Zheng Partners LLC

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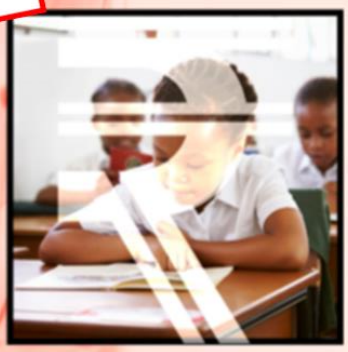
The Short Version

"Pricing Impact" written as a story of discovery in 43 pages



PRICING IMPACT

Extending impact investing to price externalities and lower the cost of capital to impactful investments

David Wilton

Introduction

There have been a number of requests for a much shorter 'highlights' version of the note Pricing Impact. An explanation of the logic in as simple and brief a way as possible.

This is my attempt to meet this request.

Rather than starting at the end – the possibility of pricing externalities – this note is written as a sequential story of discovery in eleven steps.

Step 1 Distinguishing Impact and Other Approaches to Sustainable Investing

My engagement with impact investing began with managing the International Finance Corporation's private equity funds portfolio. The three-fold objective of the portfolio was to (i) create commercial proof of concept so as to attract commercial investment into under-funded areas while also (ii) creating positive development outcomes and (iii) maintaining best-practice ESG standards.

What is the difference between creating positive development outcomes and ESG and how do these two concepts relate to each other?

Impact Investing is one of four major approaches to sustainable investing, illustrated in Chart 1.

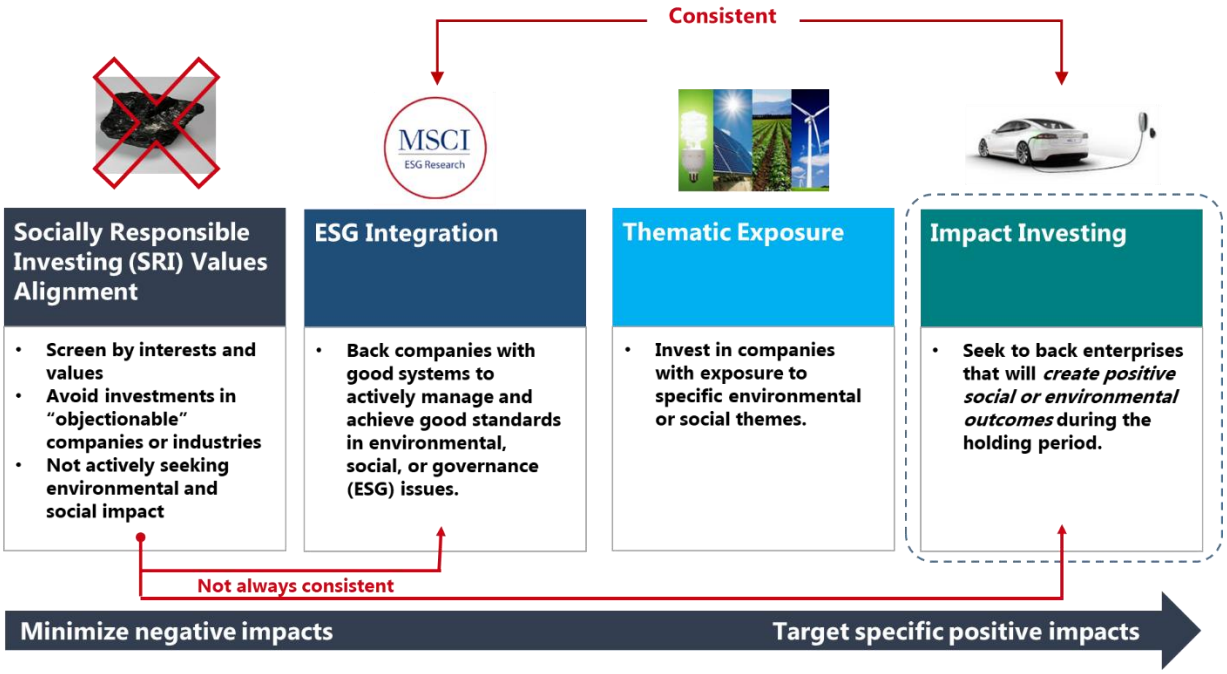
These four investment approaches are quite distinct and are not always completely compatible.

- *Impact* is the only approach which explicitly seeks investments which will *create positive outputs*, such as additional access for the disadvantaged to jobs, education and healthcare and positive environmental effects, during the holding period of the investment.
- *Seeking exposure to impactful themes*, both social and environmental, is consistent with impact investing, but is a less rigorous form of seeking impact, especially in social areas where to be impactful, in addition to location in an impactful theme (e.g. healthcare, housing) the outputs also need to benefit underserved populations to qualify as impactful. Thematic investing can be incorporated into impact investing.
- *Environmental, social and governance* (ESG) considerations focus on *managing the risk of exposure to negative outcomes*. ESG can be used both as a screen, to reduce exposure to activities and companies which create negative environmental or social outcomes and also, if thoughtfully and proactively applied, as a management tool within companies to create positive impact (e.g. a reduction in a company's carbon footprint, improvement in labor conditions).
  Managing ESG risk is separate from and complementary to impact investing. Without ESG management an impact strategy runs the risk of failing to identify negative outcomes which reduce the total net impact achieved. Impact investing is most effective and credible when executed in tandem with ESG management.
- *Socially responsible investing* (SRI) is the oldest approach to sustainable investing and is based on *excluding investments* which are considered to have objectionable characteristics (e.g. armaments, coal).
  SRI is not always consistent with ESG and impact investing. For example, retrofitting a coal-fired power station with cleaner technology to reduce its carbon footprint over its future estimated twenty year life would be seen as a positive investment from an ESG and impact investing

perspective, but for an investor wishing to exclude all fossil fuels it would be regarded as unacceptable.

