UPRIGHT PROJECT

QUANTIFYING THE NET IMPACT OF COMPANIES

WHITE PAPER

PUBLISHED ON APRIL 28, 2020
UPDATED ON NOVEMBER 25, 2021

Executive summary

The net impact of a company is the net sum of the costs and benefits that the company creates. These costs and benefits include all types of private and external costs and gains. Net impact is, therefore, a measure of net value creation of a company as a whole.

The Upright model produces continuously updated estimates of the net impact of companies by means of an information integration algorithm that consolidates data from humanity's accumulated scientific knowledge and public statistical databases. The overall aim of the model is to inform decision-making on resource allocation: how should humanity allocate its scarce capital, environmental and human resources in order to maximize its wellbeing.

In order to function in that purpose, the Upright net impact model is designed to satisfy the following requirements:

- **Measure** *net*: The model must consider both costs and gains, and provide their net sum. This is a minimum requirement for informing decision-making on resource allocation.
- **Comparability**: All estimated costs and benefits produced by the model must be comparable. Comparisons must be possible within industries, across industries, and across different types of costs and benefits.
- **Comprehensiveness:** The model must consider all types of costs and gains, not only, e.g., environmental costs or financial gains. This is a minimum requirement for understanding the whole value creation of a company and thus informing decision-making on resource allocation.
- **Whole value chain:** The model must capture the cost and benefits created in the whole value chain of a company, not just what happens inside the company or how it affects its immediate stakeholders (shareholders, clients, employees).
- **Adaptable values:** The model must not assume universal values, and must instead accommodate for the fact that every individual decision-maker has a different view of value and different optimization criteria when making decisions in different roles. The model must also be practical and provide reasonable fact-based defaults for these sets of values.
- **Scalability**: The marginal cost of quantifying the impact of an additional company should be close to zero, meaning that it should not require any manual work. This is required for large-scale adoption and thus significance of the data.

This paper describes how the Upright net impact model works, why it makes sense to measure net impact, how it compares to other measures of value creation, and what are the most relevant applications for the data it produces.

CONTENTS

1. Conceptual framework

1.1 What is net impact?

The net impact of a company is the *net sum of costs and benefits* that the company creates. Costs and benefits include all types of costs and benefits - including externalities. Since net impact is a measure of costs and benefits, it can also be referred to as net value creation of a company.

The Upright net impact model measures costs and benefits in four dimensions: environment, health, society, and knowledge. Examples of costs include e.g. GHG emissions by a car factory, usage of highly-skilled labor by an IT company, and damage to human health caused by sugar-sweetened beverages. Examples of benefits include e.g. improvements in health caused by a cancer medicine, knowledge created by research equipment, and pollution removed by a catalytic converter.

Net impact is value-dependent, since each decision-making organization or person assigns different levels of importance to different types of costs and benefits, affecting their net sum. The Upright net impact model aims to bring clarity to decisions that involve values by making the *costs, benefits and value choices* resulting in a given net sum visible.

1.2 Why measure net impact?

In his book The Wealth of Nations (1776), Adam Smith famously suggested that competitive markets lead to the best possible use of resources, without any need to *actually measure* costs and benefits. He believed that each participant in a competitive market is "led by an invisible hand to promote an end which was no part of his intention."

The purpose of the Upright net impact model is to allow individuals to understand what ends their decisions are actually promoting and to see whether they are in line with their intention.

The collective use of global resources is determined by everyday decisions of individuals, which are driven by (1) available information and (2) each person's individual view of value. Such decisions include decisions we make in different roles, such as consumers, investors, employees, voters, politicians, or business leaders.

Examples of choices Upright helps guide include:

- An asset manager chooses how much to invest in PepsiCo and how much in Walmart.
- A student chooses whether to accept a job offer from Goldman Sachs or General Electric.
- A consumer chooses whether to buy regular milk from Nestle or oat drink from Oatly.
- A CEO decides whether to recommend product strategy X or product strategy Y to the board.
- A minister decides the excise tax rate for petrol products.

Upright provides clarity to these types of decisions by providing a clear picture of related costs and benefits. This allows decision-makers to avoid gut-feeling decisions in favor of explicit assumptions about costs and benefits.

1.3 Net impact compared to other available information

Since there are a plethora of different types of data available regarding how companies create value, it can be easy to get confused. Table 1 shows examples of different types of data that are available. In this section, we will explain the essential aspects of Uprights's approach by discussing alternative approaches to understanding the costs and benefits that companies create.

