Is Gross Profit superior to Sales as a measure of firm footprint?

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Summary

Sales is currently a factor in our Core footprint-weighted portfolio methodology. In this note, we compare Sales against Gross Profit, and discuss the rationale and historical back-test performance of each strategy. We argue Sales potentially provides a biased picture of a firm's footprint as it fails to take into account firm or industry level differences in profit margins. Furthermore, Sales is also prone to *double-counting* and *downstream bias*. In contrast, Gross Profit measures a firm's overall product 'value-add' (incorporates profit margins), and does not inherit biases prone in Sales weighting.

Hypothetically, replacing Sales with Gross Profit would reduce active risk by circa 1%, and roughly double the information ratio (IR) for developed markets in the long-run, maintains the value characteristics whilst reducing some sector and region biases.

Motivation.

Gross Profit is Sales after accounting for the cost of goods sold (COGS) (variable costs), and in essence penalizes firms with lower margins as they add less value-add beyond their original inputs.

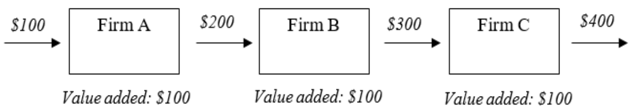
Weighting firms by Sales correctly identifies the size of a firm's total output (or turnover), but overlooks the size of a firm's inputs. This makes Sales weight not comparable between industries. Certain industries have lower margins but higher turnover that effectively generates significant headline sales. These firms would have their fundamental footprint unfairly enlarged. On the other hand, high margin, low volume industries would be unfairly shrunk.

Gross Profit favours stocks with high sales *and* high margins. Gross Profit blends a notion of profitability into Sales. Firms with higher Gross Profit produce goods or services with greater economic value-add. They are able to command a higher margin because of either favourable bargaining power over suppliers/customers and/or strategic positioning that reduces competitive rivalry, the threat of new entrants and product/service substitutes. In contrast, firms with low profit margins provide limited economic value-add, and generally operate in sectors that either have low barriers to entry or have high competition. Using Sales would overstate the value of such firms' economic footprint.

Sales Bias.

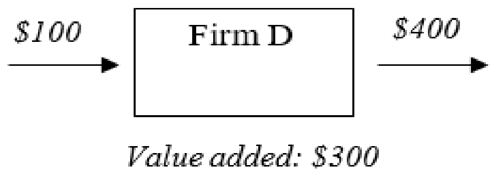
We believe that the Sales metric is prone to *double-counting* and *downstream bias*, which can easily be illustrated with a simple thought experiment.

Suppose we have three firms, A, B and C. Firm A produces a raw good that it sells to Firm B for $200. Let us assume Firm A's variable costs are $100. Firm B then adds value to this raw input and sells its worked product to Firm C for $300. Firm C adds further value to the good before selling its final product to consumers for $400. Each firm adds exactly $100 worth of value-add to the product.



The total Sales of these three firms would be $900, when in reality the total value-add generated by the three firms is only $300. Here, total Sales overstates total firm production because Firm A's sales has been counted again in Firm B's sales and again in Firm C's sales. This is known as double-counting and is often mentioned in the economics literature – when estimating a country's GDP, economists often use a value-added approach (not dissimilar to our use of Gross Profit).

Furthermore, if we weight firms by Sales, downstream firms benefit from a larger weighting. Firm C gets 44.44% weight ($400/$900) whilst Firm A and Firm B get 22.22% and 33.33% respectively. Seemingly, Firm C has a bigger footprint - which we know is not true. This bias occurs because we are not adjusting for cost of goods sold, and thus firms at the end of the supply chain with higher variables costs are rewarded with larger weights. This is clearly counterintuitive. When we use Gross Profit, however, we can clearly see that each firm is weighted equally.



Moreover, using Sales penalizes Firm D, a vertically integrated firm that adds $300 worth of value. Under Sales-weighting, there would be no differentiation between Firm D and Firm C, when clearly the former adds three times the value of the latter.

Definitions.

In Table 1, we define Gross Profit. For non-financials, the definition is clear: Sales after COGS. A sizable portion of financials firms, such as investment managers, also report Sales and COGS. For banks or lending companies, we use net interest income plus any net non-interest income (such as the brokerage arm of a bank). For insurance companies, we use premiums minus claims.

In any case, the rationale is to consider the unit costs of a product, or variable costs (COGS); but not overheads or fixed costs (SG&A).

Table 1. Gross Profit Definitions

Industry	Measurement
Non-Financials & Financials with reported Gross Profit	Sales—COGS
Banks*	Net Interest Income (Interest Income - Interest Expense) + Net Non-Interest Income
Insurance*	Sales (or premiums) - Losses, Claims & Reserves

*Only for financials with no reported Gross Profit in FactSet Fundamentals

Performance.

