio ranges from approximately USD 5 for individuals living below the poverty line in low HDI countries, Africa, and Asia, to over USD 7 for all high HDI countries combined or independently for the continents of Europe, North America, Oceania, and South America (Table 1). Detailed country-level economic-impact-to-cost ratios are presented in Figure 1.

Financing BI

Table 2 provides an overview of a portfolio of financing options that meet the double dividend hypothesis in environmental economics (e.g., implementing taxes that both reduce environmental degradation, which is the first dividend, and reduce poverty using the revenue generated, the second dividend),[38] including, for example, taxes on CO_2 emissions (Table 3, experimental procedures). We estimate that CO_2 emissions taxes alone may be able to generate double dividend financing of about USD 2.3 trillion a year (Table 3), which is enough to cover the BI cost for people living below the poverty line in low and medium HDI countries combined; in Africa, Oceania, and South America combined; or in Asia, Europe, and North America separately (Table 1).

Although there are a variety of potential financing mechanisms for BI (Table 2), we focus on assessing carbon taxes in this study because of the global push to reduce carbon emissions to reach

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Table 3. Potential total carbon tax (USD billions) by country grouping to finance basic income

	Total carbon tax (USD billions)			
Country groups	Low	Mean	High	SD
LHDI	3.3	5.0	6.7	2.4
MHDI	826	1,240	1,653	584
HHDI	725	1,087	1,450	513
Africa	62	93	123	44
Asia	852	1,277	1,703	602
Europe	263	395	526	186
North America	305	457	610	216
Oceania	21	31	41	15
South America	53	79	105	37
Global	1,555	2,332	3,109	1,099

Carbon tax estimated for each country group as per Table 1. Carbon tax for each country is estimated by the total CO_2 emissions from fuel combustion (mt) (World Bank Open Data—https://data.worldbank.org) including solid, liquid, and gaseous fuel in the most recent year (2016) and proposed tax rates (i.e., USD50 per ton and USD100 per ton of CO_2 produced for the lower and upper bounds of the tax, respectively; experimental procedures). LHDI includes countries with low human development index HDI (HDI $\leq$ 0.5); MHDI includes countries with medium HDI (0.5 < HDI < 0.8); and HHDI includes countries with high HDI (HDI $\geq$ 0.8).

sustainability goals. Williams[40] demonstrates the potential of this source of income, it reports that a $30 per ton carbon tax, which is lower than estimates of the marginal damage from carbon pollution) in the USA could raise an average of USD 226 billion per year in 2012 dollars over the first 10 years of implementation. Our approach is similar to a study by the IMF,[41] which estimated that a $ 70 per ton carbon tax, which is roughly mid-point of our assessed carbon tax rate of USD 50–100 per ton, could raise revenue of around 1%–3% of GDP in most countries. Using the 2023 global GDP of USD 105 trillion puts the total revenue at between USD 1.05 and USD 3.15 trillion.

Aside from carbon taxes, there are other sources of BI financing that can also simultaneously benefit the environment. For instance, Peszko[42] estimated that a plastic tax of $280 per ton applied to the 20 most common plastic consumer products that contain less than 30% recycled content could bring in up to $1.3 billion annually in tax revenue and reduce plastic waste generation by nearly a third below the baseline in Europe. Another possible funding source for BI that can provide a double dividend is the redirecting of environmentally harmful subsidies, such as those for agriculture and fisheries.[43] In fact, almost 90% of the USD 540 billion in global farm subsidies are harmful—redirecting these huge subsidies could potentially benefit initiatives for ending poverty, eradicating hunger, and restoring nature while improving the livelihoods of 50 million smallholder farmers worldwide.[44] With regards to fisheries subsidies, Teh et al.[45] report that the estimated harmful subsidies in Sumaila et al.[46] for 30 low-income countries could cover up to 80% of the current gap in poverty line income for the fishers in these countries. Similarly, the IMF[47] reports that USD 7 trillion was provided to the fossil fuel sector globally in 2022, and they project that this number would increase to USD 8 trillion in 2030 or about 8% of global GDP.

Challenges to BI implementation

Despite the high economic-impact-to-cost ratios, a number of concerns and questions have limited the implementation of BI. These include[28] how do we govern its implementation, and how do we mitigate the additional negative effects of BI implementation? These issues are discussed below.