Data	Question the data aims to answer
Upright net impact data	What are the costs and benefits a company creates in relation to the economy, society, knowledge, environment and health?
Earnings (EBITDA)	To what extent does the revenue of the company exceed its expenses?
Life-cycle assessment (LCA)	What are the environmental impacts associated with all the stages of the life-cycle of a product or service?
ESG ratings	How well does a company manage its risks related to environmental sustainability, social issues, and corporate governance?
UN SDG assessment	Which UN sustainable development goals does the company contribute to? (How?)
SASB materiality assessment	Which sustainability topics are likely to affect the financial condition or operating performance of a company? (How?)

Table 1: Examples of data that relate to the value creation of a company

Earnings as a measure of value creation

A common way to assess the value creation of a company is to look at its earnings, using a figure like EBITDA. Given that earnings are a net of costs and gains, it seems at first sight like a good measure for net value creation. There are, however, two problems.

Firstly, using earnings as a measure of value creation is not compatible with the fact that individuals have different values. Value creation can be reduced into a single number only *after* an individual's view of value has been taken into account, not *before*.

Secondly, even if every individual decision-maker had the same values, earnings would be an accurate measure of value creation only if all of the following assumptions were true:

- Consumers perceive the private costs and benefits associated with its products and services accurately and make "rational decisions".
- Governments estimate the *external costs* associated with its products and services correctly and set up corresponding taxes, marketable permits, or emission charges.
- Governments estimate the *external benefits* associated with its products and services correctly and set up corresponding subsidies or vouchers.
- Consumer surplus is negligible.

It is, of course, well known that consumers don't always make good choices for themselves and that activities of companies are associated with considerable external costs and benefits, such as greenhouse gas emissions and knowledge.

Sustainability metrics and LCA

Sustainability metrics and life-cycle analysis (LCA) are a way to quantify to what extent companies use resources in a way that can be sustained over time. They can provide insights into the nature of the external costs associated with a company's activities. They are not particularly useful for understanding net value creation since they do not state anything about the relationship between the costs to the benefits that are created by them. In order to do that, it is necessary also to measure the benefits that companies create.

A less fundamental problem with sustainability metrics is that in practice they typically cover only a small part of the costs and benefits created in a product's value chains, and fail to quantify costs consistently and comparably.

Bottom-up vs. top-down approach

Upright measures value creation with a top-down approach: it estimates the costs and benefits created by companies using a model of the whole private sector, encompassing all products and services traded in global markets. The results of the model are used to allocate *shares* of costs and benefits within different categories to each company.

The alternative approach would be to work bottom-up, conducting e.g. LCA-style analysis of each specific product.

The main downsides of Upright's top-down approach are:

1. **Initial inaccuracy:** Results of first iterations are inaccurate. Result accuracy is improved iteratively and also requires some manual analysis, especially in the beginning phases of the evolution of the model.
2. **Large initial workload:** A sizeable initial workload is necessary for developing the model and covering the whole private sector in terms of products and services.

The main upsides of Upright's approach are:

1. **Comparability:** Upright creates comparability between impact categories by estimating the *share* of global impact within each category. That is made possible by the fact that Upright models the whole private sector: calculating a share of a cost or benefit is only possible with

a model that understands the whole picture. That would not be possible with a bottom-up approach.

2. **Avoidance of double counting:** Given that the Upright model has the whole picture, it effectively avoids both double counting and undercounting of impacts.
3. **Scalability:** Upright's approach has a low marginal cost for adding new companies to the model. That makes it possible to cover a large number of companies and answer macroscopic questions that relate to the aggregate impact of tens of thousands of companies.

1.4 Upright's impact framework

Upright measures impact in 19 categories and four dimensions (Table 2). Upright's impact framework is designed to be:

- **Balanced:** Consider both *costs* and *benefits*.
- **Comprehensive:** Capture *all types* of costs and benefits that companies create.
- **Mutually exclusive:** *No double-counting* of benefits or costs.
- **Value-aware:** Acknowledge *different optimization criteria* and enable the application of *various value sets* of users

Dimension	Impact category
Society	Jobs Taxes Societal infrastructure Societal stability Equality & human rights
Knowledge	Knowledge infrastructure Creating knowledge Distributing knowledge Scarce human capital
Health	Physical diseases Mental diseases Nutrition Relationships Meaning & joy
Environment	GHG emissions Non-GHG emissions Scarce natural resources Biodiversity Waste

Table 2: Impact categories and dimensions within Upright's impact framework.