We show, in general, Gross Profit outperforms Sales. Overall, we see a significant increase in return and a reduction of risk in the absolute return space. Gross Profit runs at a lower tracking error to market cap benchmark than sales. This fact, coupled with higher active returns, yields a significant uplift in IR for most regions. In Australia, Gross Profit's underperformance relative to Sales is attributable to overweights in Metals & Mining coupled with underweights to Consumer Staples. The impact is somewhat exacerbated by the lack of breadth in the domestic market.

Table 2. Performance (1995 to 2019)

	Global ex AU Sales	Global ex AU Gross Profit	DM ex AU Sales	DM ex AU Gross Profit
Total Return	7.9%	9.5%	8.4%	9.5%
Total Risk	12.6%	12.2%	12.8%	12.5%
Sharpe Ratio	0.63	0.77	0.66	0.76
Active Return	0.3%	1.8%	0.6%	1.7%
Active Risk	5.2%	3.7%	4.9%	3.7%
Information Ratio	0.05	0.48	0.13	0.46
Max Drawdown	-40.1%	-39.2%	-41.8%	-40.5%
Max Active Drawdown	-23.8%	-10.0%	-24.4%	-10.0%
Turnover (1-way)	14%	14%	13%	13%
Num of Stocks	1,686	1,686	1,062	1,065

	EM Sales	EM Gross Profit	Australia Sales	Australia Gross Profit
Total Return	9.8%	10.6%	11.6%	11.0%
Total Risk	18.4%	17.7%	12.6%	12.7%
Sharpe Ratio	0.53	0.6	0.92	0.86
Active Return	3.1%	3.9%	2.1%	1.4%
Active Risk	7.5%	6.2%	4.3%	4.1%
Information Ratio	0.41	0.62	0.48	0.34
Max Drawdown	-44.5%	-40.2%	-45.2%	-44.4%
Max Active Drawdown	-31.6%	-18.1%	-15.4%	-13.3%
Turnover (1-way)	21%	21%	12%	13%
Num of Stocks	590	590	198	196

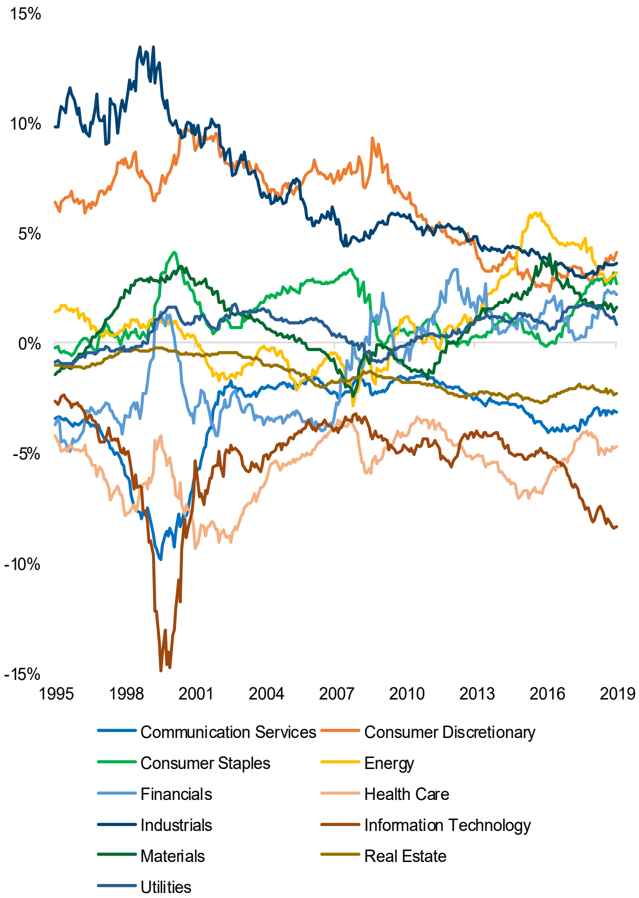
Source: Realindex, data as at 31 December 2019

Active Sector Tilts.