Investors need to make a clear choice which of these approaches or combination of these approaches they will adopt.

Chart 1 Sustainable Investing Strategies



Investors interested in optimizing the impact of their portfolios are most likely to combine some elements of all four approaches. The key decision points relate to investors individual mandates.

- *ESG.* Managing the risk of exposure to negative outcomes is a distinct discipline from impact investing, but is fully complementary and increases both the credibility of an impact strategy and the potential to achieve impact goals. For these reasons investors wishing to implement an impact strategy will want to do so in conjunction with an ESG management strategy.
  However, managing ESG risk implies excluding investments which are not ESG compliant or which cannot be brought into compliance within a reasonable timeframe. An investor adopting ESG will be maximizing net impact subject to a requirement that investments be ESG compliant. Given the likely commercial and impact benefits of ESG compliance, this is not a restriction that is likely to reduce potential impact outcomes.
- *Thematic exposure.* Is the investor's mission consistent with maximizing impact across all types of impact – creating a blended portfolio of impacts – or does the investor's mission require them to focus on a small number of themes or even on a single theme? Investors whose primary concern is to achieve return and risk targets and to achieve impact subject to these primary targets, will not typically have a mission that forces them into a few themes and will find that a broad portfolio approach to impact increases both their ability to meet their return and risk objectives and to maximize total portfolio impact.

Investors whose mission requires a focus on a select number of themes will select these themes as constraints on their operation in the impact space. These investors will seek to maximize impact outputs subject to those outputs being within the selected theme(s). The narrower the thematic focus, the more likely it is to reduce the achievable quantity of impactful outputs and/or reduce the scale at which the investor's strategy can be implemented.

- *SRI exclusions.* Exclusions under an SRI approach focus on activities which the investor finds objectionable, so the selection of exclusions is very much a personal or mission-driven decision. Given the potential for divergence between SRI and ESG/impact investing, investors without a strong mission-driven need to exclude an investment may prefer to prioritize ESG/impact considerations over SRI considerations in situations where the approaches lead to different conclusions.

There is a further subtle but important difference between impact and the other three approaches to sustainable investment. Impact is quantifiable, which opens the possibility of incorporating impact into a portfolio optimization framework. The other three approaches are varieties of screens.

If we take achieving the United Nations Sustainable Development Goals (SDGs) as our broad framework then, in my view, we can best achieve the SDGs through a combination of Impact Investing and ESG risk management.

Impact Investing will help us to identify those assets with the greatest potential to contribute to the *additional outputs* (increased access to healthcare, education and housing, improvements in energy efficiency, reduction in water usage, additional jobs for the disadvantaged) needed to meet the SDGs while ESG will help us to both identify those assets making negative contributions and encourage improved practices to reduce existing negatives.

Impact Investing without ESG will fail to identify possible negative outcomes.

Identification of ESG issues alone, without consideration of impact, will fail to identify assets with the potential to create positive outcomes.

Understanding the different approaches to sustainable investing and that impact and ESG can be combined in a mutually-re-enforcing manner is the *first step* in solving the impact puzzle.

Step 2 The Financial Model: Identifying the Role of Organic Growth in Creating Outputs

During my time managing the IFC's private equity funds portfolio, we needed to gain insight into the profile of investment that was most likely to help us meet our development goals.

As is the case with most organizational goals, there were trade-offs we were likely to have to make between different goals and we needed greater insight into what those trade-offs might look like. In IFC's case the trade-off of interest was a three-way one between achieving returns which would attract further capital, backing activities in difficult locations and creating the greatest number of outputs, measured by jobs.

Because the context was private equity, the search for answers was framed in terms of the strategy driving the return on equity. Of all the different strategies which are used in private equity to create

financial returns: (i) which strategy creates the greatest number of jobs? (ii) which adaptations need to be made to operate in difficult locations in which commercial scalability is limited? (iii) what is the return profile of models adapted to difficult locations?

The first question is the one which is relevant to the focus of this note, although insights from the other two questions have informed the discussion below in Step 7 "Interpreting the Impact Opportunity Space".

To answer the question "Which strategy creates the largest number of jobs?" the starting point was to examine the six different strategies that are used to create financial returns in equity investment. These are outlined in Table 1. The returns on all equity investments are created by some combination of these six strategies.

