

Towards a new ontological framework for the economic good

Eric D. Beinhocker

Keywords: well-being, pro-sociality, inequality, beyond GDP, sustainability

We manage what we measure, and for too long, policymakers have been measuring the wrong things when it comes to assessing what is a good or healthy economy. Katharina Lima de Miranda and Dennis Snower (hereafter KLMDs) propose an ambitious and compelling new framework that they call “SAGE” for assessing economic, social, and environmental health and well-being. What distinguishes their contribution from most previous efforts is that they don’t merely try to “correct” standard measures, notably gross domestic product (GDP), nor propose an inevitably arbitrary list of additional or alternative metrics, but rather they root their framework in a modern, empirical, interdisciplinary understanding of human well-being. They demonstrate the potential to quantify such an understanding and develop metrics for generating insights into how different policies, institutional arrangements, and political ideologies yield different outcomes for their citizens and the planet we all live on.

In my comment I will argue that the KLMDs SAGE framework represents not just another “beyond GDP” alternative but is an important contribution to a larger shift underway in economics about our understanding of human behavior and the nature and purpose of economic systems. Recognizing this broader shift helps us see how SAGE might be built upon and strengthened. In this spirit, I will 1) suggest some starting points for strengthening the normative foundations of the SAGE framework, 2) as such, suggest a different interpretation of the welfare effects of inequality than those proposed by KLMDs, 3) briefly sketch out further work that might be done on the “material gain” part of the framework, and 4) express skepticism about KLMDs’s attempt to integrate SAGE into a utility maximizing model of decision making and briefly suggest an alternative. I will conclude that SAGE provides a framework for a very rich future research agenda.

SAGE VERSUS GDP – A SHIFT IN ONTOLOGICAL FRAMEWORK

The many flaws and limitations in using GDP as a normative guide for policymaking are well known (e.g. Coyle 2015; Stiglitz, Sen, and Fitoussi 2010). But one underappreciated strength of GDP is a kind of ontological coherence that most proposed alternatives do not have. One can draw a historical and intellectual line from Thomas Hobbes’s proposition that humans seek to maximize pleasure, to Jeremy Bentham’s utilitarian calculus, to the development of utility theory as both a positive and normative decision theory in economics, to the welfare theorems of Kenneth Arrow and Gérard Debreu, to the notion that maximizing GDP is good for society.¹ In this set of interrelated concepts, an allocatively efficient economy is one where individuals maximize their utility in markets subject to the Pareto constraint, and GDP per capita (or consumption per capita) is then interpreted as a rough proxy for, or indicative of, individual utility maximization. Thus, for half a century, when policymakers have set GDP growth as their prime

¹ For a history of this intellectual and philosophical lineage, see Wootton (2018).

economic objective, economists have been able to nod soberly in agreement, comfortable in its theoretical and moral philosophical underpinnings.

One can thus think of GDP and its related metrics as sitting atop what I will call an “ontological stack” of interrelated concepts (Table 1), running from the foundations of utilitarian moral philosophy, up through utility theory, neoclassical economics, and welfare theory. It is the line of reasoning running through this ontological stack that has meant that GDP is more than just a metric, it is part of a larger conceptual framework regarding human welfare, how the economy works, and how it should work.

Table 1. The “ontological stacks”: GDP versus SAGE

	GDP	SAGE
Metrics	Production, income, consumption, productivity	Solidarity, agency, material prosperity, sustainability
Normative framework	Utilitarian, welfare theorems	Capabilities, democratic equality, human need
Economy and environment	Externality	Embedded
Economic systems theory	General equilibrium	Complex adaptive system
Behavioral theory	Self-regarding, utility maximizing, rational	Other regarding, multi-directed, inductive, heuristic
Psychological concept	Happiness	Life satisfaction & meaning
Philosophical tradition	Hedonic	Eudemonic

But of course, the chain of reasoning in the GDP stack is tenuous at best. This is not new news to economists, many of whom have been critical of how GDP is interpreted and used since its earliest days—for example, Simon Kuznets, the inventor of national accounts said in 1934, “The welfare of a nation can, therefore, scarcely be inferred from a measurement of national income...” (Kuznets 1934). More recent critiques have added to our understanding of the flaws and limitations in GDP (e.g. Stiglitz, Sen, and Fitoussi 2010), and there have been any number of worthwhile efforts to develop alternatives (e.g. OECD Better Life Index, the Social Progress Index, Jones and Klenow 2016). But to date, none of these alternatives have developed broad acceptance nor come into widespread use.² There are many reasons for this, not least the fact that policymakers, media, and businesspeople find GDP simple and familiar, and there is momentum in such a widely used metric. But I would further argue that the lack of intellectual foundations to many of the proposed alternatives has been a barrier to convergence by the academic community. In other words, to date no challenger has developed an alternative ontological stack with the coherence of the existing one.

The limitations of GDP alternatives to date

GDP alternatives have typically fallen into three categories. First, are those that seek to extend or enhance GDP, for example by adding shadow prices for unpaid work, creating GDP-like metrics for natural capital, or incorporating measure of inequality (e.g. SEEA 2014; Piketty, Saez, and Zucman 2018). This has the advantage of preserving the coherence of the existing ontological stack but such efforts don’t address any of the fundamental problems of that

² The possible exception is the UN Sustainable Development Goals (SDGs), which have arguably had an impact on international discussions of economic success and measurement as well as the policies of a number of developing countries and aid agencies.

construction, notably problems with utility maximization as a theory of human well-being, or the highly restrictive conditions of the fundamental theorems of welfare economics (and thus their questionable applicability in the real world).