Upright's framework is different from common sustainability and impact frameworks (such as UN SDGs, SASP, and the GRI reporting standard) in that it aims to capture *all value created by the company to the surrounding world*. In contract, traditional sustainability and impact frameworks only consider a limited selection of "impact topics."

In Upright's framework, this is especially evident in the knowledge dimension: In the modern economy, it is impossible to comprehensively assess the value creation of companies without considering their contribution to creating and sharing knowledge. Similarly, it is essential to consider the opportunity cost related to the use of highly skilled workers, which is captured in the *scarce human resource* impact category.

Given that each decision-maker has different values and uses different optimization criteria when making decisions in different roles, Upright's framework is designed to allow users to flexibly switch between different optimization criteria.

2. The Upright net impact model

The Upright net impact model is a mathematical model of the economy that estimates the net impact of companies. The following sections describe how the model represents knowledge about products and services, value chains, and companies, what data it uses, and how it consolidates different types of information to estimate the costs and benefits that companies create.

2.1 Product and service graph

The Upright product and service graph is a directed graph that represents all globally traded products and services. Each node in the graph represents a single product or service. Edges connecting the nodes express generalization, specialization, and value chain relations (Figure 1).

The purpose of the product and service graph is to represent products and services in a way that allows the Upright model to automatically gather known information about products and services, generalize knowledge, and attribute impacts (costs and benefits) along value chains.

The Upright product graph contains 12,000+ products and services. There are 500,000+ relations between the products and services. Upright analysts continuously update the graph with new products and services, as well as new information about value chain relations.

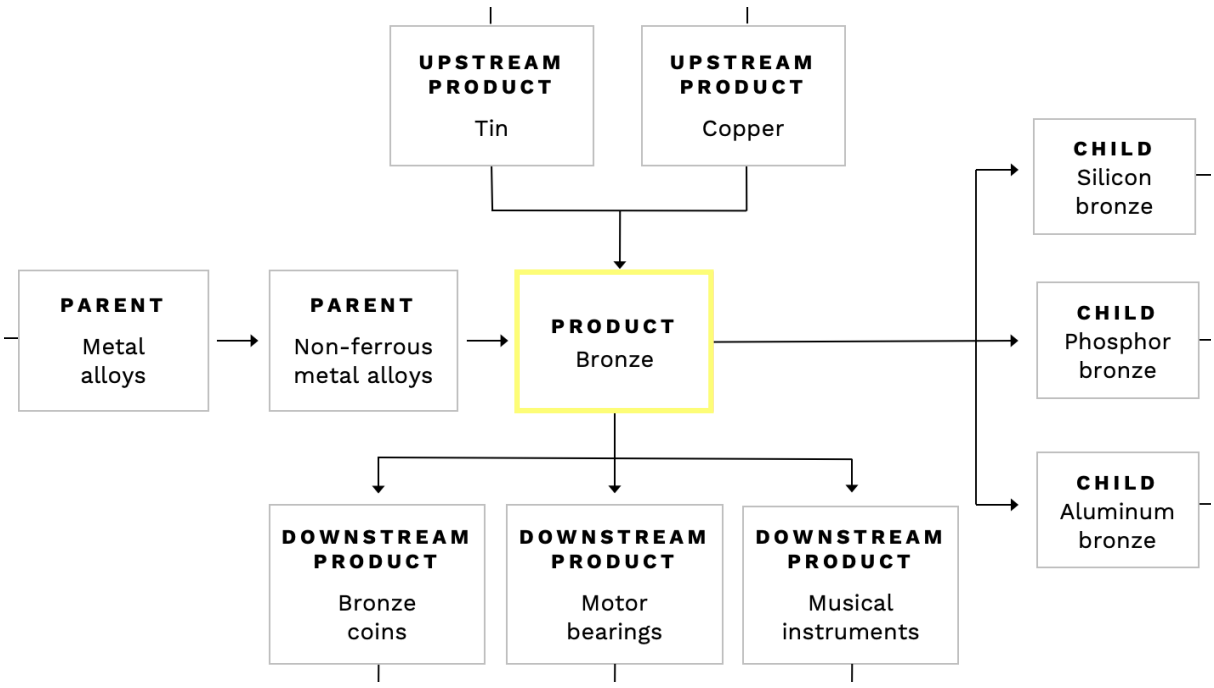


Figure 1: Illustrative example of the representation of products in Upright's product graph. Links to parent and child products represent generalization and specialization, and other links represent value chain relations.

