Corporate sustainability, externalities, and market value of firms

Do financial markets attach value to sustainability? And if so, how much?

Answers to these questions are important because they have major implications for corporate management, public policy making and investment management. So far, however, academics and practitioners had no conclusive answers, probably because no sufficiently precise, objective metric for sustainability was used.[1)]

Recent research[2)] using externalities as a measure of sustainability has found a direct link to firms' market value that is economically meaningful and statistically significant. The current document summarizes the key aspects of this research, which used Effectual's externalities database.

1) This (statistical) errors-in-variables problem is also raised by Eskildsen et al. (2024): In search of the true greenium, working paper, Copenhagen Business School.

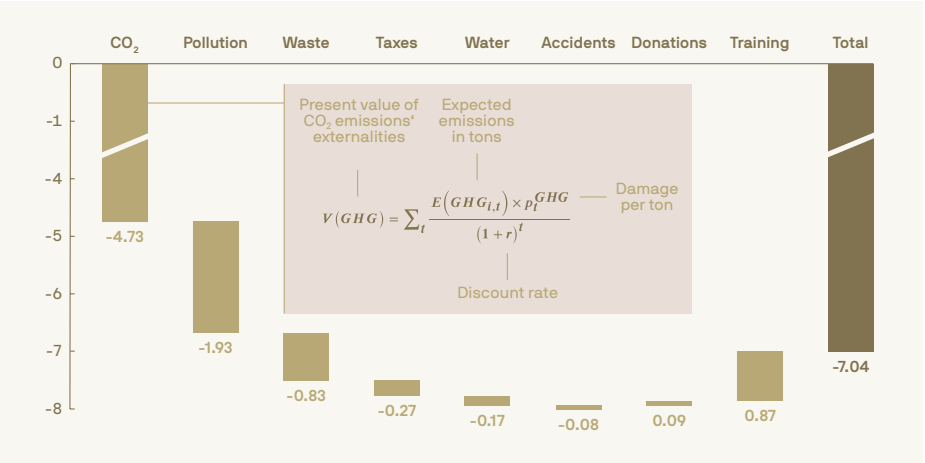
2) Wilkens et al. (2024): Corporate sustainability, externalities and firms' market value, working paper, Augsburg University.

Externalities

Externalities are firms' (uncompensated) cost and benefits to society and the environment.[3] Externalities are calculated by multiplying a physical quantity causing an external effect, such as CO_2 emissions, with a monetary estimate of the damage or benefit due to the external effect.[4] Externalities are the economic and objective measure of a firm's sustainability.[5] The (present) value of a firm's externalities is the sum of discounted expected future externalities.[6]

Valuing externalities

average firm
in USD bn



3) The original exposition is in Pigou (1920): The economics of welfare, Macmillan. A modern textbook treatment is in Laffont (1994): Fundamentals of public economics, MIT Press.

4) See for a example the textbook Boardman et al. (2018): Cost-benefit analysis: concepts and practice, Cambridge University Press. Examples of government agency guides include EU Commission (2014): Guide to cost-benefit analysis of investment projects; UK Treasury (2022): The green book—central government guidance on appraisal and evaluation; Umweltbundesamt (2023): Methodological convention 3.1 for the assessment of environmental costs—value factors; and U.S. EPA (2014): Guidelines for preparing economic analyses.

5) Accounting and finance academics recently have started to apply externalities, see for example Greenstone et al. (2023): Mandatory disclosure would reveal corporate carbon damages, Science 381 (6660), 837 -840; Serafim et al. (2019): Impact-weighted financial accounts: The missing piece for an impact economy, working paper, Harvard University, and Schoenmaker and Schramade (2019): Principles of sustainable finance, Oxford University Press.