Second, are efforts in essence to short-circuit the ontological stack by more directly measuring utility, or “happiness” (Kahneman 2000; Kahneman and Krueger 2006; Layard 2011). The logic of this approach is if the objective is to maximize societal utility, we should then more directly measure that, and use surveys of “happiness” as a proxy rather than more indirect measures such as economic consumption or output. But there are two problems with this approach. First, as we will discuss, empirical evidence shows that humans are not unidimensional hedonic happiness maximizers but rather multi-directed in their motivations. And second, many of the drivers of individual happiness are either only tenuously connected to the levers of policy (e.g. the quality of one’s family relationships) or well beyond it (e.g. twin studies indicate a significant genetic component to happiness, see De Neve, et. al. 2012), so it is unclear how actionable something like “Gross National Happiness” is from a policymaker perspective.

The third category of alternatives are “dashboard” approaches that seek to compile a set of metrics to better capture what a “good” or “successful” economy looks like (e.g. OECD Better Life, the Happy Planet Index, the Social Progress Index, the Legatum Prosperity Index). Surely, the dashboard approach is heading in the right direction—we would not trust a doctor who assessed our health on a single metric (e.g. temperature), nor (to use KLMDS’s analogy) a pilot who flew a plane relying on a single instrument. The economy is a highly complex system that must be understood and assessed from multiple metrics, but which ones? A key problem of the dashboard approach is the seeming arbitrariness of the choices for composition of the dashboard. Should education be on the dashboard? Female empowerment? Access to healthcare? These intuitively seem like good things, but one has to ask why one set of intuitively good things is included and not another? Thus, different dashboards emphasize different notions of the “good” (e.g. reducing poverty, increasing equality, preserving the environment) depending on the tastes or objectives of their authors. Institutions working on alternative metrics have attempted to work around this inherent arbitrariness by using legitimizing processes—for example the UN’s Sustainable Development Goals (SDGs) were developed via a consensus driven political process, and the OECD invites people to “create your own index” from its dashboard of Better Life metrics.³ But while such workarounds may help in legitimization they don’t solve the inherent problem of arbitrariness.

This is where the KLMDS SAGE framework differs from previous efforts. Yes, it is a dashboard approach proposing multiple metrics under the broad categories of solidarity (S), agency (A), material gain (G), and environmental sustainability (E). But I would argue it is not an arbitrary dashboard, rather it sits atop a highly coherent ontological stack; one that I believe could ultimately replace the hedonic, utility maximizing, neoclassical economics stack that underpins GDP (Table 1).

SAGE’s philosophical and behavioral foundations

The key concepts in this new stack are (building up from its base) a eudemonic rather than hedonic view of human well-being; a modern empirical view of human behavior rather than rational utility maximization; and a view of the economy as a complex, evolving, socio-ecological system, rather than a neoclassical, equilibrium view.⁴ While space does not allow a full exploration

³ See <https://www.un.org/sustainabledevelopment/sustainable-development-goals/> and <http://www.oecdbetterlifeindex.org/responses/>

⁴ The ideas here are more fully described in Beinhocker and Hanauer (forthcoming).

of this new stack, I will provide a brief sketch. At its foundation is a different philosophical conception of the good life. The current stack is anchored in a hedonic philosophical tradition with historical roots in Epicurus, Hobbes, and Bentham that proposes that the good life involves maximizing pleasure or happiness and minimizing displeasure or pain. The new stack, one could argue, is anchored in a eudemonic philosophical tradition with roots in Aristotle that proposes a broader conception of the good life as eudemonia or human flourishing. Debating the differences and similarities between these perspectives has kept philosophers busy for over two thousand years, but the key point for our purposes is that “happiness” and “flourishing” are two distinct concepts. Modern empirical psychological work sees happiness as a momentary psychological state—e.g. eating an ice cream might make one happy in that moment—and is usually measured by asking respondents in a variety of ways how happy they are, as well as through brain imaging and other measurements looking at bio-neurological states associated with feelings of happiness or unhappiness (Davidson 2000; Davidson et al. 2000). In contrast, flourishing is a more reflective state, asking respondents to consider their general satisfaction with their life over time and whether they find their life to be meaningful—e.g. think about how you might feel looking back over your life from your deathbed—this state is associated with feelings of contentment or discontent (Sirgy 2012).⁵ GDP crudely proxies our happiness through how much stuff we produce and consume, whereas SAGE attempts to get at a broader set of drivers of life satisfaction and meaning.

Recent work on human motivations (including Snower’s work with colleagues Bosworth and Singer) shows that people are “multi-directed” in their motivations (e.g. Bosworth, Singer, and Snower 2016; Pang 2010; Heckhausen 2000). The pursuit of pleasure and avoidance of pain is certainly one such motivation—Hobbes and Bentham weren’t entirely wrong in recognizing hedonic motivations; most people would prefer an ice cream to a poke in the eye. But such “Self-interested Wanting” (in the typology of Bosworth, Singer, and Snower, 2016), is only one of a number of empirically distinct psychological motivators. Many other motivators have to do with relations to other people—for example, caring, affiliation, and power—and the balance across motivations is strongly determined by social relations and social settings. And while there are various ways to create typologies and categorizations of human needs, scholars are unified that psychological needs involving social relations are as fundamental as physical needs (Nussbaum 2003; Max-Neef 1991; Doyal and Gough 1991; Gough 2015), and in fact the two are closely related as emotions from social relations are experienced physiologically (Sapolsky 2017). Finally, empirical studies show that social relations and social capital are powerful determinants of life satisfaction (e.g. Bjørnskov 2003; Bjørnskov, Dreher, and Fisher 2008).

