WHITE PAPER

Asset Portfolio Impact Measurement and Valuation

An overview of the assessment of societal impacts of asset portfolios with the usual measurement tools and an additional key figure.

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1 Introduction

Assessing the societal impacts of asset portfolios is possible with the usual measurement tools and an additional key figure. This publication provides an overview.

Managing a company comprehensively involves not just understanding the required resources and capabilities, but also recognizing the unintended consequences it may generate and its vulnerability to external factors beyond market forces. It is crucial for senior leadership to fully grasp the company's influence on local communities, society, and the broader environment along its entire value chain. In view of the climate crisis, growing social inequality and the global decline in biodiversity, companies increasingly face the responsibility to contribute to overcoming these problems and to work sustainably, and not just in terms of economic responsibility. On the other hand, the aforementioned crises also pose problems for companies. Risks arise, for example, from disruptions in global supply chains, and a lack of responsibility leads to reputational damage. Added to this is the increasing regulation of reporting and due diligence obligations on the part of the authorities, to which companies must respond.

Recognizing the need to account for non-financial externalities associated with their business activities, many companies have started measuring not only key sustainability figures like their greenhouse gas emissions, water consumption or occupational injuries and diseases but also the impact that they have on society. The UN Development Programme defines impact as "changes to aspects of wellbeing as experienced by people and/or planet caused by the organization through its decisions and actions in its own operations and through its supply and value chains and its business relationships. Impacts can be positive or negative, intended or unintended, direct or indirect."[1]

The focus for measuring impact has primarily been on managing a company's own operations, and more recently, this has expanded to the supply chain. For financial institutions however, given the limited relevance of their classical supply chains, attention is shifted to the downstream effects imposed through their investments and asset portfolios. While material externalities of the assets held are not solely initiated by the investor, they are certainly enabled through the investment. To be able to tackle risks and respond to increasing due diligence requirements and stakeholder demands, companies holding financial portfolios will therefore need to broaden their understanding of the impacts and dependencies of their investment portfolio. Moreover, considering that investees, asset managers, or policyholders of insurance

[1] UNDP (2023) SDG Impact Standards – Glossary of terms to support the SDG Impact Standards for Enterprises, Private Equity Funds and Bond Issuers. https://sdgimpact.undp.org/assets/SDG-Impact-Standards-Glossary.pdf

companies in profit-generating investments have an interest to generate revenue or cover future liabilities, a comprehensive screening for material dependencies beyond market performance is vital.

These analyses can be extended to other key performance indicators. For example, in Switzerland[2] and Germany[3], companies are required to conduct due diligence assessments to understand their exposure to child labor. This application can reveal the exposure to child labor, and by diving deep into specific countries, industries, and vendor companies, asset managers can identify 'impact hot spots' in their portfolios, informing about mitigating opportunities and allowing for more targeted interventions. For example, the analysis could reveal carbon intensive industries in particular countries, or hot spots, where forced labor potentially could occur. Beyond the hot spot analysis, it offers a general avenue to test hypotheses about societal and environmental interlinkages between different KPIs. Highlighting for example the interlinkages between Occupational Health and Safety and GHG Emission depending on a given scenario, several questions may be relevant for a company operating in the field of health. Such questions could then be connected to the health of the population in general. In summary, this granular approach helps to unveil patterns that require further explanation, ultimately benefiting the management of a portfolio's overall impact. It further serves as a starting point for planning a greenhouse gas reduction pathway, providing scope 3 under the Greenhouse Gas Protocol.

With one intermediate step, impact measurement and valuation (IMV) can be applied to asset portfolios. This way, downstream investment impact can be assessed. This publication proposes the necessary steps for this assessment and provides an overview of the data involved.

2 Impact Measurement and Valuation Methodology

IMV as described in this publication builds upon the frameworks of organizations such as the Capitals Coalition, the Value Balancing Alliance (VBA), and the International Foundation for Valuing Impacts (IFVI) which assist companies in making the externalities of their own operation and supply chain more tangible. Our proposition for the analysis of asset portfolio impacts fits into this concept and can be seen as a contribution to the existing frameworks. Within the mentioned approaches, it follows on from the macroeconomic methods to measure

[2] Der Bundesrat: https://www.seco.admin.ch/seco/de/home/seco/nsb-news.msg-id-86226.html

[3] Federal Ministry of Labor and Social Affairs (2022) Act on Corporate Due Diligence Obligations in Supply Chains

a company's value chain impact, such as WifOR's IMV methodology[4] and can be used as a supplement. We demonstrate how the given methods can also be applied to make a company's investment externalities tangible. Methods and data sets for this purpose are already available. Our contribution consists therefore not in the development of an own methodology, but in the compilation of existing tools and data and the application of these methods in the context of IMV.