Table 1: The Six Strategies for Creating Financial Returns on Equity

Strategy	Description	Role in Impact
Organic Growth	Revenue growth driven by increased sales in existing business and internal introduction of new business. Financial return comes from increased sales.	Directly linked to provision of additional goods/services as this is what drives organic growth. Linked to job creation as company grows.
Inorganic Growth	Revenue growth created by mergers and acquisitions. Growth comes from purchasing existing revenue of another company. Financial return comes from cost-cutting and scale benefits.	No additional goods/services provided or jobs created by acquisition. May reduce jobs short term due to rationalization.
Efficiency Gains	Cutting costs to improve margins. Financial return comes from improved EBITDA.	No additional provision of goods/services in the short term. Short term possibly a negative effect on jobs. Medium to long term, if lower costs are passed on to consumers in lower prices, it could increase the access of underserved groups. If this happens, it will be captured in organic growth.
Leverage	The amount of debt the company is carrying. Larger debt relative to equity increases the return on equity but also increases risk.	No link to additional provision of goods/services or additional jobs.
Multiple Expansion	An increase in the valuation of the company, typically expressed as a higher P/E ratio. Valuation changes can be caused by the company reaching a size that makes it a more attractive acquisition target, by performance exceeding expectations and by market momentum.	No link to additional provision of goods/services or additional jobs.
Cash Extraction	Payment of cash by the company, for example as dividends, fees, royalty payments, stock buyback.	No link to additional provision of goods/services or additional jobs.

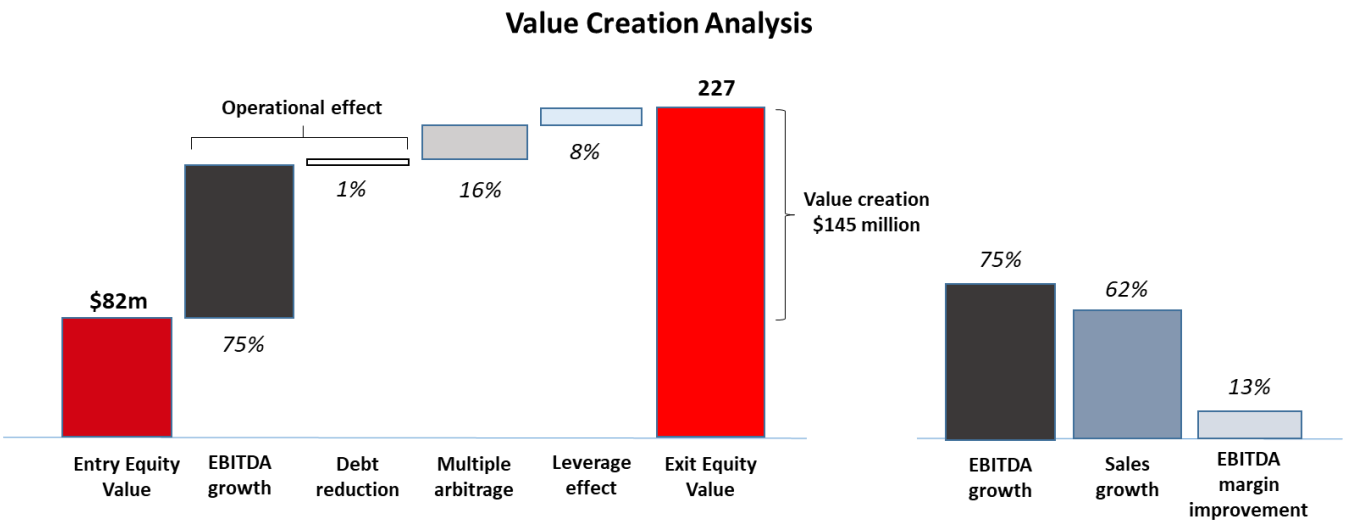
Four of the six strategies for creating financial value have no connection to the creation of outputs such as jobs or additional patients treated. These four strategies are leverage, multiple expansion, cash extraction and inorganic growth.

Creating financial value by improving efficiency may, in time, lead to an increase in impactful outputs, but also it may not, depending on the extent to which the higher margins created by improved efficiency are passed on to consumers in lower prices. Lower prices will improve access and should result in an increase in outputs. To the extent that improved efficiency is passed on in lower prices, the effect will be captured through increased organic growth.

Of the six strategies for generating financial return, only organic growth has a clear and direct logical link to creating additional outputs: additional jobs, pupils educated, patients cared for, climate effects etc.

The contribution of each of the six strategies to the return on an equity investment can be identified through a value bridge analysis of the accounts of the company. Chart 2 illustrates the output from such a value bridge analysis.

Chart 2 An Example of a Value Bridge Analysis[1]



This logical point is supported by data from IFCs funds' portfolio (Table 2) which shows a surprisingly consistent relationship between revenue growth (driven mostly by organic growth in this data set) and job creation across companies of different sizes[2].

Table 2: Data From the IFC Funds' Portfolio on Revenue Growth and Job Creation[3]

	SME	Larger Company	Total/Average
Number of companies	235	284	519
Total jobs created	26,679	276,656	303,335
Average jobs created per company	114	974	584
Average revenue growth per company	$14,112,910	$140,863,906	$81,644,178
Average revenue growth per job created	$120,694	$132,294	$131,208
Investment by funds	$946,000,000	$3,320,000,000	$4,266,000,000
Fund investment per job created	$35,439	$12,000	$14,064
Job growth rate (annual)	18.3%	12.9%	15.3%
Revenue growth rate (annual)	29.8%	14.9%	21.5%
Average number of jobs at investment	79	1,628	927
Average revenue at investment	$4,130,336	$231,354,368	$125,616,452

Identifying the central role of organic growth in creating additional outputs is the *second step* in solving the impact puzzle. The most impactful investments – those which create additional jobs and access and climate effects – will have a meaningful amount of organic growth in their business strategy.