BI can be implemented at a range of scales, from local (e.g., city-scale implementation like Stockton, USA)[48] to global. Larger scales may require novel institutions for raising funds (Table 2) and delivering payments. Although a universal cash transfer undoubtedly poses challenges in terms of administration and governance, these challenges are not insurmountable as providing BI will involve similar processes and systems as those used to deliver social protection programs that most governments already deliver nationally or via international organizations where applicable. The universality of some BI programs is an advantage and can reduce the cost of implementation over eligibility-based social programs that involve relatively more complex recipient targeting. Additionally, this universality may remove the negative social stigma associated with many social programs, leading to higher uptake, and reduce negative unintended consequences for non-beneficiaries when cash transfers are conditional.[49,50] The simpler administrative demands of BI also reduce the scope for corruption and abuse of power by frontline officials, particularly in countries where state capacity is low.[51]

Innovations in information and communications technology can facilitate BI implementation. For example, mobile phone money transfers have been widely adopted in many low-income countries, even where access to financial infrastructure is limited.[52] Still, mobile money transfers require reliable electricity and mobile networks, which could unintentionally disadvantage groups that lack access to these infrastructure.[52]

Additional barriers to BI include the perception that it may weaken incentives to work, save, and invest and the risk that it may increase inflation. It is argued that BI may create negative social outcomes such as alcohol addiction or reduce people's motive to work,[53] although evidence suggests these concerns to be unsubstantiated or overblown.[15,51,52,54] Evidence from two BI schemes, Alaska's Permanent Fund Dividend and Iran's national cash transfer, does not support this claim. The Alaska Permanent Fund has been providing an annual cash dividend to all residents since 1982. A recent study found that the dividend had no effect on employment and, in fact, increased part-time work by 17%.[55] Moreover, a high percentage of Alaskans save their children's dividends or use them to set up college funds or pay down debt.[56] In Iran, a national cash transfer program was started in 2011 in which monthly cash deposits amounting to 28% of median per capita household income were made into individuals' accounts. A study found that these cash transfers did not reduce labor force participation or number of hours worked.[57] Instead, the cash transfers had positive effects on the labor supply of women and self-employed men, although there was a negative effect on the number of hours worked for men aged 20–29 years old. However, this reduction in hours