2.2 Quantifying the impact of products and services

The Upright net impact model produces quantitative estimates of the costs and benefits related to each product and service in each of the 19 impact categories within Upright's impact framework. Each estimate is composed of costs and benefits related to three parts of the value chain: upstream, internal, and downstream.

The Upright model collects information on the impacts of all products and services from scientific literature and public statistical databases. The primary data source for scientific literature for the Upright net impact model is the CORE database, which contains approximately 180 million scientific papers. That represents approximately 50% of all scientific articles that have ever been published.

Public statistical databases used by the Upright model include The World Bank database, OECD Structural and Demographic Business Statistics (SDBS), OECD Programme for the International Assessment of Adult Competencies (PIAAC), The Global Burden of Disease database from IHME, The Global Peace Index, and others.

To turn scientific articles into structured data that can be used to produce quantitative estimates of impact, the Upright model uses natural language processing to conduct an automated literature review on the impact of individual products and services.

The literature review is based on a deep-learning network that has been pre-trained using the whole of Wikipedia and subsequently trained to classify scientific articles with a training set of 35,000+ scientific papers. The training set has been manually labeled by Upright analysts and is designed to cover a broad range of impact topics. A small portion of the training set is not used for training and used for validation purposes instead (Figure 2).

Finally, Upright uses its proprietary information integration algorithm to consolidate the information from scientific literature, public databases, and the Upright product graph into estimates of the impact of each product and service. Box 1 provides an in-depth description of how the algorithm allocates impact along value chains.

Classification of scientific articles

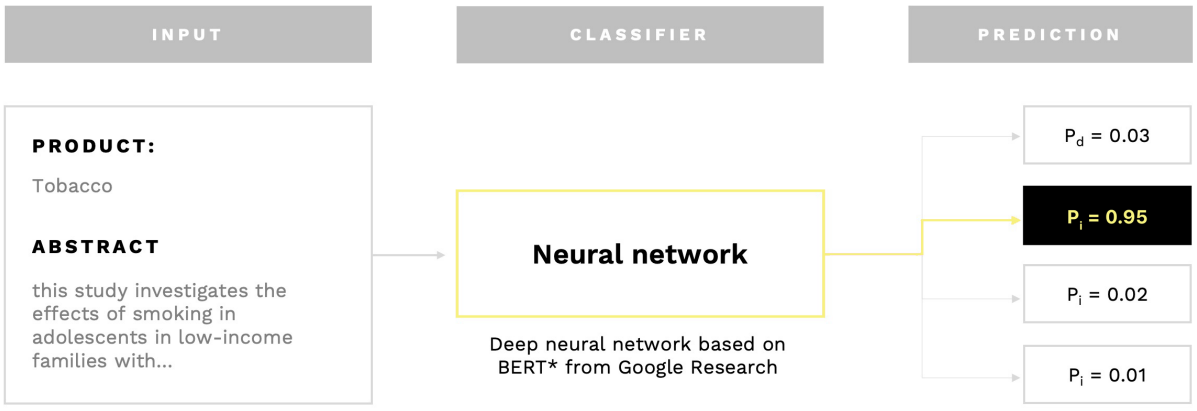


Figure 2: Classification of scientific articles. The job of the neural network is to predict whether the given article states a causality between an impact and a product. In the example illustrated in the figure, the neural network assigns a 94% probability that the article states that tobacco causes diseases (in this case, cancer). The Upright net impact model uses a Bidirectional Encoder Representations from Transformers (BERT) network from Google Research.

Box 1: In-depth description of the allocation of impact along value chains.

Allocation of impact along value chains is a crucial part of the Upright net impact model. The Upright model allocates impact based on a model of the value chains of all products and services.

When allocating impact to products that are *upstream* of product **b**, the share of product **b**'s impacts that will be allocated to product a is proportional to the *share of added value* product **a** contributes to product **b**. Allocation of impact to *downstream* follows a symmetrical logic, but for simplicity and clarity, we limit the discussion here only to the allocation of impact to the upstream direction.

In this context, *added value* refers to the usual definition of gross value added at basic prices (OECD, 2001). Example: if the product **a** is sold for a total of $250b and the upstream products used to produce product a cost $150b, the value added in the production of product **a** is $250b - $150b = $100b. Moreover, if 15% of the production of product **a** is used for manufacturing product **b**, contribution of value added by product **a** to product **b** is 15b$. If product **b** is sold for a total of $150, the share of value added by product **a** to product **b** is $15b/$150b = 10%. If now product b was known to prevent 1000 cancers annually, product **a** would be *allocated* 1000 * 10% = 100 of those prevented cancers.