[1] Source: Courtesy of Africinvest

[2] Revenue growth per new job will differ across time periods and countries and between less automated and highly automated activities. This data is a snapshot from 519 growth equity companies across sixty two emerging market countries in the period 2000-2011.

[3] Source: "The Benefits of Private Equity Investment", David Wilton, Commonwealth Trade and Investment Report 2013

Step 3 Locating the Greatest Quantity of Outputs: Identifying Concentrations of Organic Growth

Our next step is to see if it is possible to identify where nodes of strong organic growth might be located. Is the contribution of organic growth to return on equity randomly distributed across companies and projects or can we identify patterns?

Data from the IFC funds' portfolio, which was mainly invested in organic growth strategies, indicates that the *rate* of revenue growth is strongly connected to firm size (scale), as measured by top line revenue (Table 3).

As scale increases, the rate of revenue growth declines. The rate of growth is not the same thing as the contribution of organic growth to returns, which additionally depends on the scale over which the growth is occurring amongst other factors.

None-the-less, the decline in growth rates suggests that the contribution of organic growth to financial returns may decline as the size of companies increases.

If the contribution of organic growth to financial returns declines at larger company sizes, it suggests that as companies get larger financial return is increasingly driven by the other five strategies used to create financial return: the five strategies which do not create outputs such as jobs or additional access to education or healthcare.

Table 3 Growth Rate in Revenue at Different Company Sizes[4]

	Revenue Growth Rate
All companies	21.5%
Revenue at investment < $5 million	36.2%
$5 to $15 million	18.8%
$15 to $30 million	19.2%
$30 to $50 million	7.9%
$50 to $100 million	14.8%
$100 to $250 million	13.2%
$250 to $500 million	6.0%
> $500 million	4.4%

To identify business models with high potential to create outputs such as jobs, we need to understand the relationship between company size and the contribution of organic growth to returns over the full range of company sizes from micro-enterprise to multinational.

Chart 3 provides some partial data from the Morgan Stanley portfolio on the relationship between the contribution of organic growth to financial returns and company size. Both sales growth (the red line) and the contribution of sales growth to returns (the dashed line) decline as companies get larger. The implication is that as companies get larger financial returns are increasingly driven by the five non-output-creating strategies.

[4] Source: "The Benefits of Private Equity Investment", David Wilton, Commonwealth Trade and Investment Report 2013

Chart 3 Contribution of Sales Growth to Financial Returns[5]

Identifying this declining relationship between company size and the contribution of output-creating organic growth to financial returns, with the implication that organic growth may play a greater role at smaller company sizes, is the *third step* in solving the impact puzzle.

Step 4 Locating the Greatest Quantity of Outputs:

The Interaction of Organic Growth and Company Size

Our next step is to get a feel for how the two factors, organic growth and company size, interact. While the contribution of organic growth to financial returns declines with scale, this is not the same thing as the creation of impactful outputs such as jobs and access to education.

The increase in revenue which drives job creation is the result of the *combination* of organic growth and scale. Scale is the base over which organic growth operates. High growth over a small base may result in fewer jobs than lower growth over a larger base. We need to get a feel for how this relationship works.

Is there an impact sweet spot in terms of scale?

For example, to better understand the impact characteristics of companies it would be interesting to be able to answer questions such as: "Is there some range of company sizes over which increasing scale off-sets the decline in organic growth, leading to an increase in outputs?" and "Is there a point at which the decline in organic growth off-sets the increase in scale, so that beyond that point outputs decline?"

To understand the relationship between company size, the contribution of organic growth to returns and outputs such as jobs, Table 4 uses the data from the IFC funds' portfolio in Tables 2 and 3 to create a mapping of the estimated average number of jobs created by companies in different revenue brackets.

In Table 4 the growth rates from Table 3 are smoothed and used to compound revenue over five years, beginning with the mid-point of the range in which the company is located. The final revenue is then

[5] Source: Morgan Stanley AIP

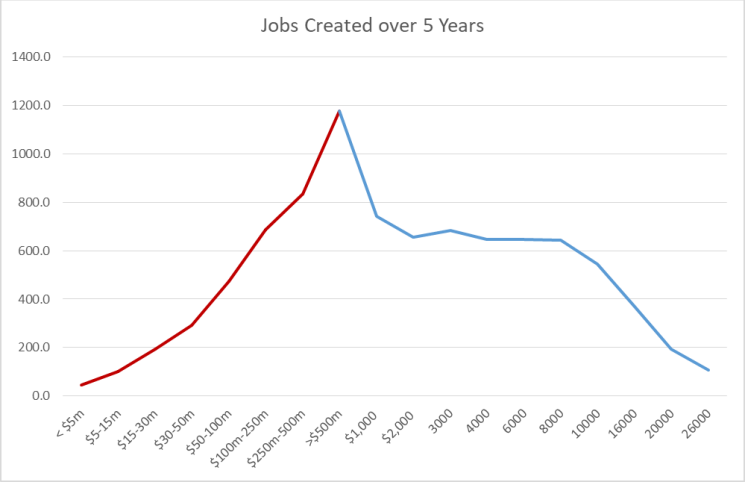
divided by $125k, as a representation of average-revenue-growth-per-new-employee from Table 2, resulting in an estimate of the number of jobs created.