As KLMDs note, the reason why social relations play such a large role in well-being is we evolved that way (Wilson 2019). Biologists highlight that humans are among the most cooperative species on the planet and are unique in that their cooperation is not just supported by the hardware of genetics, but also through the rapidly evolving and flexible software of culture (Wilson 2012; Nowak 2011). Human prosocial instincts are universal (Henrich et al. 2001, 2004), and differing cultures over time have developed a variety of norms and institutions to harness those instincts into cooperation for a variety of purposes and at a variety of scales—from armies, to states, religions, and economies (Turchin 2018). There is thus an intrinsic relationship between the (S) and (G) dimensions of the KLMDs framework, in that not only are positive social relations and social solidarity critical for individual well-being, but societies that are able to create and harness

⁵ Sirgy (2012) makes a distinction between “prudential happiness” (life satisfaction) which is a positive state of being and “perfectionist happiness” (eudaimonia) which also contains a normative, moral element. As SAGE arguably addresses aspects of both, I have not delved into this distinction.

social solidarity on larger scales are also likely better able to create material goods.⁶ Atomistic, low trust, conflict-ridden societies are almost inevitably poor, while cooperative, high trust, low conflict societies tend to be wealthy (Acemoglu & Robinson 2013).

There is also an inherent relationship between the (S) and (A) dimensions of the KLMDs framework. For cooperation to be sustained it must involve “strong reciprocity”, i.e. cooperating unconditionally and punishing defectors at personal cost (Gintis 2000, 2003; Bowles and Gintis 2011). People must feel that the terms of cooperation are “fair” and that defectors will not “get away with it”. The ability to contribute or withdraw one’s cooperation, the ability to judge for oneself what is fair or not, the ability to punish those not playing fair, implies a degree of individual agency. In this conception, agency is not just the ability to pursue individual pleasure through consumption (in the hedonic-utility-neoclassical-GDP stack there is an implied notion that more consumption is also an expression of individual freedom). Rather it is a broader interpretation of agency where there is also agency in one’s relationships to one’s fellow human beings and to society.

SAGE’s (implicit) systems level theory

In addition to building off of such behavioral foundations, I believe the KLMDs framework implies (or requires) a different systems level theory of the economy. If humans *were* hedonically motivated, rational, utility maximizing creatures, if utility *was* generated primarily through consumption, and if the economy *in fact* settled into states of general equilibrium, then GDP *would* be a justifiable proxy for well-being. But as KLMDs recognize, the real world is one of multi-motivated human beings, interacting in constantly evolving webs of cooperation, social relations, and complex institutions, creating emergent patterns of system behavior (e.g. growth, inequality, carbon emissions). This is more appropriately and realistically described and understood as a complex adaptive system (Arthur 1999, 2015; Miller and Page 2007; Beinhocker 2006). In such a conception, GDP is not only inadequate as a proxy for individual well-being, but also as an indicator of system health. KLMDs assert that SAGE not only provides a better link with individual well-being, but also its multiple dimensions better measure long-term system health in a complex economy.⁷ However, there is a two-way, reflexive relationship between individual well-being and system health that needs further exploration. We know that in complex adaptive systems such as the economy, system behaviors are not just a linear adding up of individual agent behaviors at a moment in time, rather they emerge from dynamic, non-linear interactions amongst agents and structures in the system. Thus “more is different” (Anderson 1972), and well-being at the individual level may or may not imply a healthy system that will sustain flourishing tomorrow.

The prime example of this of course is the economy’s relationship with the environment, and here KLMDs also depart from the GDP ontology. In Figure 1 of their paper the complex adaptive system of the economy and society is appropriately shown embedded in the larger complex adaptive system of the bio-physical environment. They then advocate measuring environmental sustainability (E) as a core part of their framework. My interpretation is in doing so they are (at least implicitly) rejecting the idea that the environment is simply an externality to the economy that can be measured and managed through appropriate price signals. Instead, they join an ecological economics tradition that says the economy’s two-way interactions with the bio-

⁶ KLMDs note (correspondence) that the boundaries between social and economic groups may not necessarily overlap and may sometimes be in conflict (e.g. high solidarity amongst workers and managers but conflict between the two groups), thus economic outcomes depend not just on within-group solidarity but also across-group.

⁷ KLMDs note (correspondence) that SAGE naturally incorporates the externalities flowing from different motivations, e.g. caring is associated with positive preference externalities and contributes to system health while anger and status-seeking can create negative externalities in a community.

physical world are complex, varied and the sustainability of those interactions must be explicitly measured and actively managed across multiple dimensions (Raworth 2017; O'Neill et al. 2018; Lamb and Steinberger 2017).

Thus, in my view, SAGE represents more than just an extension of GDP or yet another dashboard. It is an attempt to devise a measurement system built on very different, and more empirically grounded, conceptual framework than that which underpins the current GDP-based framework.

FOUR WAYS TO STRENGTHEN AND EXTEND THE SAGE FRAMEWORK

Cast in this light, what KLMDs are trying to do looks highly ambitious. As such, it is not surprising that there are a number of ways the SAGE framework could be strengthened and extended. I will briefly sketch four suggestions here.

Moral foundations

While the bottom layers of what I've identified as the alternative ontological stack are increasingly well developed—notably empirically grounded theories of human behavior, the economy as a complex, evolving system, and economic-environment interactions—the upper normative layer is much less so. While there is much to criticize about neoclassical welfare economics (e.g. Atkinson 2001, 2009), we should again recognize the strength of its internal coherence and connection with other ideas in the stack. There is as of yet no alternative theory of welfare economics that can claim this. Such a new welfare economics is very much needed, and there are attempts in the behavioral economics community (e.g. D. Bernheim 2010; B. D. Bernheim 2016; Fleurbaey and Schokkaert 2013) and ecological community (e.g. Lamb and Steinberger 2017; Brand-Correa and Steinberger 2017) to develop alternatives to the neoclassical welfare model.