The example was the simple case of a direct contribution, but the algorithm also considers transitive contributions that go over several links in a product's value chain. In general, the share of added value $S_{a,b}$ that product a contributes to product b, is given by:

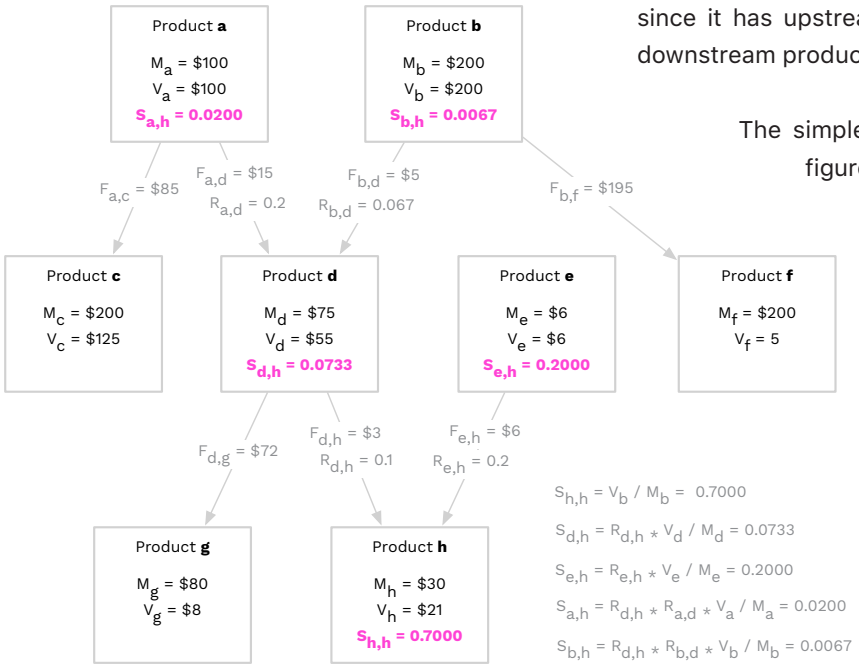
$$S_{a,b} = R_{a,i_o} \cdot R_{i_o,i_1} \cdot \ \ldots \ \cdot R_{i_n,b} \cdot (V_b / M_b) \ \ i \in B_{a,b}$$
$$R_{a,b} = F_{a,b} / M_a$$

Where $B_{a,b}$ is the set of products that are in the value chain between products ***a*** and **b** (including b), $F_{a,b}$ is the estimated flow of value from product a product **b**, V_a is the value added in the production of product ***a***, and $\boldsymbol{M_a}$ is the market size of product **a**. Value flows $F_{a,b}$ represent payments made at basic prices, and are estimated by a separate algorithm.

The below figure shows an example of how this works out for upstream products of product **h** in a simple imaginary product graph with only 8 products:

The upstream products of H are A, B, D and E. Products D and E are the only products that a are directly upstream from H. Note how Product E inherits a significant share of product H:s impact since it has upstream products and H is its only downstream product.

The simple product graph shown in the figure contains only 8 products, whereas the real product graph in the Upright net impact model contains 12,000+ products and services, with a total of 500 000 value chain links between them.



2.3 Quantifying the impact of companies

Similar to products and services, the Upright net impact model produces quantitative estimates of the positive and negative impacts of a company in each of the 19 impact categories within Upright's impact framework.

The Upright net impact model estimates the impact of companies based on the estimated impact of their products and services. That relies on knowledge of the products and services that each company produces. Upright produces that information with a machine learning algorithm that automatically consolidates information from regulatory filings, company websites, Wikipedia, public company databases, and structured assessments by Upright analysts.

As companies are not required to disclose detailed information on their products and services, the accuracy of Upright's estimates is limited by the availability of information. Upright always seeks to create the best possible estimates based on available knowledge.

2.4 Quantifying the impact of equity funds

Upright calculates the impact of equity funds based on the impact of the companies they invest in. The underlying logic is that companies do not exist without owners, and therefore their owners collectively bear the responsibility for their impact.