IMV is a concept in progress, being formed by various contributors, among which are the above-mentioned organizations. Our proposition for the analysis of asset portfolios can be seen as such a contribution. The authors understand progressing academic research and data availability will require further development of the approach.

2.1 Scope of Application

The scope of IMV described in the approaches considered can enclose impact drivers (line items) in the three dimensions of sustainability: economic, environmental, and social. A comprehensive evaluation of a company's impact in the three dimensions recognizes that its influence extends beyond the immediate realms of financial or operational control. The economic dimension usually comprises wages and salaries paid as well as taxes, which is often also presented in aggregated form (with a residual) as the contribution to the gross domestic product of a respective country. Ecological line items include indicators such as greenhouse gas and other emissions, water consumption, water pollution, land use, waste generation and impact on biodiversity. Social line items can include occupational illnesses and injuries, training hours, wage quality, pay gaps by gender or other forms of discrimination and human rights violations such as child labor or forced labor. The selection of the line items can be determined by a materiality analysis or follow the corresponding framework or model and cover all possible indicators available there.

Figure 1 Value Chain depiction and delimitations with regards to the company's own operations.

Source: Own illustration. Note: The downstream impact phases listed in this figure are an extract of the downstream categories of the Greenhouse Gas Protocol's Technical Guidance for Calculating Scope 3 Emissions, 2013.

[4] Scholz, Dorndorf, Tesch, Köster (2022) Impact measurement using WifOR's sustainability footprint method.

When businesses engage in global procurement of goods and services, they generate indirect effects linked to the production of these purchases, both at the supplier level and further up the supply chain. Additionally, the way products and services are designed has ripple effects on how customers utilize and dispose of them, resulting in further indirect consequences for society. The IMV methodology is designed to be applicable across the entire value chain of an organization, as shown in figure 1. In line with the GHG protocol (WRI and WBCSD, 2011)[5] and the Partnership for Carbon Accounting Financials (PCAF, 2022)[6], which allocate emissions triggered through investments as part of downstream emissions (scope 3 category 15), we categorize asset portfolio impacts to the third area of the value chain. One exception involves assets used by the company itself, such as real estate, which are classified as own operations.

2.2 Methodological Approaches to IMV

Many large companies measure the direct effects triggered through their own operations directly where they happen. However, indirect effects, i.e., effects triggered via other agents through purchases, sales, or investments, generally must be estimated. The assessment of supply chain effects (i.e., the company's upstream impact) can be approached either at the level of the product the company produces or at the macroeconomic level of the industry the company belongs to. The two approaches can also be described taking a bottom-up or a top-down perspective. A commonly employed method for assessing impact from a bottom-up perspective is the process-based lifecycle assessment. Another approach involves gathering data from suppliers or in the case of asset portfolios from investee companies or projects. This method's advantage lies in its reliance on primary data. While it may be desirable for a financial institution to receive the required information from the respective investees' publications, at least for now this remains between extremely resource intensive and not yet viable. Data is often specific to individual products or vendors and only offers insights into certain aspects of the company's overall impact. It is regarded as resource-intensive and, due to the presently remaining fragmentation of companies' sustainability data and a lack of standardization in reporting formats and measurement methods, not necessarily more accurate than macroeconomic estimates with industry average statistics. However, as industries and companies move towards more standardized and centralized sustainability data, this could change and relying on primary data on the effects triggered may become more viable. From a macroeconomic perspective, impacts can be estimated with comparatively low effort and high scalability using multipliers[7] that translate primary financial data[8] into economic,

[5] WRI and WBCSD (2011) GHG Protocol, Corporate Value Chain (Scope 3) Accounting and Reporting Standard, Supplement to the GHG Protocol Corporate Accounting and Reporting Standard.

[6] PCAF (2022) The Global GHG Accounting and Reporting Standard Part A: Financed Emissions.

[7] WifOR and various other organizations offer pre-calculated multipliers for a rapid and uncomplicated estimation of indirect effects such as Scope 3 greenhouse gas emissions.

[8] These include a company's output of goods and services, detailed lists of purchases or sales with region and sector specific information, as well as granular asset portfolio data, as described in the following chapter.

environmental, and social indicators. These multipliers can be calculated with tools like Input-Output (IO) analysis[9].