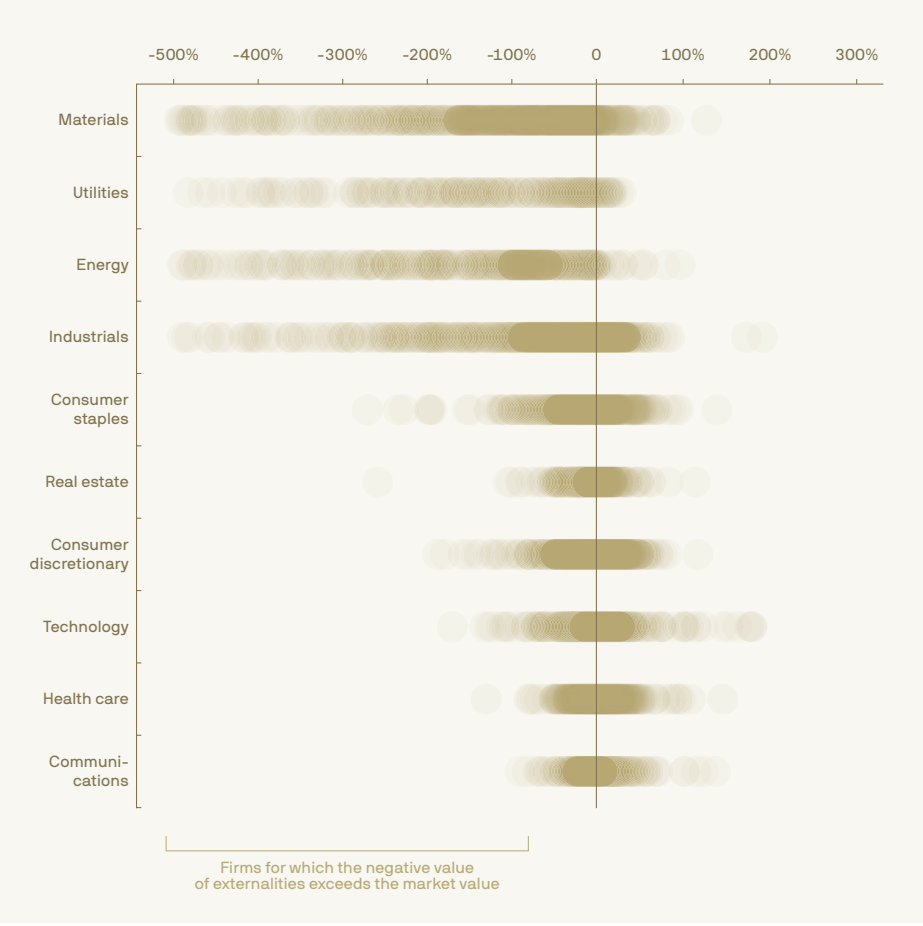
6) Pastor et al. (2024): Carbon burden, working paper, NBER, similarly calculate the present value of future externalities of carbon emissions.

Data

Effectual's database contains present values of externalities for a global sample of 8.000+ listed, developed-markets companies.[7] Externalities data are based on companies' reported figures, where available, of physical quantities causing various external effects on society and the environment, such as emissions or resource use. When specific data items are not available, they are estimated based on firm characteristics. Future expected quantities are estimated using time-series analysis. The monetary valuations of damages, or benefits, associated with the physical quantities are obtained by meta studies from publicly available research. The products of expected future quantities and valuations are aggregated and discounted over 30 years by the real USD swap rate[7] to yield the present value of externalities. All financial data, including earnings, book value of assets and firms' market values of assets are obtained from Thomson Reuters.

Value of externalities

in % of firm market value, each circle represents one out of c. 7.000 non-financial firms



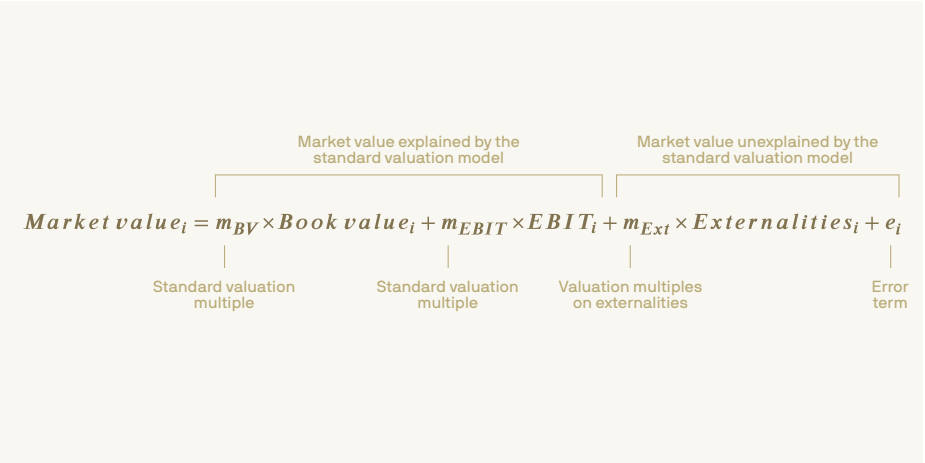
7) See also Pastor et al. (2024)