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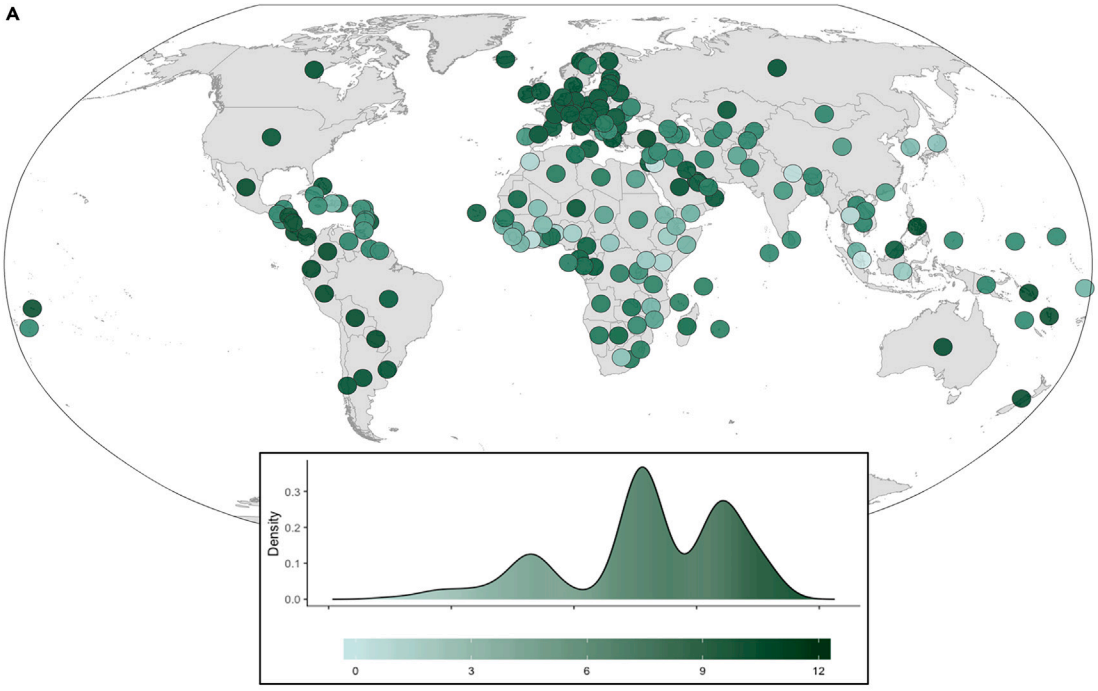
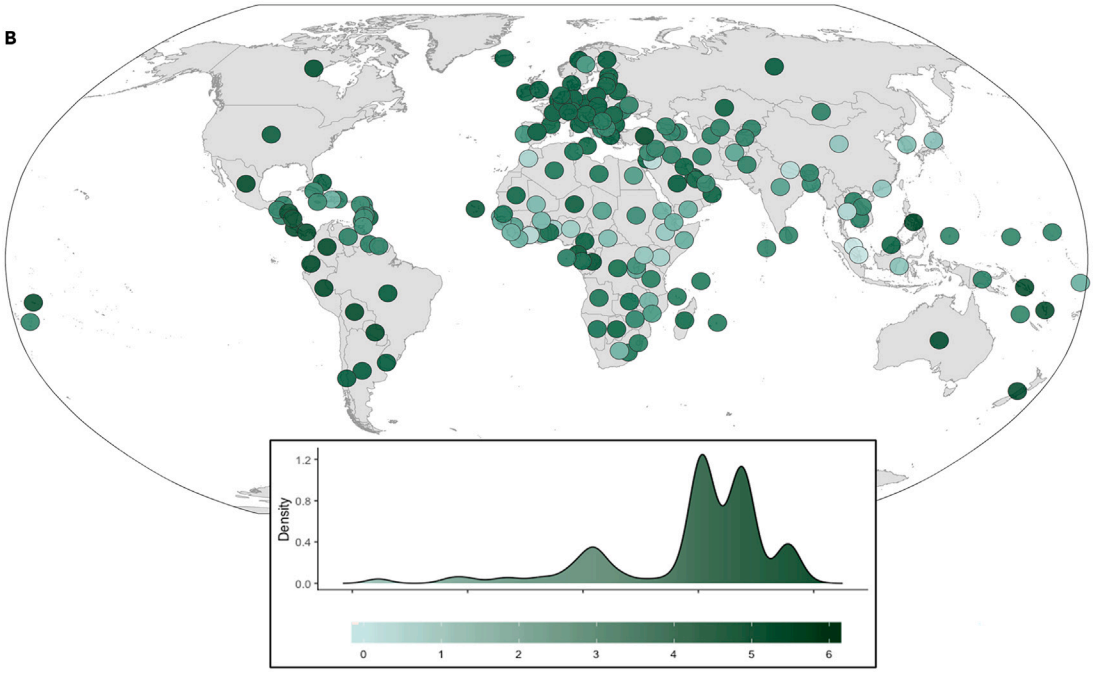


Economic impact to cost ratio (population below poverty line)



Economic impact to cost ratio (entire population)

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worked was likely due to youth not being attached to the job market and because many in this age group had the option to enroll in higher education.[52] Although not provided universally, negative income tax experiments carried out in the US and Canada, which provided an unconditional income floor to a targeted group of people, also found no, or only moderate, reductions in work participation.[52] BI can in fact have positive effects on the labor market by increasing human capital investments (e.g., using cash transfers to acquire a new skill). The security of having an income floor can also increase entrepreneurship by reducing the risk of trying out new business ventures.[58]

Inflation can occur if income transfers increase aggregate purchasing power without an accompanying increase in the supply of goods and services, as was the case during COVID.[59,60] This situation is unlikely to manifest given the widespread unemployment and/or underemployment in many countries. The question of whether or not BI will increase inflation depends on factors that likely differ across countries, such as peoples' responses to the extra income, individual countries' current political and economic conditions, as well as how governments plan to finance BI. Nikiforos et al.[61] found that the effect BI has on inflation is moderate at an annual increase of less than half a percentage point in most scenarios studied. Based on results from smaller cash transfer programs, Ortiz et al.[36] argue that BI has no significant effect on inflation. However, a recent study reported that there was a 136.5% cumulative rise in prices 5 years after the introduction of an unconditional, universal cash transfer in Iran.[62] But given Iran's political and economic situation in recent years, it is difficult to attribute this increase to BI. One could argue that inflationary pressures could arise if the government decided to print money rather than pay for BI costs through increased taxes or similar measures.

