

Clearing up the ‘scaling’ confusion in carbon intensity

The two popular ways to measure a company’s carbon intensity – scaling by revenue or by enterprise value including cash – lead to differences in portfolio characteristics. In this article we analyze the investment impacts of each method.

By Vitali Kalesnik

Carbon intensity (CI) is the measure of greenhouse gas (GHG) emissions scaled by a company’s size. It is the key metric investors use to adjust their portfolios to reflect the investment risks and opportunities associated with global warming.

A heated debate is ongoing about which of two popular ways to measure company size, and hence its carbon intensity, is better: carbon emissions scaled by a company’s revenue – an older measure backed by the Task Force for Climate-Related Financial Disclosure (TCFD) – or carbon emissions scaled by enterprise value including cash (EVIC) – a newer measure proposed by the EU Technical Expert Group on Sustainable Finance (TEG) and codified in EU regulation in July 2020.

In our study entitled ‘Carbon Intensity for Climate Mitigation: Clearing Up the ‘Scaling’ Confusion’, my coauthors, Chris Brightman, Ari Polychronopolous and Joseph Shim, and I examine the investment impacts of the two measures on portfolio characteristics. I outline our general findings here.

Stocks and sectors: A cloudy picture

To see the potential differences at the stock level, let’s look at Mercedes Benz Group (MBG) and Tesla. When we measure scaled by revenue (carbon footprint/company revenue), MBG’s CI is 3.3 times lower than Tesla’s. When we measure scaled by enterprise value (carbon footprint/EVIC), we see the exact opposite: MBG’s CI is more than eight times higher than Tesla’s! The reason Tesla so outpaces MBG on this score is that Tesla has a much larger market capitalization, \$ 970 billion versus \$ 84 billion for MBG. The picture is far from clear.

A similar cloudy picture emerges at the sector level. We analyzed the Morningstar Developed Markets Large/Mid Index, a broadly diversified cap-weighted index. The CI of the index itself is 157 when emissions are scaled by revenue and

49 when scaled by EVIC. The differences are even greater at the sector-level.

The two sectors with the largest carbon footprint are energy and utilities. Their respective CI scores differ substantially when calculated using the two methods. Using EVIC results in a CI for the energy sector of 257 versus a CI for the utilities sector approximately two times higher at 496. But when we use revenue, the CI of the energy sector rises to 487, while the CI for the utilities sector soars to almost five times higher at 2,224.

The vastly different results come down to the fact that energy companies’ revenues are more on par with their EVIC, while utility companies tend to have revenues much lower than their EVIC, giving them a much higher CI than the energy companies.

Impact of CI scaling choice on portfolios

To assess the portfolio impact of the investor’s choice in measuring CI, we constructed six portfolios in the US and six in the developed markets, three in each market with cap-weighted and three with fundamentals-weighted (considering earnings, book value, dividend yield, and sales) strategies. The

FIGURE 1: EMISSIONS AND CARBON INTENSITY FOR MERCEDES-BENZ GROUP AND TESLA, 1/1/2020 - 12/31/202

	Carbon Footprint (Scope 1 & 2)	Carbon Intensity (CF/Rev)	Carbon Intensity (CF/EVIC)
Mercedes-Benz Group	2,062,000	12.70	8.66
Tesla	974,192	41.62	1.07

Note: Carbon footprint is measured in tons CO₂eq, while revenue and EVIC are measured in USD (millions).

Source: Research Affiliates, LLC, based on data from ISS and FactSet.

cap-weighted portfolios included one without any CI reduction and two with CI reduction of 50% relative to the cap-weighted portfolio, one with CI measured using revenue and one using EVIC. We followed the same process for the fundamental-weighted portfolios. Our period of analysis was April 2016–June 2021.

We observe minimal differences in carbon emission characteristics or performance when we compare the portfolios constructed based on the two measures. Our results show that the CI reduction relative to the benchmark remains relatively stable at about 50% with both measures. We observe similar results when we examine performance. On average across all strategies, returns are approximately 65 bps a year higher when CI is measured using revenue.