Table 4 Estimate of Jobs Created Over a Five Year Period[6]

			Revenue Over 5 years Compounding at Smoothed CAGR, Starting at Range Mid Point						
$ Revenue at entry	Average revenue CAGR	Average Revenue CAGR Smoothed	1	2	3	4	5	Total Revenue Growth $m	Average Total Jobs Created over 5 years
< $5m	36.20%	36.20%	3.4	4.6	6.3	7.6	9.1	5.7	45.5
$5-15m	18.80%	20.00%	12.0	14.4	17.3	20.6	24.5	12.5	99.8
$15-30m	19.20%	19.00%	26.8	31.9	37.3	43.6	51.0	24.3	194.0
$30-50m	7.90%	17.00%	46.8	54.8	63.0	72.4	83.3	36.5	291.8
$50-100m	14.80%	15.00%	86.3	99.2	114.1	128.9	145.7	59.4	475.2
$100-250m	13.20%	13.00%	197.8	223.5	252.5	267.7	283.7	86.0	687.7
$250-500m	6.00%	6.00%	397.5	421.4	446.6	473.4	501.8	104.3	834.7
$500-1000m	4.40%	4.40%	783.0	817.5	853.4	891.0	930.2	147.2	1177.4
$1000-2000m		2.20%	1022	1044.5	1067.5	1090.9	1114.9	92.9	743.6
$2000-3000m		1.00%	2020	2040.2	2060.6	2081.2	2102.0	82.0	656.2
$3000-4000m		0.70%	3021	3042.1	3063.4	3084.9	3106.5	85.5	683.8
$4000m		0.50%	4020	4040.1	4060.3	4080.6	4101.0	81.0	648.0
$6000m		0.33%	6020	6040.1	6060.2	6080.4	6100.7	80.7	645.4
$8000m		0.25%	8020	8040.1	8060.2	8080.3	8100.5	80.5	644.0
$10000m		0.17%	10017	10034.0	10051.1	10068.2	10085.3	68.3	546.3
$16000m		0.07%	16011.5	16023.0	16034.4	16045.9	16057.5	46.0	367.9
$20000m		0.03%	20006.1	20012.1	20018.2	20024.2	20030.3	24.2	193.8
$26000m		0.01%	26003.3	26006.6	26010.0	26013.3	26016.6	13.3	106.2

The estimated average number of jobs created over five years by companies of different sizes (the last column of Table 4) is plotted in Chart 4.

Chart 4 Estimate of Jobs Created Over a Five Year Period – Outline of the Impact Opportunity Space[7]



[6] Green shading in the '$ Revenue at entry' column indicates data from IFC's portfolio. Data for revenue $1000-2000m and beyond is based on extrapolation in the absence of data from larger-sized companies.

[7] The red part of the curve indicates data based on IFC's portfolio. The blue part of the curve is based on extrapolation in the absence of data from larger sized companies.

Chart 4 suggests that the structural relationship between company size and the role played by organic growth in generating returns leads to a wide range of opportunities to create jobs and, by inference, other outputs such as access to health care and education.

At very small company sizes, while the contribution of organic growth to returns is very high the small scale results in a small number of jobs being created.

At very large company sizes the large scale is not enough to off-set the very small contribution of organic growth to returns, resulting in a small number of jobs being created.

Between the very small and the very large, the role played by organic growth is significant enough and the scale of companies is large enough that the numbers of outputs created (additional jobs, additional access to socially beneficial things) is significant.

Chart 4 also suggests that the tipping point at which the declining contribution of organic growth to financial returns is no longer off-set by increasing scale, so that the number of jobs created ceases to rise with scale and instead begins to decline with scale, is somewhere between $500m-$1000m in revenue.

For investors wanting to increase the impact of their portfolios, Chart 4 is very interesting as it indicates where they should concentrate their search for assets which create the largest numbers of outputs.

By mapping the contours of the potential quantity of outputs created by assets of all types – the contours of the Impact Opportunity Space - Chart 4 provides the *fourth step* in solving the impact puzzle.

However, Chart 4 only tells us about the location of the potential *quantity* of all outputs. It does not does not contain enough information to tell us which of these outputs are in fact impactful. It lacks the information to identify where the *impactful outputs* are located within this broad map of all outputs.

For example, in terms of social impact many of the people who benefit from the jobs created or additional access to healthcare will not come from disadvantaged backgrounds and so the jobs and access which accrue to them will not count as impactful.

Step 5 Identifying the Location of the Greatest Quantity of Impactful *Outputs*

Our next step is to identify both the quantity and the location of *impactful* outputs, for which we need more information.

In addition to the contribution of organic growth and scale, which indicate the potential quantity of outputs, we need to identify variables which indicate the proportion of these outputs which are in fact impactful.

Social impact is created when outputs such as jobs, access to health care and access to education benefit the disadvantaged.

Environmental impact is created when an asset creates environmentally beneficial outputs such as lower consumption of water and energy and cleaner production of energy.

The first key identifier of the impact profile of an asset is the degree to which the outputs of the asset benefit a disadvantaged population or the environment.