Recognizing the value of both approaches, attempts have been made to harmonize product-based and macroeconomic methods, as discussed by Beylot, Corrado and Sala (2019)[10]. A hybrid model incorporates findings from product assessments into the IO framework. Thus, it becomes possible to improve data accuracy without limiting the scope of analysis.

The application for asset portfolios, as described further below, follows on from these approaches. This linkage is in alignment with the approach endorsed by the PCAF and the Principal Adverse Impact (PAI) disclosures under the European Sustainable Finance Disclosure Regulation (SFDR) and finds application in the Joint Impact Model (JIM)[11]. Pursuing the framework of the GHG protocol, it also aligns with most GHG accounting standards globally[12]. It can be seen as a complementary methodology description to the review of impact assessment methods for public development banks recently published by the Montreal Group[13].

3 Application of Prevalent IMV Methods for Asset Portfolio Analysis

While the above-mentioned impact analysis techniques have been primarily used to calculate the economic, social, or environmental effects along enterprises' upstream supply chains, they can also be applied to approximate the share of impacts triggered by investees that are related to the assets held by an investor. As such, impact analysis can be applied to estimate the socioeconomic and environmental impacts of asset portfolios. For sustainability accounting, the asset portfolio data to be analyzed should reflect a fixed point in time in line with financial and sustainability accounting periods. This IMV approach for assets proceeds in three steps.

[9] Input-Output analysis is a relatively efficient approach to estimate indirect effects and lauded for its holistic view of the value chain. IO matrices offer an exhaustive perspective on trade dynamics between economies and sectors and their end-users. IO analysis facilitates the monitoring of production inputs across the entire value chain, reflecting global chains via multi-regional IO tables. Furthermore, IO matrices can be augmented through satellite accounts, associating monetary country/sector flows between sectors and households in different countries to physical country/sector environmental and social datapoints. This allows to tie the calculated datapoints to the generated financial output of the respective sector within a country. For example, per unit of output, sector X (in country Y) generates a certain amount of greenhouse gas emissions. A notable advantage of IO analysis lies in the detail of its outcomes, i.e., the IO provides results disaggregated into specific regions, sectors, and segments in the supply chain where impacts are initiated. A more detailed explanation has been provided by Scholz et al. (2020) Impact Assessment and Input-Output Tables: Data Selection.

[10] Beylot, Corrado and Sala (2019) Environmental Impacts of European Trade: Interpreting Results of Process-Based LCA and Environmentally Extended Input-Output Analysis towards Hotspot Identification.

[11] https://www.jointimpactmodel.org/_files/ugd/7aa894_13651634add6407a93c09a851fb705c1.pdf

[12] The GHG protocol is the current dominant standard for GHG emission accounting; other reporting standards derivate from it, as shown by Jia et al. (2023).

[13] The Montreal Group (2023) From Outputs to Outcomes: A Global Review of Impact Assessment Methods in Public Development Banks.

The first step entails the **categorization and mapping** of portfolio asset data. The portfolio's asset data needs to be labeled and sorted by asset type, i.e., stocks, bonds, real estate, debt and equity financing, etc. Additionally, every data point within the asset portfolio needs to be mapped to a specific economic sector and to a geographical region, i.e., a country. The mapping allows to attribute a country/sector specification as to where the asset operated and what production-related purpose it serves.

The second step entails a translation of assets to the share of a company's production or service output enabled through the utilization of the physical capital as a production factor. This translation attributes an amount of output to the asset volume via a country and industry-specific **Turnover-Asset (TA) conversion**. This technique operates under the assumption that one unit of asset can stimulate a specific turnover per year. By providing equity or debt financing, investments substantively reinforce revenue generation.

The third step entails the linkage of the estimated output share of the asset with economic, social, and environmental **impact multipliers**, e.g., GHG in kg per EUR production value. This can be achieved using prevalent multipliers or impact measurement approaches. WifOR's global multiregional IO model provides compatible economic, social, and environmental impact multipliers.

The methodology was principally crafted for assessing investments in companies, focusing on stocks and bonds. Investments in funds can also be considered, with an emphasis on disaggregating these funds for precise mapping. Additionally, portfolios frequently comprise diverse investment categories such as insurance-linked securities, commodities, and real estate. While it is pivotal not to exclude these components systematically, including them demands formulating critical assumptions to facilitate efficacious analysis. Similarly, with transparent and consistently applied assumptions, diverse portfolios can be matched to the TA conversion ratio.