Research design

The standard valuation model of corporate finance is based on valuation multiples of book values and/or profits. This can also be written as a (statistical) regression equation explaining firms' market values by book value and EBIT. By adding the value of externalities on the right-hand side of the regression equation, it is then possible to estimate the valuation multiple of externalities, i.e., the market value due to (the "price" of) externalities—in addition to the value of financials.

Statistical analysis

multi-variate regression equation of standard corporate finance valuation model incl. externalities



The general research design follows the value relevance literature that studies the association between (usually financial) firm attributes, such as earnings, book values, etc., and firm value by cross-sectional regressions in large samples of firms.[8)]

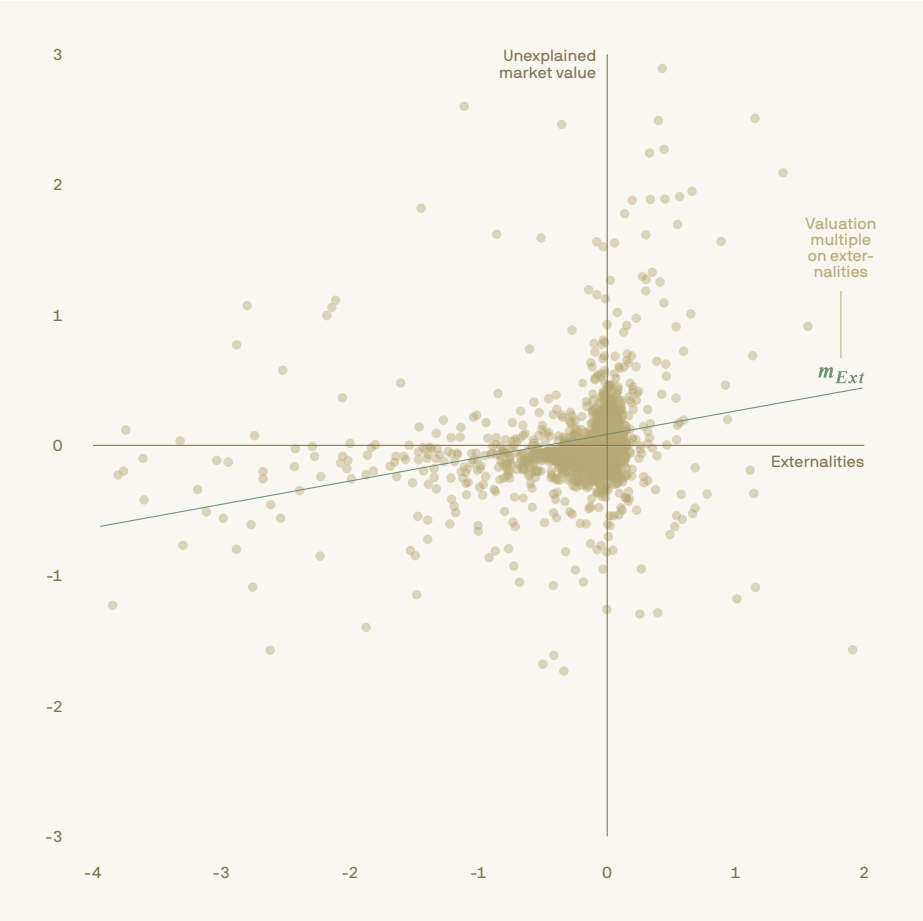
8) See Barth et al. (2023): Evolution in value relevance of accounting information. Accounting Review 98 (1), 1–28, for a recent application and extensive literature review. An extension to information about sustainability is Migliavacca (2024): Value relevance of accounting numbers and sustainability information in Europe: empirical evidence from nonfinancial companies. Journal of International Accounting, Auditing and Taxation 55.