But just as neoclassical welfare theory has philosophical roots in the Benthamite utilitarian tradition, one must ask what moral philosophy foundations a welfare theory in this new stack might built on? KLMDs's triad of solidarity (S), agency (A), and material gain (G) points to two potential cornerstones. The first is Amartya Sen's capabilities approach. Sen, and later work by Martha Nussbaum, argues that agency is not just freedom from constraint, but the freedom to pursue one's notion of the good life and fulfill one's human potential (Nussbaum and Sen 1993; Sen, 1999; Nussbaum 1995, 2011)). But such positive freedoms are only meaningful if one has the capabilities to pursue them. Thus, true agency depends on the capabilities provided by factors such as healthcare, nutrition, education, and political rights. And when one has capabilities, one is able to engage in social relations (S) without coercion and exploitation, and able to fairly and productively contribute to and benefit from society's material prosperity (G). In Sen's framework, well-being is a consequence of agency and capabilities are a necessary (though not sufficient) condition for agency (Sen 1987). Explicitly recognizing capabilities as a core component of agency would significantly strengthen the KLMDs framework and inform the choice of additional metrics for the (A) part of the dashboard.

Likewise, a second moral cornerstone can be found in Elizabeth Anderson's notion of democratic equality (Anderson 1999). One could say that a healthy, successful, and just economy is not just one where people have the freedom to work and consume as they desire, but also where they have sufficient political, social, and economic power such that one set of people is not able to unfairly exploit another set. KLMDs nod at this aspect of agency in choosing labor market

insecurity as one of their metrics, but other measures of agency versus exploitation could and should certainly be added (notably measures of gender and racial equality).⁸

A new welfare economics that unites normative foundations, an analytical framework, and a set of metrics is still some distance away, but KLMDs help us think about the direction it might take.

The role of inequality

KLMDs have a brief discussion about the role of inequality in their framework, noting attempts to include equality/inequality as a measure of economic health, the apparently conflicting empirical work on inequality's impact on well-being, and long-standing philosophical debates about its normative implications. They then in essence kick the question into the long grass of "future research". In doing so, however, they have omitted a central issue as well as missed an opportunity to strengthen their framework.

As they note, "the welfare consequences of inequality depend crucially on how the inequality is generated" (p. 6). As research has progressed on this subject it has become increasingly clear that what matters to people's welfare is not inequality per se, but *fairness* (Starmans, Sheskin, and Bloom 2017). And they are two different concepts—inequality is about outcomes, while fairness is about process. Equal or unequal outcomes may or may not signal a fair process depending on the circumstances or the "game" being played. In a game of coin flipping we would expect equal outcomes and highly unequal outcomes would signal something unfair. But in a running race with people of widely varying abilities the opposite holds true, an unequal outcome would be fair, while an equal outcome would look suspicious. Fair processes are critical to cooperation, and expectations of fairness in social relations appear to be universal and develop at a very young age (McCrink, Bloom, and Santos 2010; Hamlin et al. 2011). When norms of fairness are violated, people feel emotions of moral outrage, withdraw cooperation, and often seek to punish violators.

Economic inequality as measured by top income shares, Gini coefficients and other macro variables thus does not have a direct effect on well-being, and few people other than economists actually track such metrics (Norton and Ariely 2011). But people do look in their local environment for signals of fair or unfair processes (e.g. how am I treated at work, how am I doing versus my neighbors?) as well as more general societal signals (e.g. news reports about people making money fairly or unfairly, or general reports about rising inequality). The emotions of fairness versus unfairness generated by such observations do have a tangible impact on well-being, are often expressed politically, and have major consequences for social solidarity (S). The de-coupling phenomena which is central to KLMDs's motivation can be interpreted as a multi-decade, society-wide violation of fairness, a breakdown in the social contract.

Thus, while I agree with KLMDs's decision to omit macro inequality variables from their framework, measures of perceptions of fairness versus unfairness seem essential and should be added to (S).

Material gain

For their measure of material gain (G), KLMDs rely on GDP, despite its limitations. While the familiarity of GDP may help tactically in the goal of engaging policymakers with SAGE, there

⁸ KLMDs note (in correspondence) that gender and racial equality can be viewed both as an outcome of fairness and agency (A), and as well as an input to broader social solidarity (S), thus raising important questions about the most meaningful way to incorporate these factors into the SAGE framework.

are nonetheless opportunities to explore alternative concepts and measures of (G). I would argue that the crucial notion here is not so much “material gain” which implies a rate of change in material comfort, but rather “prosperity” which implies a certain standard of living (but I admit “SAGE” sounds a lot better than “SAPE”). How to conceptualize prosperity, what its impacts on well-being are, how to measure it, and what its relationships are to the (S), (A), and (E) dimensions, are critical questions. Again, the hedonic, GDP ontological stack has answers. Prosperity is our ability to consume, and by rationally choosing what we consume we maximize our utility and thus well-being. In this framework (S) is subsumed in our utility function as “other regarding preferences”, (A) is our ability to exercise individual choice in consumption, and (E) is the unpriced externalities generated as a result of our consumption. Again, all highly questionable, but also highly coherent. So, is there an equally coherent alternative?