The weight of each company in a fund's impact estimate is proportional to the weight of the companies equity in the fund. The Upright model uses the mean price-to-sales (P/S) ratio of S&P 500 to estimate the amount of company revenue that should be attributed to a fund based on the size of each of its investments.

With slightly different assumptions and weighting logic, the Upright net impact model is also commonly used to calculate the aggregate impact of companies included in bond funds, loan books, indices, customer portfolios, lists of (government) grant recipients, and other groups of companies.

2.5 Understanding results

The impact estimates created by the Upright net impact model are presented as *relative* and *absolute* impact scores. Absolute impact scores capture the absolute value of the impacts of a company, while relative scores relate the absolute value of each impact on the size of the company. Figure 4 shows an example of a net impact profile.

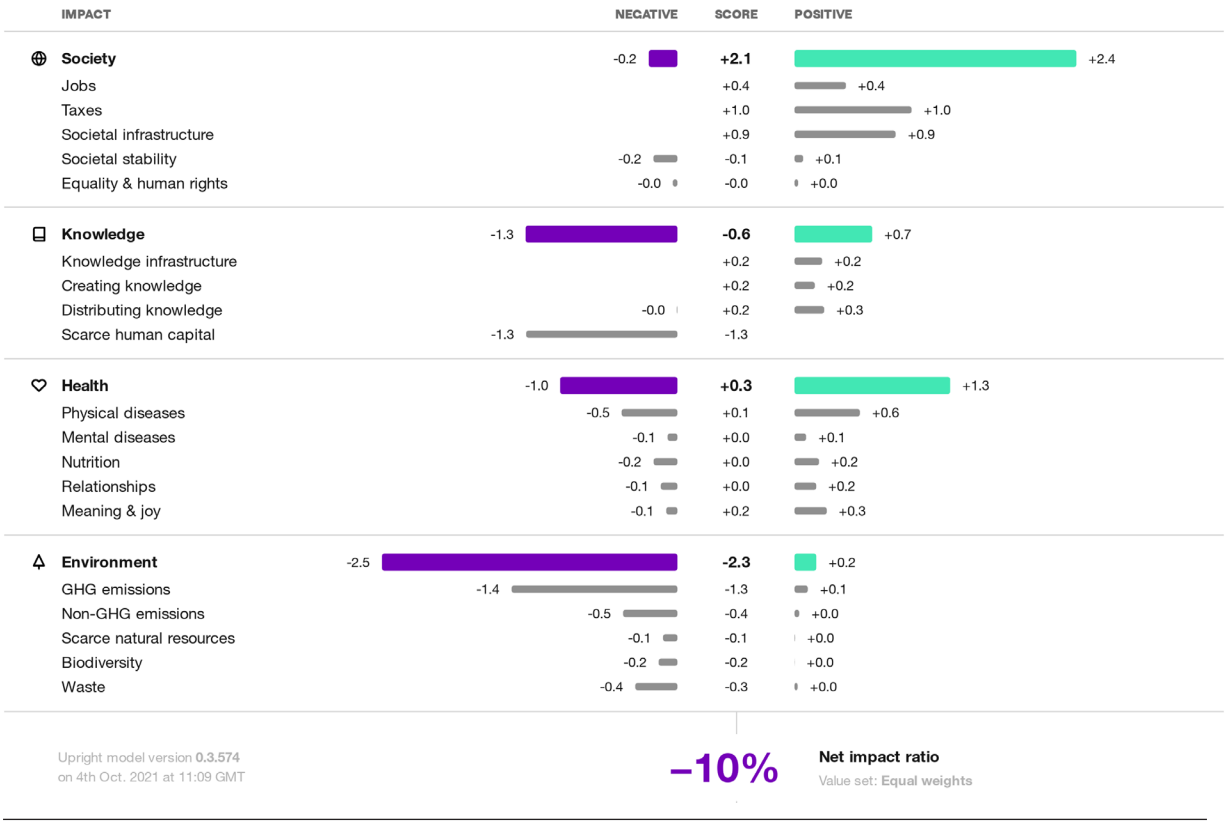


Figure 4: Aggregate net impact profile for Fortune 500 companies. Numbers are shown as relative impact scores except for the net impact ratio, the quantitative measure that represents the net impact of a company (see definitions below).

The absolute impact score $S_{a,c,i}$ for company **c** for impact **i** is defined as:

$$S_{a,\,c,\,i} = q_{c,\,i} * \lambda_i$$

where $q_{c,i}$ is the *share* of impact **i** that company **c** creates, and λ_i is a *size factor* for the impact category **i**. The meaning of size factors is explained in Box 2.