Closing the inequality gap?

It should be noted that the fact that we set payments at poverty lines means there is the potential that global economic hierarchies may be reinforced because people in rich countries will continue to receive greater amounts of BI. What is more, our analysis shows that marginal propensity to consume (MPC) is greater in rich countries, and therefore the economic impacts of UBI will be greater in rich countries. We note here that the focus of this paper is mainly to get people out of extreme poverty and the inability to meet their essential needs. Clearly, this is only a start, because to truly reduce overall global inequality, we need measures such as investment in education and skills development, as argued for in World Bank,[63] implementation of progressive taxation and redistribution,[64] and the promotion of fair trade practices and labor rights.[65]

Conclusions

We present a global estimation of BI's economic impact and the associated implementation costs across 186 nations. Our findings show a positive economic-impact-to-cost ratio for BI implementation across all scenarios examined. Although acknowledging barriers beyond financial constraints, including systemic challenges, our study highlights several potential benefits that substantiate the rationale for BI adoption.

Existing evidence indicates that BI implementation can yield substantial dividends beyond mitigating financial costs. Improved social and health outcomes emerge as key components, presenting governments with a viable avenue to curtail economic burdens while concurrently fostering enhanced environmental stewardship, for example, through innovative double dividend financing strategies (Tables 2 and 3).

Given this compelling evidence of BI's multifaceted benefits, we recommend earnest exploration of its implementation by nations, recognizing that its successful implementation hinges on a convergence of factors, including fiscal considerations, societal attitudes toward poverty alleviation, and political resolve. Critical to the viability of BI policies will be the meticulous and participatory design of effective programs[66]—a safeguard against potential individual misuse and systemic corruption that could undermine their efficacy.[67]

We urge governments to perceive BI not merely as a reactive measure but as a proactive and anticipatory economic strategy.[68] By furnishing a guaranteed income stream to both the unemployed and the economically marginalized, BI serves as a more universal societal safety net, fostering financial confidence among the less affluent segments and fortifying resilience against devastating shocks, such as pandemics and climate disasters, that jeopardize the livelihoods of millions worldwide.[69] BI stands poised not only to redress existing extreme poverty, but it can also serve as an approach to help mitigate the rising specter of vulnerability worldwide, averting socio-economic instabilities that fuel unrest, conflict, and forced mass migrations, often triggered by such upheavals.[70,71]

In harnessing the potential of BI, societies pave the way for proactive resilience-building, steering developmental trajectories toward reduced poverty and sustainable futures.[72] In an era characterized by unprecedented risks and uncertainties, embracing extraordinary policies like BI becomes a necessary stride toward fortifying societies against future shocks, aligning with the ambitions set forth in Agenda 2030.[73] In essence, we contend that these extraordinary times necessitate commensurate measures. The adoption of visionary policies like BI emerges as an important step, not merely to cushion against contemporary crises but to proactively shape a more socially resilient, sustainable global landscape. In sum, the convergence of evidence highlights the transformative potential of BI, not merely as an economic stimulant but as a catalyst for societal well-being, resilience, and sustainable progress—aligning with global aspirations for a world free from extreme poverty and environmental degradation.

Figure 1. Economic impact of UBI-to-cost ratio by country

(A) Economic impact of UBI-to-cost ratio by country for people living below national poverty lines.

(B) Economic impact of UBI-to-cost ratio by country for the entire population. The color in the frequency graph denotes the overall global distribution of the economic impact of basic-income-to-cost ratio. The color of the bubbles on the map represents the economic-impact-to-cost ratio for each country. The darker green color represents high economic impact of UBI-to-cost ratio, whereas the light green color represents low economic-impact-to-cost ratio.

Please cite this article in press as: Sumaila et al., Utilizing basic income to create a sustainable, poverty-free tomorrow, Cell Reports Sustainability (2024), https://doi.org/10.1016/j.crsus.2024.100104

EXPERIMENTAL PROCEDURES

Resource availability

Lead contact

The lead contact is U. Rashid Sumaila.

Materials availability

All data used in this study are available from the lead contact upon reasonable request.

Data and code availability

No codes were used in this study. All data are available from the lead contact upon reasonable request.