At present no, but we can see some starting points. In particular are needs based frameworks that explore how theories of human need, sufficiency, and satiation relate to all four dimensions of the SAGE framework (e.g. Nussbaum 2003; Doyal and Gough 1991; Gough 2000; Max-Neef 1991, Hanauer and Beinhocker 2013). Needs based approaches have been applied in studies of the relationship between well-being and material condition, as well as poverty and deprivation. It is well known that income and life satisfaction are loosely related at best (e.g. Easterlin 2001), however, attempts to more directly measure the material condition of life have yielded stronger results (Christoph 2010). Such research makes it clear that while the hedonic treadmill of increasing income does not lead to sustained increases in happiness (e.g. Knight and Gunatilaka 2012), but that the fulfillment or deprivation of certain human material needs (e.g. adequate food, housing, hygiene, health, security, etc.) does relate significantly to broader life-satisfaction (Christoph 2010). This then provides a basis for asking what material conditions are necessary for a flourishing life, how best to measure that, and what are the normative implications (e.g. Offer 2006; Sirgy 2012). Of course, one of the most critical normative implications is how such needs can be met in a fair way on a finite planet. There has recently been progress in examining at how needs-based frameworks can be integrated with data on needs satisfaction and biophysical boundaries to answer the epoch defining question of how we might create widely shared well-being within planetary boundaries (Wiedmann et al. 2020; O’Neill et al. 2018; Lamb and Steinberger 2017).

Such work has the potential to provide a new perspective on the (G) part of the SAGE framework, and one that is much more deeply connected to the (S), (A), and (E) dimensions than GDP.

SAGE as an analytical model

Finally, KLMDs attempt to use SAGE to construct an analytical welfare model by in essence expanding the standard utility model to include the SAGE dimensions. While I applaud their intention, I find this the least convincing part of the paper. One of the strengths of the current ontological stack is an analytical welfare model that connects the moral and behavioral foundations below with the metrics above. Any competing ontological stack will also need such an analytical welfare model—such connective tissue is essential if the framework is to be of prescriptive use in policy and enable us to make statements such as “Policy X will lead to net welfare gains (losses) and therefore is good (bad).” The current model has rigor going for it, but it has also led to empirically false or even dangerously misleading results.⁹ Thus an equally rigorous, but more scientifically grounded alternative would be a hugely important contribution.

⁹An example of empirically false results would be predictions of welfare loss due to minimum wage policies which numerous studies have refuted (e.g. Cengiz, Dube, Lindner and Zipperer 2019). An example of dangerously misleading results would be Nordhaus (2019) claiming that warming of 4 degrees C is “optimal” despite a scientific

In my view, the problem with KLMDs's attempt is not so much in their specific adaptation of utility theory for their welfare model, but their use of it in the first place. The broad literature on human behavior, motivation, pro-sociality, cooperation, and well-being that underpins their framework challenges not just the unidimensional focus of utility theory on consumption, but the construct of utility theory itself. Space does not allow a review of this complex topic, but I would simply note that evidence from modern behavioral science provides a very different portrayal of human decision making from that presented in standard utility theory (e.g. Gigerenzer and Gaissmaier 2011; Mercier and Sperber 2017; Sapolsky 2017; Sloman and Fernbach 2017). Instead, the picture that emerges is one of inductive, heuristic decision making, tightly integrated with our emotional, biological, and neurological systems, and highly integrated with the decision making of our fellow human beings and influenced by our shared cultural norms.

The path from this cross-disciplinary picture of human decision making to a formal theory, let alone an analytical framework for welfare analysis, is certainly a challenging one. Yet, again there are entry points to be explored. For example, Herbert Gintis's "Beliefs, Preferences, and Constraints" (BPC) model preserves the analytical rigor of rational choice, but re-grounds it in modern perspectives from cognitive science, sociobiology, sociology and other fields (Gintis 2007). Gintis further demonstrates how this framework can be applied to questions of welfare analysis (Gintis 2009, 2017). Another approach is illustrated by Joshua Epstein (2014) who proposes an "agent_zero" model grounded in neurocognitive research that can be used in agent-based computational models for a variety of purposes and could be in principle adapted to conduct welfare modeling utilizing the SAGE framework.

Thus, while the intention of the model presented in KLMDs is to be applauded, and the formalism used has the advantage of familiarity to economists, the ideas incorporated in SAGE require that we go beyond utility-based welfare analysis.¹⁰

CONCLUSION

In this comment I have tried to emphasize two points. The first is that the search for alternatives to GDP requires not just new metrics, but a new way of thinking about human nature, social relations, the economy as a system, and that system's interactions with the natural world. Such new thinking by necessity spans multiple levels and disciplines, from foundations in moral philosophy, to studies of human behavior, theories of economic systems, normative frameworks, and methods for welfare analysis. I've called this set of interrelated concepts an ontological stack and made the claim that the SAGE framework is situated atop an ontological stack that is very different from the set of concepts that supports GDP. In short, I am proposing that what KLMDs are attempting to do with SAGE is even more ambitious than they themselves may realize.

But given such ambition, it is not at all surprising that there are opportunities to strengthen and extend what KLMDs propose. I have suggested four such opportunities: 1) providing more solid moral philosophical foundations to their framework, notably in the work of Sen, Nussbaum, and Anderson, 2) incorporating fairness rather than inequality as a central factor in the social

consensus that such a level of warming presents dangers of ecological collapse, mass extinction, and risks it may not be compatible with the continuation of human civilization (Keen 2019).

¹⁰ KLMDs note (correspondence) that while they make use of the formalisms of utility theory, their objective function should not be interpreted as a modified utility function, but rather as a decision function incorporating multiple context-dependent motives (per Gintis 2007) whereby switching or conflicting motives may lead to preference inconsistency.

solidarity (S) part of their framework, 3) replacing their use of GDP in the (G) component with a conception of material prosperity drawn from research on human needs, and 4) looking beyond conventional utility theory to provide an analytical framework for welfare analysis.