Example: $q_{facebook,jobs}$ = all jobs created by Facebook / all jobs created by all companies globally

The relative impact score $S_{r,c,i}$ for company **c** for impact **i** is de ined as:

$$S_{r,\,c,\,i} = S_{a,\,c,\,i} \;/\; \frac{r_c}{R}$$

where r_c is the revenue for company **c** and **R** is the total revenue of all companies.

Absolute impact scores are typically really small, since individual companies normally create only a tiny proportion of the total impact within an impact category. For that reason, Upright displays absolute scores in parts-per-billion (PPB) units.

Net impact ratio is quantitative measure that represents the net impact of a company. It is defined as:

$$\text{net impact ratio} = \frac{\text{positive impacts} - \text{negative impacts}}{\text{positive impacts}}$$

The maximum value for net impact ratio is 100%, representing a theoretical company with no negative impacts. The minimum value is −∞. It can be interpreted similar to net profit ratio, which is defined as:

$$\text{net profit ratio} = \frac{\text{revenue} - \text{costs}}{\text{revenue}}$$

Similar to net profit ratio, net impact ratio is a relative measure - otherwise identical companies of different sizes have the same net impact ratio.

Box 2: Impact category size factors

Impact category size factors represent the relative sizes of the impact categories. There are two size factors for each impact category, one representing costs and one representing benefits. They are derived from estimates of aggregate costs and benefits that all products and services create within each impact category. Upright bases the estimates of costs and benefits on classical measures of economic cost used by The World Bank, WHO and IMF, and others. The currently used estimates are shown below:

Impact category	Cost, t$	Benefit, t$
Jobs	-	10.13
Taxes	-	21.33
Societal infrastructure	-	6.86
Societal stability	2.28	7.25
Equality & human rights	0.17	0.31
Knowledge infrastructure	-	5.34
Creating knowledge	-	16.60
Distributing knowledge	-	10.34
Scarce human capital	18.35	-
Physical diseases	13.26	10.29
Mental diseases	2.24	1.96
Nutrition	3.59	7.80
Relationships	1.20	4.79
Meaning & joy	2.06	1.41
GHG emissions	17.97	0.56
Non-GHG emissions	5.03	0.25
Scarce natural resources	2.96	0.22
Biodiversity	7.35	0.26
Waste	2.81	0.24

Table 3: Estimated aggregate social costs and benefits created by the private sector within each impact category, converted to 2020 international dollars, along with size factors for each impact category. Based on data from World Bank, IMF, WHO, OECD, IPCC, CDC, USDA, and others. A full list of references is available at the end of this document.

The role of the size factors is to provide a measure on how *significant* the aggregate impact of companies is in each of the impact categories. Since the relative importance of the different impact categories ultimately depends on values, the Upright net impact model allows users to customize the weight of each impact category using *value sets*.

3. Discussion

In less than 200 years, the proportion of the labor force employed in activities related to basic human needs (food, shelter, heat) has dropped dramatically. When Adam Smith wrote The Wealth of Nations in, the proportion of labor employed in agriculture in the United Kingdom was 36 %. Today it is less than 1 %.

In 1776, when a typical economic decision was whether to buy food to feed one's children or firewood to heat the house, nobody needed a sophisticated net impact model to understand the costs and benefits of that decision. Moreover, there were no complex time-delayed global externalities that one would have to think about.

Now that technology has freed most of the workforce to devote their time to working on endeavors beyond basic needs, we need to think really hard about how we choose to use that time, and how we use the planet's limited resources. The Upright net impact model is an attempt to offer a concrete tool for facilitating that thinking process in businesses, governments and individuals.

To solve the most significant challenges of our time, we do not need better values. We just need better understanding of the values we currently practice, better information about the consequences and trade-offs included in our choices, and a better sense of responsibility.

References

World Bank (2020). *World Bank DataBank*. The World Bank Group, Washington.

OECD (2020). *OECD General Statistics*. OECD online library. Paris, France.

Beaumont, N. J., Aanesen, M., Austen, M. C., Börger, T., Clark, J. R., Cole, M., ... & Wyles, K. J. (2019). *Global ecological, social and economic impacts of marine plastic*. Marine pollution bulletin, 142, 189-195.

Daroudi, R., Faramarzi, A., Akbari Sari, A., & Nahvijou, A. (2019). Cost Per Daly Averted in Low, *Middle and High Income Countries: Evidence from Global Burden of Disease Study to Estimate the Cost Effectiveness Thresholds* (July 14, 2019).