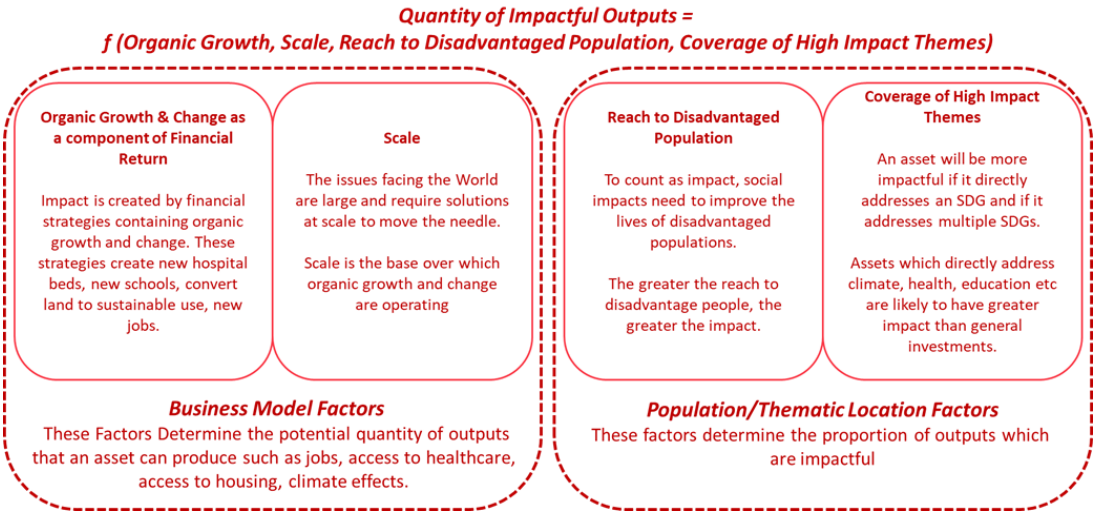
The second identifier of the impact profile of an asset is the extent to which the asset is exposed to high impact themes, potentially generating a double-count of impact.

For example, assets in which organic growth plays a role in generating returns will create jobs. However, depending on the industry in which an asset is located, the asset may create only jobs or *both* jobs and access to socially beneficial things or positive environmental effects.

Assets located in high impact themes such as health, education, housing and the environment will, in addition to jobs, create access to further socially and environmentally beneficial things.

If we combine (i) measurement of the *quantity* of outputs, based on the contribution of organic growth and the scale over which the growth is occurring with (ii) measurement of the *percentage* of outputs which are *in fact impactful*, based on the degree to which the benefit of an asset is received by a disadvantaged population and the exposure of the asset to high impact themes, we have a theory of how the quantity of impactful outputs is created. This theory is illustrated in Chart 5.

Chart 5 The Determinants of an Asset's Ability to Create a Quantity of Impactful Outputs



A key insight of Chart 5 is that the quantity of impactful outputs is driven by two different sets of factors: (i) factors embedded in the business model being used to create financial returns, which determine the potential quantity of outputs and (ii) population and thematic factors which determine what percentage of this quantity of outputs is in fact impactful.

The insight that we cannot successfully model the quantity of impact created without adequately addressing *both* the business model being used *and* the location of the activity in terms of population and impact themes is the *fifth step* in solving the impact puzzle.

Step 6 Mapping the Impact Opportunity Space

Our next step is to create a complete mapping of the Impact Opportunity Space, a map of the location of impactful outputs, by using the theory described in Chart 5 to identify the location of impactful assets within the outline of the Impact Opportunity Space in Chart 4.

To map the location of impactful assets within Chart 4, we begin by using a simple matrix framework to generate impact ratings (Chart 6).

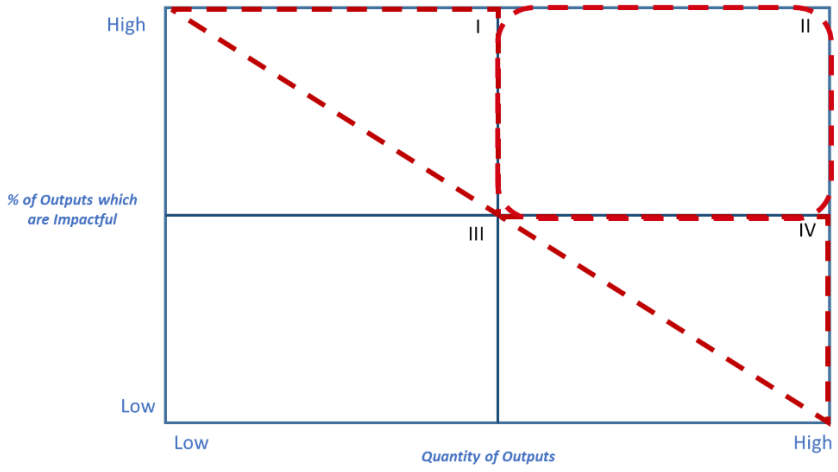
The idea is to create a family of impact ratings in which (i) the potential of each asset to create a *quantity of impactful outputs* is rated on a consistent basis and (ii) the ratings of assets relative to each other are objectively reasonable and logically consistent with the theory outline in Chart 5.

In Chart 6 each axis is a composite measure of two variables, which means that the placement of assets within the Chart needs explanation.

The x-axis measures the quantity of primary outputs such as additional jobs, additional access to education and additional carbon offset that an asset can potentially produce. It says nothing about the percentage of these outputs which are impactful, it is simply a measure of the potential quantity of outputs.