The issues of de-coupling, social division, and looming environmental catastrophe provide powerful motivations for developing a new framework to more deeply understand the health of our economies and societies. KLMDs take on this challenge in a thoughtful and provocative manner and in doing so help us see a rich and vital agenda for future work.

ACKNOWLEDGEMENTS

I am grateful for Katharina Lima de Miranda and Dennis Snower for providing the target article and for their insightful feedback on my comment. I would also like to thank Hwei-Chun Su for research assistance, and the Institute for New Economic Thinking and the Open Society Foundations for their support.

AUTHOR BIOGRAPHY

Eric Beinhocker is Professor of Practice in Public Policy at the Blavatnik School of Government, University of Oxford, and the founder and Executive Director of the Institute for New Economic Thinking at the Oxford Martin School (www.inet.ox.ac.uk), an interdisciplinary research center dedicated to bringing innovative approaches to major economic, societal, and public policy challenges. Beinhocker is also a Supernumerary Fellow in Economics at Oriel College, Oxford, and an External Professor at the Santa Fe Institute. He is a graduate of Dartmouth College and the Massachusetts Institute of Technology.

REFERENCES

- Acemoglu, Daron, and James A. Robinson. 2013. *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. London: Profile Books.
- Anderson, Elizabeth S. 1999. "What Is the Point of Equality?" *Ethics* 109 (2): 287–337. <https://doi.org/10.1086/233897>.
- Anderson, P. W. 1972. "More Is Different." *Science, New Series* 177 (4047): 393–96. <http://www.jstor.org/stable/1734697>.
- Arthur, W. Brian. 1999. "Complexity and the Economy." *Science* 284 (5411): 107–9.
- Arthur, W Brian. 2015. "Complexity Economics: A Different Framework for Economic Thought." In his *Complexity and the Economy*, 1–29. Oxford: Oxford University Press.
- Atkinson, A. B. 2009. "Economics as a Moral Science." *Economica* 76 (SUPPL.1): 791–804. <https://doi.org/10.1111/j.1468-0335.2009.00788.x>.
- Atkinson, A. B. 2001. "The Strange Disappearance of Welfare Economics." *Kyklos* 54 (April): 193–206. <https://doi.org/10.1111/1467-6435.00148>.

- Beinhocker, Eric D. 2006. *The Origin of Wealth: Evolution, Complexity, and the Radical Remaking of Economics*. Boston, MA: Harvard Business School Press.
- Beinhocker, Eric D., and Nick Hanauer. Forthcoming. *Market Humanism*.
- Bernheim, B. Douglas. 2016. "The Good, the Bad, and the Ugly: A Unified Approach to Behavioral Welfare Economics." *Journal of Benefit-Cost Analysis* 7 (1): 12–68. <https://doi.org/10.1017/bca.2016.5>.
- Bernheim, Douglas. 2010. "Behavioral Welfare Economics." *Panoeconomicus* 57 (2): 123–51. <https://doi.org/10.2298/PAN1002123B>.
- Bjørnskov, Christian. 2003. "The Happy Few: Cross-Country Evidence on Social Capital and Life Satisfaction." *Kyklos* 56 (1): 3–16. <https://doi.org/10.1111/1467-6435.00207>.
- Bjørnskov, Christian, Axel Dreher, and Justina A. V. Fischer. 2008. "Cross-Country Determinants of Life Satisfaction: Exploring Different Determinants across Groups in Society." *Social Choice and Welfare* 30 (1): 119–73. <https://doi.org/10.1007/s00355-007-0225-4>.
- Bosworth, Steven J., Tania Singer, and Dennis J. Snower. 2016. "Cooperation, Motivation and Social Balance." *Journal of Economic Behavior & Organization* 126 (June): 72–94. <https://doi.org/10.1016/j.jebo.2015.12.005>.
- Bowles, Samuel, and Herbert Gintis. 2011. *A Cooperative Species: Human Reciprocity and Its Evolution*. Princeton: Princeton University Press.
- Brand-Correa, Lina I., and Julia K. Steinberger. 2017. "A Framework for Decoupling Human Need Satisfaction From Energy Use." *Ecological Economics* 141 (November): 43–52. <https://doi.org/10.1016/j.ecolecon.2017.05.019>.
- Cengiz, Doruk, Arindrajit Dube, Attila Lindner, and Ben Zipperer. 2019. "The Effect of Minimum Wages on Low-Wage Jobs: Evidence from the United States Using a Bunching Estimator." Working Paper 25434. Working Paper Series. National Bureau of Economic Research. <https://doi.org/10.3386/w25434>.
- Christoph, Bernhard. 2010. "The Relation Between Life Satisfaction and the Material Situation: A Re-Evaluation Using Alternative Measures." *Social Indicators Research* 98 (3): 475–99. <https://doi.org/10.1007/s11205-009-9552-4>.
- Coyle, Diane. 2015. *GDP: A Brief but Affectionate History*. Revised and Expanded edition. Princeton: Princeton University Press.
- Davidson, Richard J. 2000. "Affective Style, Psychopathology and Resilience: Brain Mechanisms and Plasticity." *American Psychologist* 55 (11): 1196–1214.
- Davidson, Richard J., Daren C. Jackson, and Ned H. Kalin. 2000. "Emotion, Plasticity, Context, and Regulation: Perspectives from Affective Neuroscience." *Psychological Bulletin* 126 (6): 890–909. <https://doi.org/10.1037/0033-2909.126.6.890>.
- De Neve, Jan-Emmanuel, Nicholas A. Christakis, James H. Fowler, and Bruno S. Frey. 2012. "Genes, Economics, and Happiness." *Journal of Neuroscience, Psychology, and Economics* 5(4): 193–211.
- Doyal, Len, and Ian Gough. 1991. *A Theory of Human Need*. Palgrave.
- Easterlin, Richard A. 2001. "Income and Happiness: Towards a Unified Theory." *Economic Journal* 111: 465–484.