Analysis

The multi-variate regression can be visualized in two dimensions by plotting the market value "unexplained" by financials (i.e., market value minus book value and EBIT times their respective multiples; on the vertical axis in below graph) against the value of externalities (the horizontal axis). Firms "lining up" from lower left to upper right shows the positive relationship between externalities and market value after taking into account financials; the slope of the regression line is the valuation multiple of externalities.

Partial regression

non-financial firms in USD 100mn



Key results

Estimating the regression equation shows that the valuation multiple on the value of externalities is 0.19, with high statistical estimation precision.[9)]

	Externalities	Book value	EBIT
Valuation multiple (est.)	0.19	0.99	5.94
95% confidence band	+/-0.02	+/-0.04	+/-0.22

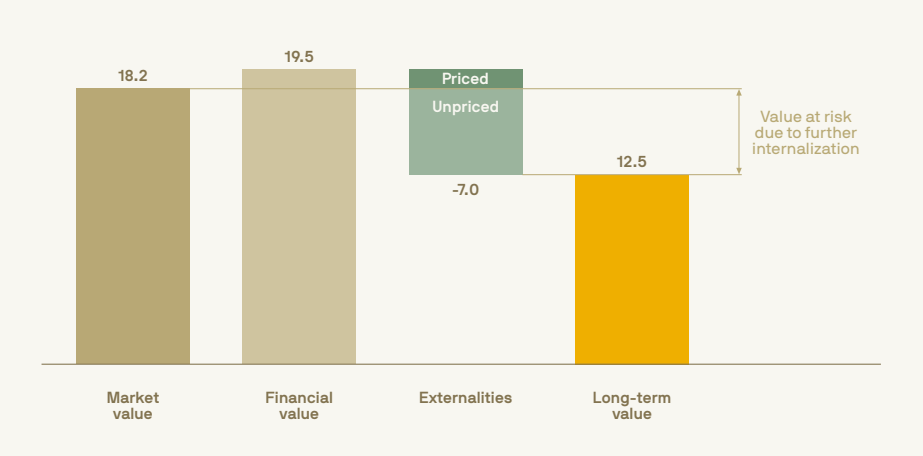
The dependent variable (market value) and the independent variable of interest (value of externalities) are in the same dimension, namely (present) value. Therefore, the valuation multiple has the immediate interpretation that c. 20% of the value of externalities is reflected in market value, which is an economically meaningful degree.

These results are best[10)] consistent with the market expecting externalities to significantly impact future cash flows, i.e., the market anticipates some internalization, yet far from fully.

Value impact

Using the valuation multiples, the market value of a firm can be decomposed into its various components. For the average firm, externalities currently take off c. USD 1.3bn or 7% of market value. In the case of full internalization, the market value impact would increase by another c. USD 5.7bn or 30% of market value.

Value components
average firm
in USD bn



9) These findings are broadly consistent with Eskildsen et al. (2024) and Freiberg et al. (2021): Corporate Environmental Impact: Measurement, Data and Information, working paper, Harvard Business School.

10) The main competing, and prevalent, hypothesis is that investor preferences for sustainability are affecting cost of capital. The magnitude of the effect and the link of externalities to future cash flows suggest that cash flow expectations are driving the results, not discount rates.

Implications

The fact that externalities have a significant impact on firms' market value has important ramifications.

Investment strategy	Further internalization of externalities will have significant valuation effects. Assets with negative externalities will depreciate and vice versa. Portfolios that take into account externalities will outperform.
Corporate management	Factoring in the current market value of externalities improves the accuracy of project valuations, ultimately increasing firm value. Similarly, initiatives for corporate sustainability can be valued and subjected to standard capital budgeting.
Risk management	As yet unpriced externalities indicate the value at risk due to further internalization. Hence, unpriced externalities are a good risk measure both for risk to market value and risks to future cash flows.
Public policy making	The fact that market prices reflect externalities strongly suggests that they are a relevant metric for sustainability, e.g., for corporate sustainability reporting or sustainable investment reporting.

About Effectual

Effectual was established in 2022 to develop a comprehensive, objective and verifiable framework for sustainable investing. At its core is the theory of externalities, which is also behind such concepts as impact valuation and cost-benefit analysis and which forms the basis of environmental and public economics. Effectual provides a range of services around sustainable investing for professional investors, such as consulting and sustainable asset allocation. Effectual also licenses the framework for financial products and indices.

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In cooperation

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