Computing the cost of implementing BI

UBI cost = direct and indirect cost in country *i* is the payment amount, times the number of people covered by the scheme. We assume for the indirect cost of raising taxes to be the same as the marginal cost of public funds (MCF), which, for a country, represents the welfare cost to a society from raising additional revenue for public expenditures (in our case, basic income [BI]). This welfare cost arises from the market distortions (the deviation from socially optimal consumption and production) created by the tax instrument used to raise revenues. In public economics, distortions differ based on the tax instrument used; for example, revenue raised through an income tax will have a different MCF than revenue raised through consumption or profit taxes.[74] We first collected data on average MCFs reported in the literature by country and found numbers for a total of 61 countries.[74] Next, we used these reported MCFs to compute average numbers for low, medium, and high human development index (HDI) country groups, respectively. These averages were then used to fill the data gap, ensuring that we have MCF estimates for all 186 countries included in our study (Table S2).

Computing the benefit of UBI

A change in fiscal policy has a multiplier effect on the economy, which is a measure of the extent to which fiscal expenditures boost gross domestic product (GDP), i.e., it is a measure of the efficacy of expansionary fiscal policy.[28] For instance, a multiplier effect of 2 means that each dollar of stimulus will lead to USD 2 in income generated. This type of effect is due to increases in disposable income, which in turn affects spending, consumption, and investment levels in the economy. More technically, fiscal multipliers relate to the impact of a change in government spending (ΔG) or change in tax paid ($-\Delta T$) on real national output (ΔY). Estimates of the value of fiscal multipliers vary widely—partly because of the use of different modeling methods[75] and because even a single modeling method will give different results at different times, under different economic circumstances, and using different assumptions.

Here, we estimate fiscal multipliers using the marginal propensity to consume (MPC), which captures the proportion of extra income that is used for consumption. For example, if 80% of all new income in a given period of time is spent on products in a country, the MPC would be 80/100, or 0.8. The multiplier effect generated from this expenditure is then calculated using the following equation: $1/(1 - \text{MPC})$. Hence, if consumers spend 0.8 and save 0.2 of every dollar of extra income, the multiplier is equal to 5, which means that every dollar of new income generates USD 5 of extra income overall.

Many influential papers have studied the effects of direct fiscal transfers to individuals.[76] Parker et al.[77] and Sahm et al.,[78] for instance, examined the effect of the 2008 tax rebates provided by the US after the Great Recession. Both studies found an MPC of about 0.25 and as high as 0.67 for what the authors describe as "liquidity-constrained" households. That is, households that are unable to borrow when income is low and/or are unable to quickly sell assets to cover shortfalls. In general, there is evidence that MPC can be quite high during crises because those who lose their jobs are likely to use their transfer funds or UBI for basic needs such as food, housing, and utilities.[76] It is therefore reasonable to assume that people with incomes below the poverty line would also have high MPCs. Ganong and Noel[79] found evidence to support this notion, showing that spending by unemployed individuals decreased sharply when unemployment insurance benefits end, a clear indication that these benefits have a large impact on consumption, resulting in high MPC and fiscal multipliers. Vladová[75] reported mean MPC from gross indicators for 10 European countries (Belgium, Britain, the Czech Republic, Hungary, Poland, Portugal, Slovakia, Spain, Sweden, and Switzerland) to be 86.2% (range: 80.5%–89.2%) and 90.9% (range: 85.8%–94.5%) in 1993 and 2003, respectively. By including a further 6 non-European OECD countries (Australia, Canada, Japan, Korea, New Zealand, and the USA), the author found that the mean MPC from net indicators for 1993 and 2003 to be 90% (range: 79.2%–100.2%) and 95.5% (range: 88.9%–106.5%), respectively. Two conclusions may be drawn from Vladová's study. First, MPC for OECD countries is high, and secondly, MPC in these countries is increasing with time. Carroll et al.[74] also find that the aggregate consumption response across 15 European countries (Austria, Belgium, Cyprus, Germany, Spain, Finland, France, Greece, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovenia, and Slovakia) ranges between 0.1 and 0.4 and that it is higher in economies with large wealth inequality, where a larger proportion of households have little wealth, as well as under larger transitory income shocks when only households using liquid assets (rather than net wealth) to smooth consumption are considered. The authors conclude that wealth inequality and differences in the dynamics of household income affect the response of economies to a "fiscal stimulus" in an economically relevant way. In a study of the impact of remittances on consumption in a selection of countries in the Middle East and Europe, Glytsos[80] found MPC in Egypt, Greece, Jordan, Morocco, and Portugal to be 0.735, 0.847, 0.531, 0.607, and 0.667, respectively.