- Epstein, Joshua M. 2014. *Agent_Zero: Toward Neurocognitive Foundations for Generative Social Science*. Princeton University Press.
<https://press.princeton.edu/books/hardcover/9780691158884/agentzero>.
- Fleurbaey, Marc, and Erik Schokkaert. 2013. "Behavioral Welfare Economics and Redistribution." *American Economic Journal: Microeconomics* 5 (3): 180–205.
<https://doi.org/10.1257/mic.5.3.180>.
- Gigerenzer, Gerd, and Wolfgang Gaissmaier. 2011. "Heuristic Decision Making." *Annual Review of Psychology* 62 (1): 451–82. <https://doi.org/10.1146/annurev-psych-120709-145346>.
- Gintis, Herbert. 2000. "Strong Reciprocity and Human Sociality." *Journal of Theoretical Biology* 206 (2): 169–179. <https://doi.org/10.1006/jtbi.2000.2111>.
- . 2003. "Solving the Puzzle of Prosociality." *Rationality and Society* 15 (2): 155–187.
<https://doi.org/10.1177/1043463103015002001>.
- . 2007. "A Framework for the Unification of the Behavioral Sciences." *Behavioral and Brain Sciences* 30 (1–61): 1–61.
- . 2009. *The Bounds of Reason: Game Theory and the Unification of the Behavioral Sciences*. Princeton, NJ: Princeton University Press.
<http://ebookcentral.proquest.com/lib/oxford/detail.action?docID=457805>.
- . 2017. *Individuality and Entanglement: The Moral and Material Bases of Social Life*. Princeton, NJ: Princeton University Press.
- Gough, Ian. 2000. *Global Capital, Human Needs and Social Policies*. Palgrave Macmillan UK.
<https://doi.org/10.1057/9780230289093>.
- . 2015. "Climate Change and Sustainable Welfare: The Centrality of Human Needs: Fig. 1." *Cambridge Journal of Economics* 39 (5): 1191–1214. <https://doi.org/10.1093/cje/bev039>.
- Hanauer, Nick, and Eric D. Beinhocker. 2014. "Capitalism Redefined." *Democracy Journal*, 2014.
<https://democracyjournal.org/magazine/31/capitalism-redefined/>.
- Happy Planet Index, <http://happyplanetindex.org/>
- Heckhausen, Jutta. 2000. "Evolutionary Perspectives on Human Motivation." *American Behavioral Scientist* 43 (6): 1015–29. <https://doi.org/10.1177/00027640021955739>.
- Heckhausen, Jutta, and Heinz Heckhausen, eds. 2010. *Motivation und Handeln*. 4th ed. Springer-Lehrbuch. Berlin Heidelberg: Springer-Verlag. <https://doi.org/10.1007/978-3-642-12693-2>.
- Henrich, Joseph, Robert Boyd, Samuel Bowles, Colin Camerer, Ernst Fehr, Herbert Gintis, and Richard McElreath. 2001. "In Search of Homo Economicus: Behavioral Experiments in 15 Small-Scale Societies." *American Economic Review* 91 (2): 73–84.
<https://doi.org/10.1257/aer.91.2.73>.
- Henrich, Joseph, Robert Boyd, Colin Camerer, Ernst Fehr, and Herbert Gintis, eds. 2004. *Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies*. Oxford: Oxford University Press.
- Jones, Charles I., and Peter J. Klenow. 2016. "Beyond GDP? Welfare across Countries and Time." *American Economic Review* 106 (9): 2426–57. <https://doi.org/10.1257/aer.20110236>.
- Kahneman, Daniel. 2000. "Experienced Utility and Objective Happiness: A Moment-Based Approach." In *Choices, Values, and Frames*, edited by Daniel Kahneman and Amos Tversky, 1st ed., 673–92. Cambridge University Press.
<https://doi.org/10.1017/CBO9780511803475.038>.