Volatility is also slightly higher for the strategies scaling by revenue, which leads to their all having

similar Sharpe ratios. Over the analysis period, the outperformance of the strategies using revenue to measure CI can almost entirely be attributed to the overweight in Apple stock.¹

We do observe greater differences, however, when we compare the portfolios’ characteristics and implementation costs. Scaling by revenue tilts a portfolio toward companies with large revenues and lower market capitalization. As EVIC is highly correlated with market capitalization (much more than revenue), these companies tend to be relatively cheaper, giving the portfolio using a revenue-based CI measure a value tilt compared to the EVIC-scaled strategy.

The strategy that scales emissions by EVIC has lower turnover and implementation costs, and higher capacity (trading costs are approximately 35% lower on average). The use of EVIC, a measure highly correlated with market capitalization, tilts a port-

folio toward companies with a large EVIC and lower revenues (high EVIC leads to lower CI), moving the portfolio toward the market-cap benchmark, resulting in lower tracking error.

Our portfolio construction approach tilts companies within sectors rather than across sectors. Had we tilted company weights based on absolute CI across sectors, we could have observed bigger differences across the portfolios, but would also have created the undesirable effect of significant sector weight shifts away from high-emitting sectors, such as energy and materials, and into low-emitting sectors, such as technology, and thereby essentially greenwashed the portfolio.

Investor awareness is key

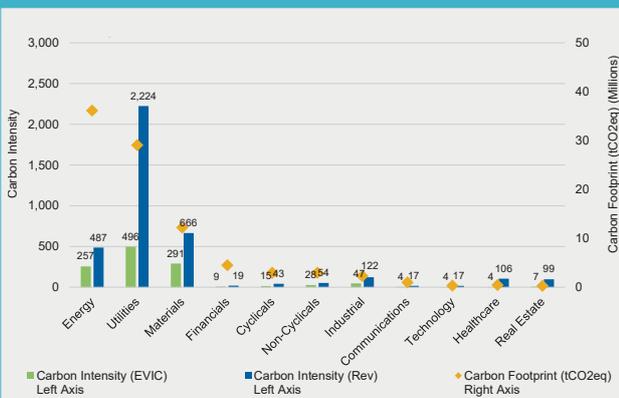
We find both measures lead to a strong growth bias, but scaling by EVIC leads to a marginally stronger growth bias. For investors who are concerned about valuation - those invested in smart beta or value-oriented strategies - using revenue to scale carbon emissions may be the better choice. We observe, however, that the use of EVIC to scale emissions leads to lower transaction costs and higher investment capacity and may appeal to investors in a cap-weighted or growth-oriented strategy. ■



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FIGURE 2: CARBON INTENSITY OF THE MORNINGSTAR DEVELOPED LARGE/MID INDEX MEASURED USING REVENUE AND EVIC, AS OF DECEMBER 31, 2021



Note: A valid criticism is that these numbers do not incorporate scope 3 data. Given that vehicles produced by Tesla create far lower emissions than MBG, what would these numbers look like if we were to incorporate scope 3 data? MBG’s scope 3 emissions are 5.8 times higher than Tesla’s (102.2 million tons CO2eq compared to 17.8 million tons CO2eq). Incorporating the scope 3 emissions data would yield a similar result as using scope 1 and 2 emissions only: MBG has lower CI when using revenue (642.5 versus 800.4) and a higher CI when using EVIC (438.0 versus 20.6) to scale emissions.

Source: Research Affiliates, LLC, based on data from ISS and FactSet.

SUMMARY

Research shows there are minimal differences in carbon emission characteristics or performance when portfolios are compared based on the two most popular ways to measure the carbon intensity of a company – scaling by a company’s revenue and by enterprise value including cash (EVIC).

Both measures lead to a strong growth bias, but scaling by EVIC leads to a marginally stronger growth bias.

For smart beta or value-oriented investors, using revenue to scale carbon emissions may be the better choice. However, the use of EVIC leads to lower transaction costs and higher investment capacity and may appeal to cap-weighted or growth-oriented investors.

1 Apple’s CI when scaled by revenue is lower than its CI when scaled by EVIC relative to other tech companies. This results in a higher weight to Apple in the CI-reduction strategy using revenue. Apple outperformed the developed market by nearly 20% over our analysis period.

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