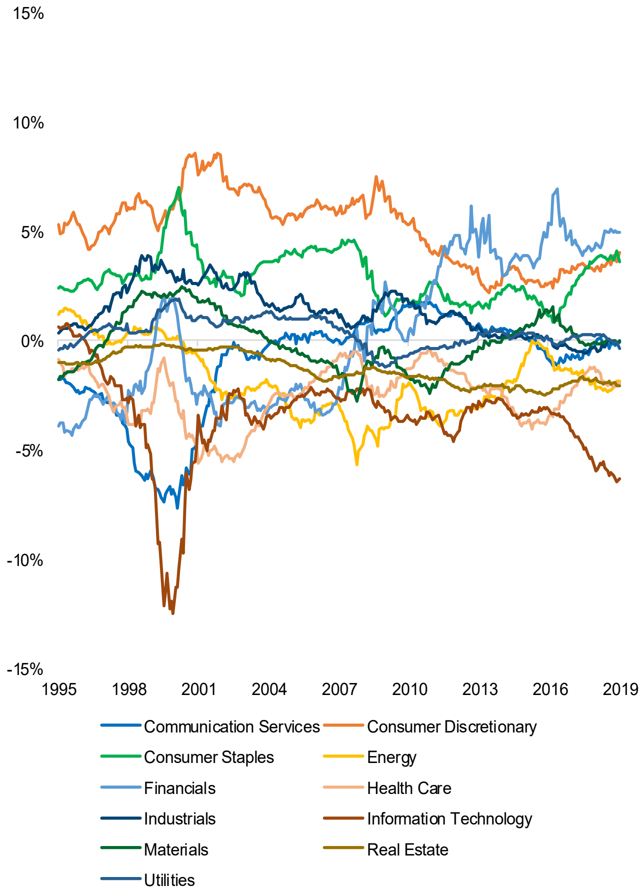
Whilst, the construction methodology behind Sales weighted and Gross Profit weighted portfolios are benchmark agnostic, it is still often useful to examine active sector tilts. Gross Profit yields substantially more desirable sector tilt characteristics than Sales whilst retaining the overall flavour.

Chart 1. Sector Active Weights in Global ex Australia

Panel A. Sales



Panel B. Gross Profit



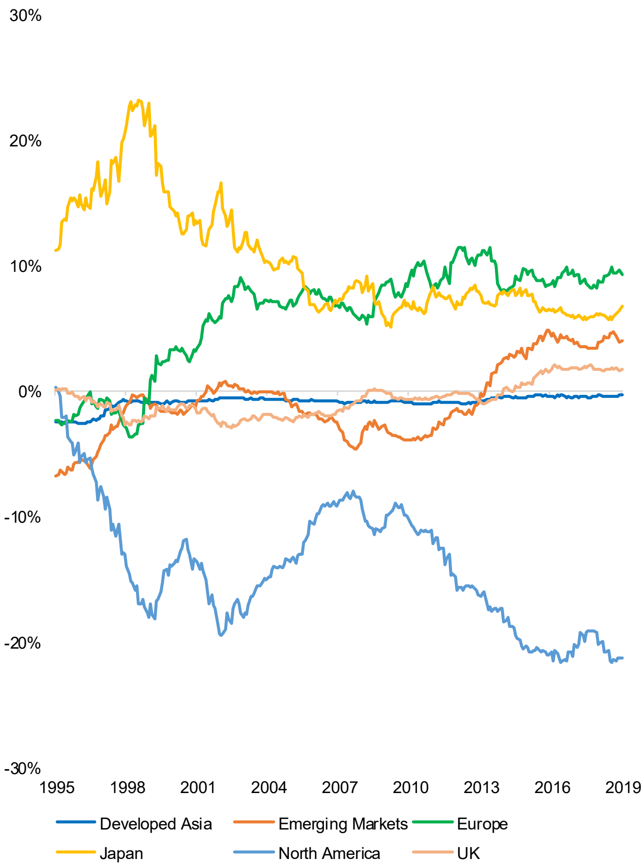
Source: Realindex, data as at 31 December 2019

Active Region Tilts.

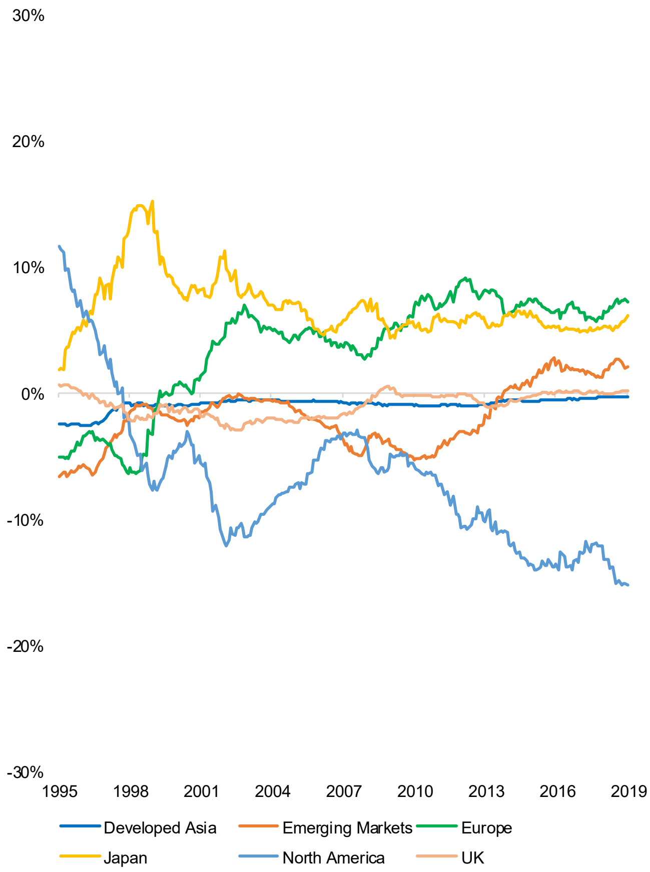
With Gross Profit, we still retain the overall characteristics of Sales but pare back some of large overweights and underweights. We believe Gross Profit yields a more stable distribution of weights than Sales.