- Kahneman, Daniel, and Alan B Krueger. 2006. "Developments in the Measurement of Subjective Well-Being." *Journal of Economic Perspectives* 20 (1): 3–24. <https://doi.org/10.1257/089533006776526030>.
- Keen, Steve. 2019. "'4°C of Global Warming Is Optimal' – Even Nobel Prize Winners Are Getting Things Catastrophically Wrong." *The Conversation*. November 14, 2019. <http://theconversation.com/4-c-of-global-warming-is-optimal-even-nobel-prize-winners-are-getting-things-catastrophically-wrong-125802>.
- Knight, John, and Ramani Gunatilaka. 2012. "Income, Aspirations, and the Hedonic Treadmill in a Poor Society." *Journal of Economic Behavior & Organization* 82: 67–81.
- Kuznets, Simon. 1934. "National Income, 1929–1932." 73rd US Congress, 2nd session, Senate document no. 124.
- Lamb, William F., and Julia K. Steinberger. 2017. "Human Well-Being and Climate Change Mitigation: Human Well-Being and Climate Change Mitigation." *Wiley Interdisciplinary Reviews: Climate Change* 8 (6): e485. <https://doi.org/10.1002/wcc.485>.
- Layard, Peter R. G. 2011. *Happiness: Lessons from a New Science*. New ed.: fully rev. and Updated. Penguin Psychology. London: Penguin Books.
- Legatum Prosperity Index, <https://www.prosperity.com/>
- Max-Neef, Manfred A. 1991. *Human Scale Development: Conception, Application and Further Reflections*. New York: The Apex Press.
- Mercier, Hugo, and Dan Sperber. 2018. *The Enigma of Reason*. London: Penguin Books.
- Miller, John H., and Scott E. Page. 2007. *Complex Adaptive Systems: An Introduction to Computational Models of Social Life*. Princeton, NJ: Princeton University Press.
- Nordhaus, William. 2019. "Climate Change: The Ultimate Challenge for Economics." *American Economic Review* 109 (6): 1991–2014. <https://doi.org/10.1257/aer.109.6.1991>.
- Norton, Michael I., and Dan Ariely. 2011. "Building a Better America-One Wealth Quintile at a Time." *Perspectives on Psychological Science* 6 (1): 9–12. <https://doi.org/10.1177/1745691610393524>.
- Nowak, Martin A. 2011. *SuperCooperators: The Mathematics of Evolution, Altruism and Human Behaviour*. Edinburgh: Canongate.
- Nussbaum, Martha. 2003. "Capabilities As Fundamental Entitlements: Sen and Social Justice." *Feminist Economics* 9 (2–3): 33–59. <https://doi.org/10.1080/1354570022000077926>.
- Nussbaum, Martha C. 1995. "Human Capabilities, Female Human Beings." In *Women, Culture, and Development*, edited by Martha C. Nussbaum and J. Glover, 61–104. Oxford: Clarendon Press.
- . 2011. *Creating Capabilities: The Human Development Approach*. Cambridge, MA: Harvard University Press.
- Nussbaum, Martha C., and Amartya K. Sen, eds. 1993. *The Quality of Life*. Oxford: Clarendon Press.
- OECD Better Life Index, <http://www.oecdbetterlifeindex.org/responses/>
- Offer, Avner. 2006. *The Challenge of Affluence: Self-Control and Well-Being in the United States and Britain since 1950*. Oxford: Oxford University Press.

- O'Neill, Daniel W., Andrew L. Fanning, William F. Lamb, and Julia K. Steinberger. 2018. "A Good Life for All within Planetary Boundaries." *Nature Sustainability* 1 (2): 88–95. <https://doi.org/10.1038/s41893-018-0021-4>.
- Pang, Joyce S. 2010. "The Achievement Motive: A Review of Theory and Assessment of n Achievement, Hope of Success, and Fear of Failure." In *Implicit Motives*, edited by Oliver Schultheiss and Joachim Brunstein. Oxford, New York: Oxford University Press.
- Piketty, Thomas, Emmanuel Saez, and Gabriel Zucman. 2018. "Distributional National Accounts: Methods and Estimates for the United States." *The Quarterly Journal of Economics* 133 (2): 553–609. <https://doi.org/10.1093/qje/qjx043>.
- Raworth, Kate. 2017. *Doughnut Economics: Seven Ways to Think like a 21st-Century Economist*. London: Random House Business Books.
- Sapolsky, Robert. 2017. *Behave: The Biology of Humans at Our Best and Worst*. London: The Bodley Head.
- SEEA. 2014. "System of Environmental-Economic Accounting 2012: Central Framework." New York: United Nations. https://seea.un.org/sites/seea.un.org/files/seea_cf_final_en.pdf.
- Sen, Amartya. 1987. *On Ethics and Economics*. Oxford UK: Blackwell Publishing.
- . 1999. *Development as Freedom*. New York: Alfred A. Knopf.
- Sirgy, M. Joseph. 2012. *The Psychology of Quality of Life: Hedonic Well-Being, Life Satisfaction, and Eudaimonia*. 2nd ed. Social Indicators Research Series. Springer Netherlands. <https://doi.org/10.1007/978-94-007-4405-9>.
- Sloman, Steven A, and Philip Fernbach. 2017. *The Knowledge Illusion: The Myth of Individual Thought and the Power of Collective Wisdom*. London: Macmillan.
- Social Progress Index, <https://www.socialprogress.org/>
- Starmans, Christina, Mark Sheskin, and Paul Bloom. 2017. "Why People Prefer Unequal Societies." *Nature Human Behaviour*, 1 (0082): 1–7. <https://doi.org/10.1038/s41562-017-0082>.
- Stiglitz, Joseph, Amartya K Sen, and Jean-Paul Fitoussi. 2010. "Mismeasuring Our Lives: Why GDP Doesn't ADD Up." The Report by the Commission on the Measurement of Economic Performance and Social Progress. New York and London: The New Press.
- Turchin, Peter. 2018. *Historical Dynamics: Why States Rise and Fall*. Paperback. Princeton, NJ: Princeton University Press. <https://press.princeton.edu/books/paperback/9780691180779/historical-dynamics>.
- Wiedmann, Thomas, Manfred Lenzen, Lorenz T. Keyßer, and Julia K. Steinberger. 2020. "Scientists' Warning on Affluence." *Nature Communications* 11 (1): 3107. <https://doi.org/10.1038/s41467-020-16941-y>.
- Wilson, David Sloan. 2019. *This View of Life: Completing the Darwinian Revolution*. New York: Penguin Random House.
- Wilson, Edward O. 2012. *The Social Conquest of Earth*. 1st ed. New York: Liveright Pub. Corporation.
- Wootton, David. 2018. *Power, Pleasure, and Profit: Insatiable Appetites from Machiavelli to Madison*. Cambridge, Massachusetts: The Belknap Press of Harvard University Press.