3.1 Asset Data Preparation for the Assessment

To estimate impacts of a specific activity employing multi-regional IO analysis, a vital step is the precise allocation of each data point to a country and an economic sector. This requires careful mapping of each portfolio asset, a critical piece of the assessment especially given the heterogeneous landscape of asset classes and the absence of a universally endorsed framework for structured products and emerging asset classes.

Publicly listed companies are typically categorized by their predominant sector or business line often aligning with established industry classification paradigms like the UN International Standard Industrial Classification of All Economic Activities (ISIC), the EU Statistical Classification of Economic Activities (NACE), the Swiss General Classification of Economic Activities (NOGA), or the Global Industry Classification Standard (GICS) developed by MSCI and Standard & Poor's. However, challenges arise as this often involves multinationals with production activities in many countries outside of the country of their headquarters. Also, different entities of the same enterprise may have different economic sectors. The mapping should therefore take this into account and reflect the more specific entity sector.

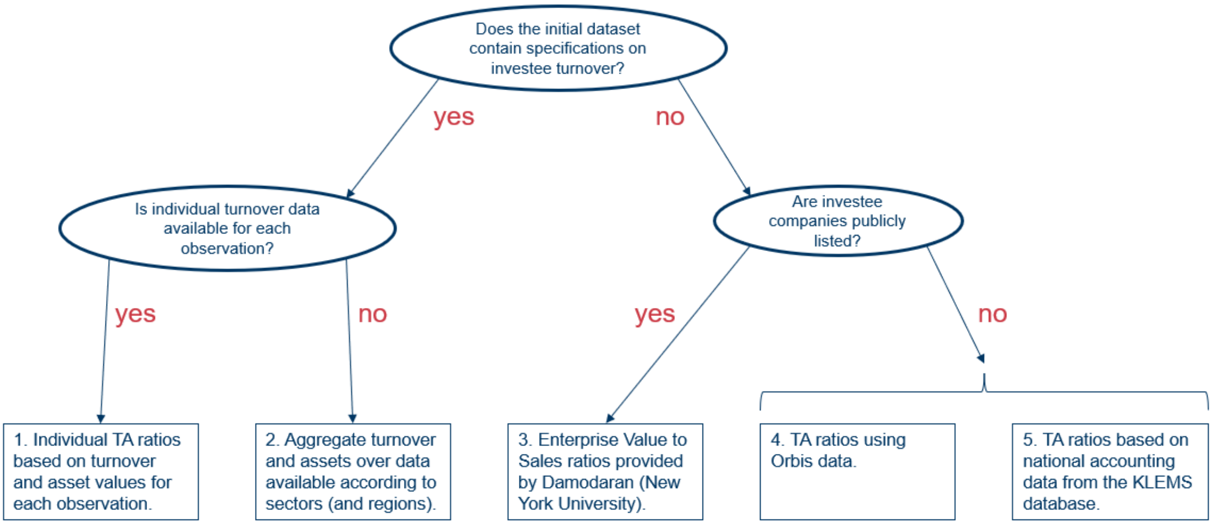
Mapping real estate also poses difficulties as properties can serve multifaceted purposes. For instance, a production facility could be classified both as part of the garment industry and as real estate. In the sector of insurance, the mapping requirements may differ fundamentally from the ownership model, given the diverse risk factors involved. Currencies held as liquidity form another asset class that needs certain assumptions to be mapped; it may be seen as an asset placed at a financial institution or bank and allocated to the corresponding sector. Beyond this, mapping individual assets to countries also presents challenges, especially for transnational corporations and international institutions such as securities held from development banks. However, when assumptions are made transparent and applied consistently, diverse portfolios can be fully mapped.

3.2 Turnover-Asset Conversion Ratio

Each asset value listed in the portfolio must be converted individually into the (production) output value triggered through the investment so that impact multipliers can be applied. There are various approaches to this conversion, each relying on a different data set. To derive TA conversion ratios five distinct approaches are available, each can be chosen based on the specific prerequisites and demands of the given application case.

Figure 2 illustrates five different approaches to convert assets into turnover equivalents. The first two approaches require having turnover specifications available within the portfolio dataset under analysis, as well as a large enough number of asset observations, ideally for each country/sector combination. These approaches rely on the portfolio's internal data to determine the TA conversion ratios. The remaining three approaches depend on supplementary databases, i.e., for approaches 2-5 to be effective, a mapping of the data is essential, as outlined in chapter 3.1. This mapping process should not only align with the prescribed methodology but also ensure that the respective TA conversion ratios can be accurately assigned to the portfolio data. At a minimum, the industry classifications employed for portfolio mapping, essential for the IO analysis, must be compatible with the TA conversion data, enabling a seamless allocation process.