Two factors drive the quantity measure: the contribution of organic growth to return and the scale of the base over which organic growth is occurring.

Chart 6 A Matrix Framework for Rating the Quantity of Impactful Outputs



To be positioned in the right side of Chart 6 in segments II and IV, *both* the contribution of organic growth and scale have to be moderate to high.

An asset can be on the left hand side of Chart 6 due to both organic growth and scale being low, or due to one being very low while the other is moderate or high.

This leads to quite different types of assets being located on the left side of the chart in segments I and III. For example, a very large company with significant scale but no organic growth and a quite small company with high organic growth but little scale will both be on the left side of the chart.

The y-axis measures the percentage of the output which is in fact impactful.

For environmental impact this is a single measure of the extent to which the asset is focused on creating positive environmental outputs. The environment benefits us all, regardless of our level of social advantage or disadvantage.

For social impact it is a compound measure of (i) the extent to which the asset is focused on an impactful theme such as education or healthcare and (ii) the extent to which the beneficiaries (consumers or employees) are from a disadvantaged population.

This combined measure means that for assets with social impact to be located in the top of the chart in segments I and II, exposure to both an impactful theme and a disadvantaged population needs to be moderate to high.

Assets may be in the bottom half of the chart in segments III and IV for quite different reasons. Either exposure to both high impact themes and the disadvantaged is low, or the exposure to one may be high and the other very low. This results in activities with high exposure to impactful themes but very low benefit to the disadvantaged being located in the bottom half of Chart 6.

In Chart 6, assets with above-average impact characteristics are located above the dashed diagonal line. These are the assets for which an above average percentage of outputs are impactful for any given level of output.

The assets likely to create the greatest quantity of impactful outputs in Chart 6 are those located in Segment II. These assets combine the largest quantity of outputs with the largest percentage of outputs which are in fact impactful.

To operationalize the conceptual rating matrix illustrated in Chart 6 we need to create measures for the x-axis and y-axis.

To create a measure for the x-axis on Chart 6 we use the data in Table 4 and calculate the number of jobs created at each level of revenue as a percentage of the maximum number created. This gives us the scale in Table 5 which we use on the x-axis to indicate the Quantity of Output relative to the maximum.

Table 5 Rating Matrix x-Axis: Quantity of Output Relative to the Maximum

Revenue at Entry	Jobs Created as a % of Maximum
$500-1000m	100%
$250-500m	71%
$1000-2000m	63%
$100-250m	58%
$3000-4000m	58%
$2000-3000m	56%
$4,000	55%
$6,000	55%
$8,000	55%
$10,000	46%
$50-100m	40%
$16,000	31%
$30-50m	25%
$15-30m	16%
$20,000	16%
$26,000	9%
$5-15m	8%
< $5m	4%

The y-axis of Chart 6 is a compound measure of exposure to (i) high impact themes (HIT) such as the environment, health care and education and (ii) for social impacts (but not environmental impact), exposure to a disadvantaged population (DP).

To create a measure for the y-axis Table 6 creates a simple compound measure of "percentage impactful" by multiplying the two exposure percentages.

Table 6 Rating Matrix Y-Axis "Percentage Impactful": Compound Measure of Exposure to High Impact Themes and Disadvantaged Populations

Exposure to High Impact Theme	100%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	90%	0%	9%	18%	27%	36%	45%	54%	63%	72%	81%	90%
	80%	0%	8%	16%	24%	32%	40%	48%	56%	64%	72%	80%
	70%	0%	7%	14%	21%	28%	35%	42%	49%	56%	63%	70%
	60%	0%	6%	12%	18%	24%	30%	36%	42%	48%	54%	60%
	50%	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
	40%	0%	4%	8%	12%	16%	20%	24%	28%	32%	36%	40%
	30%	0%	3%	6%	9%	12%	15%	18%	21%	24%	27%	30%
	20%	0%	2%	4%	6%	8%	10%	12%	14%	16%	18%	20%
	10%	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
		Exposure to Disadvantaged Population										

To get from Table 6 to units we can use on the y-axis in Chart 6 we need to take each of the 121 "percentage impactful" measures in Table 6, label them with a descriptor and sequence them from largest to smallest.

The descriptor is simply a statement of the segments of the y- and x- axis in Table 6 to which the measure corresponds. For example "21% impactful" corresponds to both 70%HIT:30%DP and 30%HIT:70%DP.

We are now ready to create an operational version of Chart 6, which appears below as Table 7.

To create Table 7 we place the measure of "quantity of output" from Table 5 on the x-axis and the measure of "percentage impactful" from Table 6, sequenced low-to-high, on the y-axis.