To determine MPC for the 186 countries in our study, we adopted the following step-by-step approach: (1) record all published country-level MPCs; (2) set MPCs greater than 0.82 at 0.82, which is the average of MPCs for high HDI countries. This is done to ensure that our estimates are conservative; (3) use the MPCs recorded in (2) to calculate average MPCs for low, medium, and high HDI country groups and use these to fill data gaps for countries with no data reported in the literature (of the 186 countries studied, we found data for 78). These steps provide average aggregate MPCs for all countries in our study, which we assume match the MPCs for the total population of a country. From the literature summarized above, we can assume that the MPCs for people living below the poverty line within a country are greater than the MPCs for the total population. This is because households living below the poverty line are more likely to face "liquidity constraints" compared with those who are not.

But by how much are MPCs for households living below the poverty line higher than those of the total population? In their study of the effects of "bankruptcy flag" removal using a sample of over 160,000 bankruptcy filers whose flags were removed between 2004 and 2011, Gross et al.[81] find that in the year following flag removal, credit card limits increase by USD780 and credit card balances increase by roughly USD290, implying an "MPC out of liquidity" of 0.37. The authors also found a significantly higher MPC during the Great Recession, with an average MPC roughly 20%–30% larger between 2007 and 2009 compared with surrounding years. Carroll et al.[76] report that more pronounced wealth inequality increases both the proportion of households with little wealth and the MPC among the lower half of the population. The authors report a difference in MPC between the top 10% and bottom 50% of income earners of 33% and the difference between those employed and unemployed of about 50%. Given these pieces of evidence, we conservatively assume that the MPCs for people living below the poverty line are 10% higher than the MPC for the total population.[45]

Several caveats to our methodology merit consideration. Firstly, one might question the usefulness of a 2-year time horizon. Also, filling in the data gaps in MCP country data could introduce a bias toward wealthier countries, as low-income countries are less likely to have comprehensive data. Additionally, it has been argued that fiscal multipliers are nullified in the long run. However, we maintain that the short-term boost remains valuable, echoing Keynes' famous sentiment: "in the long run, we are all dead." Given that BI is not a one-shot policy but rather a continuous one, we anticipate that the economic stimulus would persist over time. Furthermore, we encounter challenges when dealing with averages. One might question the validity of averaging MCFs for country income groups, as this approach may overlook important differences in the distributions of MCFs within and between groups.

Finally, it is worth noting that the analyses on funds/sources and payments/impacts could be brought together more tightly because, at the moment, the estimates of economic costs and BI payments are at a country level, but the estimates for funds raised through carbon taxes are at country group level. Hence, we acknowledge that there is more work to be done, and our hope is that this work would kick off a number of follow-up papers that would fill up the kind of typical gaps that are often inherent in global large-scale studies such this one.

It is crucial for the reader to be mindful of these caveats and questions as they navigate our analysis.

Sustainably funding UBI through environmental taxes

We present a simple illustrative exercise estimating revenues generated using a carbon tax on fossil fuels. We assume, justifiably,[82] that most countries have existing infrastructure in place to tax (solid, liquid, and gaseous) fossil fuels. This is because the primary supply of fossil fuels is concentrated within a limited number of state or private entities in almost all countries. We do not extend the carbon tax to carbon emissions from cement manufacturing, or to other greenhouse gases such as methane, and nitrous oxide emissions. Some of these emissions are from non-point sources (such as agriculture), or from specific industries, and to implement such a new tax and monitoring infrastructure may be needed. As carbon emissions are a global externality, we assume that the carbon tax is uniform across the world. This differs from the current approach to reducing emissions via the Paris Agreement, which allows countries to determine their own commitments to reduction.

A caveat is in order: we provide a business-as-usual financing estimate. This ignores the fact that fossil fuel taxes will reduce consumption. Our purpose is to illustrate the power of this financing mechanism, but a complete analysis of the benefits and costs from this tax will account for the elasticity of consumption from the tax. It would recognize that a reduction in consumption of fossil fuel from the tax generates benefits and, correspondingly, reduces revenues that finance the BI. Such an analysis is outside the scope of the current analysis.