Figure 2 Decision tree to inform about the appropriate TA approach based on the type of asset portfolio.



Source: Own illustration.

The first approach depends on primary data, involving the computation of individual TA conversion ratios for each individual asset within the portfolio. This approach is regarded as potentially the most accurate. However, it demands comprehensive portfolio data encompassing all companies or assets, which can be challenging to obtain. Additionally, considering that turnover and enterprise value data published by portfolio managers might be based on estimations themselves, the inherent accuracy of this approach is not guaranteed. Moreover, if the investee companies are start-ups, individual turnover and asset data may not reflect the long-term relationship between turnover and assets.

In contrast, the second approach also utilizes primary data but consolidates turnover and assets based on economic sector classifications to compute sector-average (or median) TA conversion ratios. This way, TA conversion ratios can be extrapolated onto assets/companies with missing datapoints when there are enough data points to calculate robust averages as estimations. Statistical methods can be used to determine the number of data points required per economic sector for results to be robust. For this approach, companies in the portfolio need to be initially categorized by country and economic sector to derive respective averages for the ensuing step.

Distinguishing between publicly listed and private companies is crucial when employing the three approaches involving secondary data. When dealing with publicly listed companies, the TA ratio should be computed based on market values. In contrast, for private companies, it is advisable to utilize their book asset value. Capital markets provide financing for public companies based on market values, while private companies lack a market value.

The third approach employs sector-specific Enterprise Value to Sales data (corresponding to inversed TA ratios), as proposed by Damodaran (2023)[14], segregated into eight regional sets, each presenting an average Enterprise Value to Sales Ratio for 94 industries. The Enterprise

[14] https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datacurrent.html, last access 04.05.2023.

Value to Sales ratio involves companies market values and should be used for publicly traded companies. Successful implementation of this approach necessitates aligning the companies in the portfolio with the sectors and regions outlined in the dataset. To facilitate this conversion, the TA ratio dataset must be mapped to resonate with the portfolio's economic sectors and countries. Given data availability for selected countries or country categories, namely China, India, USA, Japan, Australia, New Zealand, Canada, (Western) Europe, Emerging markets, and World, a careful allocation needs to be performed to correspond with the countries represented in an investment portfolio.

The fourth approach extracts book value TA conversion ratios from Orbis [15] data, a comprehensive database encompassing a wide array of enterprises, including Small and Medium Enterprises (SMEs) and large firms. The Orbis data can be used to compute median yearly TA conversion ratios for specific NACE levels across various countries and years, requiring a meticulous sectoral and regional mapping.

Lastly, the fifth approach relies on national accounting data sourced from the KLEMS [16] database, focusing on production output and capital stock of 40 different economic sectors aggregated at NACE levels within each EU27 member state, Japan, United Kingdom, and the US. By utilizing this approach, sector and country-specific book value TA conversion ratios can be derived via the perpetual inventory method where the capital stock is estimated based on the gross fixed capital formation from national accounts (Berlemann and Wesselhöft, 2014). While this approach offers the advantage of covering a substantial period and enables tracking changes in TA conversion ratios over time, it is limited to European countries, the US, and Japan, and may not be suitable for global portfolios. As for the other approaches, a meticulous regional and sectoral mapping is essential for accurate application.

4 Limitations

In conclusion, the outlined application of IMV methods offers a structured approach to assess and attribute value to the impacts of asset portfolios. IMV applied to asset assessment serves as a beneficial analytical tool for decision-makers. However, because of its limitations, the integration of complementary strategies or perspectives is advisable.

Macroeconomic methods for impact analysis, such as IO modelling, primarily leverage secondary data. Since this data often represents sector-wide averages on a national scale, it generalizes outcomes rather than pinpointing distinct contributions or lapses of individual

[15] https://login.bvdinfo.com/R0/Orbis

[16] https://economy-finance.ec.europa.eu/economic-research-and-databases/economic-databases/eu-klems-capital-labour-energy-materials-and-service_en

companies. While IO Analysis presents a comprehensive overview, there is potential to gloss over intricate relationships or to miss nuanced effects within the value chain.