Gomis, R. (2019). *The global labour income share and distribution*. ILO Department of Statistics, Methodological description. Geneva, ILO.

CDC (2019). *National vital statistics, Historical Data, 1900-1998*. CDC National Center for Health Statistics, U.S. Department of Health & Human Services.

International Monetary Fund (2019), *Government Finance Statistics*. IMF Statistics Department, Washington, DC.

Beaumont, N. J., Aanesen, M., Austen, M. C., Börger, T., Clark, J. R., Cole, M., ... & Wyles, K. J. (2019). *Global ecological, social and economic impacts of marine plastic*. Marine pollution bulletin, 142, 189-195.

OECD (2019). *The Heavy Burden of Obesity: The Economics of Prevention*. OECD Health Policy Studies, OECD Publishing, Paris.

United Nations Population Division (2019). *World Population Prospects*: 2019 Revision. New York.

Barnichon, R., Matthes, C., & Ziegenbein, A. (2018). *The Financial Crisis at 10: Will We Ever Recover?* FRBSF Economic Letter, 19.

IHME (2018). *Global Burden of Disease*. Institute for Health Metrics and Evaluation, University of Washington.

Landrigan, P. J., Fuller, R., Acosta, N. J., Adeyi, O., Arnold, R., Baldé, A. B., ... & Chiles, T. (2018). *The Lancet Commission on pollution and health*. The lancet, 391(10119), 462-512.

Masson-Delmotte, V., Zhai, P., Pörtner, H. O., Roberts, D., Skea, J., Shukla, P. R., ... & Connors, S. (2018). Global warming of 1.5 C. An IPCC Special Report on the impacts of global warming of, 1.5C

Ricke, K., Drouet, L., Caldeira, K., & Tavoni, M. (2018). Country-level social cost of carbon. Nature Climate Change, 8(10), 895-900.

Schellekens J., Heidecke L., Nguyen N., Spit W. (2018). *The Economic Value of Water - Water as a Key Resource for Economic Growth in the EU*. ECORYS.

U.S. Census (2018), *Population tables*. Washington, DC: US Department of Commerce, Economics and Statistics Administration, US Census Bureau.

Devaux, M. G. S., Goryakin, Y., Cecchini, M., Huber, H., & Colombo, F. (2017). *OECD Obesity Update 2017*.

Stover, J., Rosen, J. E., Carvalho, M. N., Korenromp, E. L., Friedman, H. S., Cogan, M., & Deperthes, B. (2017). *The case for investing in the male condom*. PloS one, 12(5).

Gershuny, J., & Harms, T. A. (2016). *Housework now takes much less time: 85 years of us rural women's time use*. Social Forces, 1-22.

Woetzel, J., Garemo, N., Mischke, J., Hjerpe, M., & Palter, R. (2016). *Bridging global infrastructure gaps*. McKinsey Global Institute, 199-217.

Bartik, T. J. (2015). *The social value of job loss and its effect on the costs of US environmental regulations*. Review of Environmental Economics and Policy, 9(2), 179-197.

World Health Organization. (2015). *Promoting Health, Preventing Disease the Economic Case: The Economic Case*. OECD Publishing.

Broadberry, S., & Gardner, L. (2013). *Africa's Growth Prospects in a European mirror: a Historical Perspective*. Chatham House.

Lohrentz, T. (2013). *The Net Economic Impact of Payday Lending in the United States*. Insight Center for Community Economic Development.

Daniel, H., & Perinaz, B. T. (2012). *What a waste: a global review of solid waste management*. World Bank.

Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., Katzmarzyk, P. T., & Lancet Physical Activity Series Working Group. (2012). *Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy*. The lancet, 380(9838), 219-229.

Leadley, P. (2010). *Biodiversity scenarios: projections of 21st century change in biodiversity, and associated ecosystem services: a technical report for the global biodiversity outlook 3* (No. 50). UNEP/Earthprint.

Sussman, S., Lisha, N., & Grif iths, M. (2011). *Prevalence of the addictions: a problem of the majority or the minority?* Evaluation & the health profes- sions, 34(1), 3-56.

OECD (2001). *OECD Glossary of statistical terms*. Gross value added at basic prices. Available online at <https://stats.oecd.org/glossary/detail.asp?ID=1185 >

Smith. A (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*. W. Strahan and T. Cadell, London, Great Britain.