Data on carbon dioxide (CO_2) emissions from solid, liquid, and gaseous fossil fuel consumption (kt) is from the World Bank Indicators for the year 2016. Our low tax scenario is USD 50 per ton of CO_2 emissions, and the high tax scenario is USD 100 per ton of emissions. These prices were inspired by the mean of USD 54 per ton reported in Wang et al.[83] and the ~USD 130 proposed by the government of Canada to achieve its Paris Agreement commitments.[84] It should be noted that currently, prices are ~USD 23 per ton of CO_2 equivalent emissions in Canada,[85] USD2 in Japan, USD 31 in Denmark, USD 68 in Switzerland, and USD 168 in Sweden.[86] Apart from Sweden, these numbers show that there is room for raising double dividend financing via carbon taxes.

Data used in analyses and definitions

Population

The population of each of the countries in our study for 2019 was taken from the CIA World Factbook. Total populations for low, medium, and high HDI for the 186 countries in our study are 472, 5,693, 1,499, and 7,664 million, respectively.

Percentage of the population below the poverty line

National estimates of the percentage of the population falling below the poverty line for 2019 were taken from the CIA World Factbook, which reports that the estimates are based on surveys of sub-groups, with the results weighted by the number of people in each group.

Labor force

The labor force represents the number of people who are employed plus the unemployed who are looking for work. The numbers used for our analysis are for 2019 and were taken from the CIA World Factbook.

Fiscal multipliers

Fiscal multipliers measure the effect that increases in fiscal spending will have on a nation's economic output, or GDP. It is the response of output in percentage with an exogenous government spending of one percent of GDP. In this study, it is derived from the MPC (experimental procedures).

Purchasing power parity

Purchasing power parity is a measurement of prices in different countries that uses the prices of specific goods to compare the absolute purchasing power of the countries' currencies. In many cases, purchasing power parity produces an inflation rate that is equal to the price of the basket of goods at one location divided by the price of the basket of goods at a different location. The purchasing power parity, inflation, and exchange rate may differ from the market exchange rate because of poverty, tariffs, and other transaction costs.

GDP at purchasing power parity (GDP)

GDP at purchasing power parity (GDP) is GDP converted to international dollars using purchasing power parity rates. GDP can tell us about the cost of living in a country. Take, for example, India's nominal GDP of USD2.182 trillion and its GDP of USD8.027 trillion.

CO_2 emissions from liquid fuel consumption (kt)

CO_2 emissions from liquid fuel consumption (kt) is CO_2 emissions from liquid fuel consumption refer mainly to emissions from use of petroleum-derived fuels as an energy source.

CO_2 emissions from solid fuel consumption (kt)

CO_2 emissions from solid fuel consumption (kt) is CO_2 emissions from solid fuel consumption refer mainly to emissions from use of coal as an energy source.

CO_2 emissions from gaseous fuel consumption (kt)

CO_2 emissions from gaseous fuel consumption (kt) and CO_2 emissions from liquid fuel consumption refer mainly to emissions from use of natural gas as an energy source.

SUPPLEMENTAL INFORMATION

Supplemental information can be found online at https://doi.org/10.1016/j.crsus.2024.100104.

ACKNOWLEDGMENTS

This research was supported by the Social Sciences and Humanities Research Council of Canada (U.R.S., W.W.L.C., L.S.L.T., and N.J.B.) and the Canada Research Chairs programme (U.R.S. and W.W.L.C.) as well as the University Killam Professors Programme (U. R. S.). We are grateful to Scott Barrett and Daniel Pauly for providing friendly reviews of earlier drafts.

AUTHOR CONTRIBUTIONS

U.R.S. conceived the study and together with C.C.C.W., V.W.Y.L., L.S.L.T., L.C.L.T., and H.S. ran all data collection and analyses. C.F., K.H., J.E.C., N.J.B., S.G., and S.P. contributed to study design. U.R.S. wrote the first manuscript draft with contributions from C.C.C.W., V.W.Y.L., L.S.L.T., and L.C.L.T. W.W.L.C., I.I., K.H., J.E.C., N.J.B., C.F., S.G., and S.P. contributed to result interpretations as well as writing and editing revisions.

DECLARATION OF INTERESTS

The authors declare no competing interests.

Received: July 13, 2023
Revised: April 9, 2024
Accepted: May 1, 2024
Published: June 7, 2024

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