The intricate mapping process also introduces potential for discrepancies. Assigning each asset in a portfolio to a unique country and economic sector can be intricate and error-prone, especially for multifaceted assets such as real estate or sustainability-linked bonds. This is especially challenging for global entities operating across multiple regions and sectors, as the application's structure leans towards singular mappings.

Additionally, when expanding the application to assets beyond stocks and bonds, various challenges arise. Adapting it for other assets such as commodities or real estate involves making certain assumptions, which may not consistently align with the real-world characteristics of those investments. Some of these have been mentioned in chapter 3.1. Another example are funds, which may be disaggregated into their components for mapping purposes, provided detailed information is accessible. In the absence of such information, a more general mapping can be conducted based on the predominant sector and region associated with the funds. Furthermore, other data-related issues arise, including missing information on economic sectors and countries regarding the mapping, as well as gaps in end-beneficiary information, and details about the purpose of dispersed loans.

Lastly, the Turnover-Asset (TA) Conversion, while insightful, introduces its own set of complexities. The process is predicated on certain assumptions regarding the revenue-generating potential of assets, and these assumptions may not universally resonate, potentially skewing the assessment. Possibilities to increase the robustness of the TA ratio would entail to build the ratio based on panel or time series data. When using, e.g., the Orbis turnover and asset data, the skewing of the TA is very minimal since the size of the observations in the dataset is very high (Orbis has information on close to 462 million companies worldwide[17]).

5 Outlook

Impact measurement and valuation based on macroeconomic data emerges as a pivotal starting point for assessing an investment portfolio's social, environmental, and economic impacts. This approach provides directional insights that enable a comparative analysis between a company’s impact dimensions and its financial metrics. As this macroeconomic methodology gains traction, its application extends beyond singular portfolios, allowing for benchmarking against standard portfolios and portfolios assessed using the same methodology. Asset owners and managers can leverage this analysis to identify potential

[17] https://www.bvdinfo.com/en-gb/our-products/data/international/orbis.

areas where the portfolio's impact may elevate to risks or relevant dependencies. This involves integrating the impact analysis with scenario analyses tailored to specific business sectors, geographies, and demographics, which can cover both individual assets and the overall portfolio. Scenarios, including established ones like Net Zero 2050, Delayed Transition, and Current Policies from the Network for Greening the Financial System, facilitate mapping trajectories against plausible futures. This strategic integration aids in anticipating and mitigating future material dependencies, ultimately minimizing the internalization of exogenous costs and optimizing positive societal impacts, thus enhancing enterprise value.

In contrast to the resource-intensive collection of individual primary impact data for single portfolios or investees, the macro-based impact analysis offers tangible insights into externalities across a company's entire value chain without straining corporate resources. For example, this methodology can quantify relationships between greenhouse gas emissions and investments across various asset categories, such as publicly listed equities, bonds, and real estate. The application of IMV to assets not only serves pre-contractual assessments during monitoring, stewardship, and engagement but also proves valuables during post-operational phases, covering disputes, insolvency, and dismantling. The application considers activity data across different asset classes and stages, employing a consistent set of key performance indicators (GHG emissions and beyond) throughout the value chain (upstream, own operations, downstream).

While primary data at investee level, such as GHG emissions, becomes increasingly accessible, the hybrid measurement approach allows for the gradual replacement of secondary data from input-output analyses. The methodology challenges high emitters to provide accurate data promoting recognition for environmental footprint reduction efforts. The incorporation of primary data enhances the accuracy and reliability of impact analyses, empowering companies to focus their efforts effectively.

In the evolving landscape of sustainable investment, companies must not only comprehend, measure, and monitor immediate and indirect impacts on society but also consider the long-term repercussions of externalities and independent external developments affecting enterprise value or company assets. Material dependencies and externalities should be identified and, if necessary, mitigated (or the company must adapt to it) to ensure long-term viability. Monetary valuation based on societal impact helps in modeling portfolio dependencies, allowing companies to adapt to future external developments and changes in expectations, thereby maintaining their license to operate in the long term.

About WifOR – If you measure it, you can shape it.

WifOR is an independent economic research institute, founded in 2009 as a spin-off from the Technical University of Darmstadt. As experts in macroeconomic analysis, our research focuses on the areas of labor markets, health, and sustainability. Through our studies, WifOR's mission is to enable data-based solutions to challenges on the labor market, set global standards in sustainability measurement, and illuminate worldwide the value of health investments. WifOR has over 75 employees located in Germany, Greece, Latin America, and the USA.

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