Chart 2. Region Active Weights in Global ex Australia

Panel A. Sales



Panel B. Gross Profit



Source: Realindex, data as at 31 December 2019

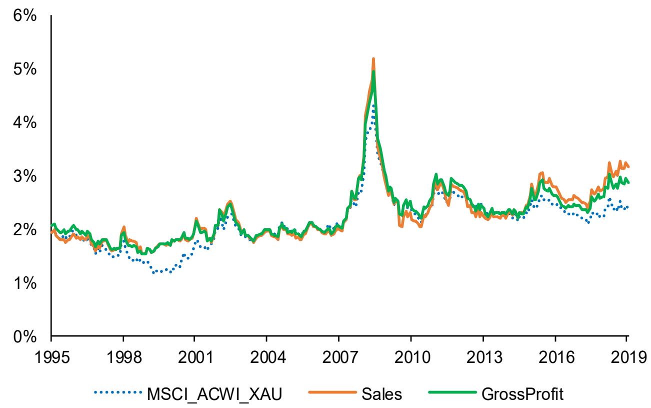
Portfolio Characteristics remain largely unchanged.

We show that a Gross Profit weighted methodology does not significantly alter the fundamental characteristics of a Sales weighted portfolio. In Chart 3, we illustrate using a global portfolio the differences between Sales and Gross Profit, but the results also hold in emerging markets and Australia. This is consistent with our analysis of sector and region tilts. The overall direction of the tilts remain in place, although the magnitude has been paired back.

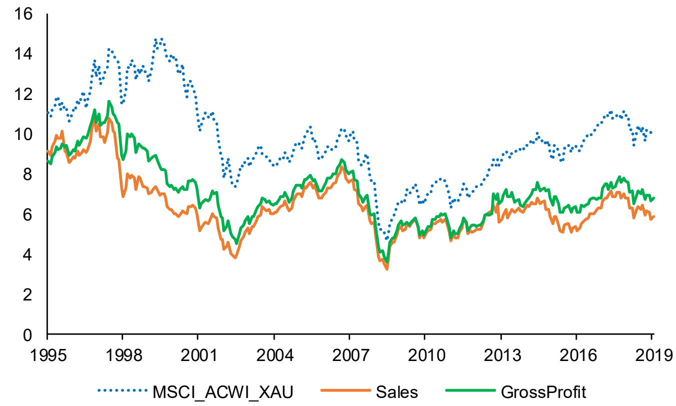
Chart 3. Portfolio Characteristics in Global ex Australia

Panel A. Price-to-Earnings

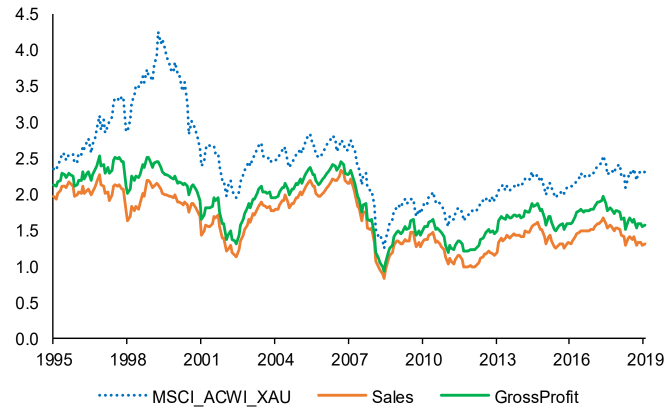
Panel B. Dividend Yield



Panel C. Price-to-Cash Flows



Panel D. Price-to-Book



Source: Realindex, data as at 31 December 2019

Conclusion.

In conclusion, we find that Gross Profit yields superior risk-return characteristics with more palatable sector and region tilts when compared to a Sales weighted portfolio. The overall portfolio characteristics remain the same, and the level of annualized turnover is also similar. In essence, a move towards Gross Profit would deliver higher absolute returns at a lower tracking error to the original Sales metric whilst preserving the original style characteristics. Furthermore, we show that the change makes intuitive sense, and reduces double-counting and downstream bias exhibited in Sales.

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