Table 7 Operational Matrix for Rating the Quantity of Impactful Outputs

% Impactful	New Build Green Buildings and Conversion of land to sustainable use		100% exposure to both HIT and DP	100%	3.9%	8.5%	9.0%	16.5%	16.5%	24.8%	31.2%	40.4%	46.4%	54.7%	54.8%	55.0%	55.7%	58.1%	58.4%	63.2%	70.9%	100.0%
			100% HIT 90% DP/ 90% HIT 100% DP	90.00%	3.5%	7.6%	8.1%	14.8%	14.8%	22.3%	28.1%	36.3%	41.8%	49.2%	49.3%	49.5%	50.2%	52.3%	52.6%	56.8%	63.8%	90.0%
			90% HIT 90% DP	81.00%	3.1%	6.9%	7.3%	13.3%	13.3%	20.1%	25.3%	32.7%	37.6%	44.3%	44.4%	44.6%	45.1%	47.0%	47.3%	51.2%	57.4%	81.0%
			100% HIT 80% DP / 80% HIT 100% DP	80.00%	3.1%	6.8%	7.2%	13.2%	13.2%	19.8%	25.0%	32.3%	37.1%	43.8%	43.8%	44.0%	44.6%	46.5%	46.7%	50.5%	56.7%	80.0%
			90% HIT 80% DP / 80% HIT 90% DP	72.00%	2.8%	6.1%	6.5%	11.9%	11.9%	17.8%	22.5%	29.1%	33.4%	39.4%	39.5%	39.6%	40.1%	41.8%	42.1%	45.5%	51.0%	72.0%
			100% HIT 70% DP / 70% HIT 100% DP	70.00%	2.7%	5.9%	6.3%	11.5%	11.5%	17.3%	21.9%	28.3%	32.5%	38.3%	38.4%	38.5%	39.0%	40.7%	40.9%	44.2%	49.6%	70.0%
			80% HIT 80% DP	64.00%	2.5%	5.4%	5.8%	10.5%	10.5%	15.9%	20.0%	25.8%	29.7%	35.0%	35.1%	35.2%	35.7%	37.2%	37.4%	40.4%	45.4%	64.0%
			90% HIT 70% DP / 70% HIT 90% DP	63.00%	2.4%	5.3%	5.7%	10.4%	10.4%	15.6%	19.7%	25.4%	29.2%	34.5%	34.5%	34.7%	35.1%	36.6%	36.8%	39.8%	44.7%	63.0%
			100% HIT 60% DP / 60% HIT 100% DP	60.00%	2.3%	5.1%	5.4%	9.9%	9.9%	14.9%	18.7%	24.2%	27.8%	32.8%	32.9%	33.0%	33.4%	34.8%	35.0%	37.9%	42.5%	60.0%
			80% HIT 70% DP / 70% HIT 80% DP	56.00%	2.2%	4.7%	5.1%	9.2%	9.2%	13.9%	17.5%	22.6%	26.0%	30.6%	30.7%	30.8%	31.2%	32.5%	32.7%	35.4%	39.7%	56.0%
			90% HIT 60% DP / 60% HIT 90% DP	54.00%	2.1%	4.6%	4.9%	8.9%	8.9%	13.4%	16.9%	21.8%	25.1%	29.5%	29.6%	29.7%	30.1%	31.4%	31.5%	34.1%	38.3%	54.0%
		100% DP	100% HIT 50% DP / 50% HIT 100% DP | 40% HIT 100% DP	50.00%	1.9%	4.2%	4.5%	8.2%	8.2%	12.4%	15.6%	20.2%	23.2%	27.3%	27.4%	27.5%	27.9%	29.0%	29.2%	31.6%	35.4%	50.0%
			70% HIT 70% DP	49.00%	1.9%	4.2%	4.4%	8.1%	8.1%	12.1%	15.3%	19.8%	22.7%	26.8%	26.9%	27.0%	27.3%	28.5%	28.6%	30.9%	34.7%	49.0%
			80% HIT 60% DP / 60% HIT 80% DP	48.00%	1.9%	4.1%	4.3%	7.9%	7.9%	11.9%	15.0%	19.4%	22.3%	26.3%	26.3%	26.4%	26.8%	27.9%	28.0%	30.3%	34.0%	48.0%
		90% DP	90% HIT 50% DP / 50% HIT 90% DP | 40% HIT 90% DP	45.00%	1.7%	3.8%	4.1%	7.4%	7.4%	11.2%	14.1%	18.2%	20.9%	24.6%	24.7%	24.8%	25.1%	26.1%	26.3%	28.4%	31.9%	45.0%
			70% HIT 60% DP / 60% HIT 70% DP	42.00%	1.6%	3.6%	3.8%	6.9%	6.9%	10.4%	13.1%	17.0%	19.5%	23.0%	23.0%	23.1%	23.4%	24.4%	24.5%	26.5%	29.8%	42.0%
		80% DP	100% HIT 40% DP | 80% HIT 50% DP / 50% HIT 80% DP | 40% HIT 80% DP	40.00%	1.5%	3.4%	3.6%	6.6%	6.6%	9.9%	12.5%	16.1%	18.6%	21.9%	21.9%	22.0%	22.3%	23.2%	23.4%	25.3%	28.4%	40.0%
			90% HIT 40% DP | 60% HIT 60% DP	36.00%	1.4%	3.1%	3.2%	5.9%	5.9%	8.9%	11.2%	14.5%	16.7%	19.7%	19.7%	19.8%	20.1%	20.9%	21.0%	22.7%	25.5%	36.0%
		70% DP	70% HIT 50% DP / 50% HIT 70% DP	35.00%	1.4%	3.0%	3.2%	5.8%	5.8%	8.7%	10.9%	14.1%	16.2%	19.1%	19.2%	19.3%	19.5%	20.3%	20.4%	22.1%	24.8%	35.0%
			80% HIT 40% DP	32.00%	1.2%	2.7%	2.9%	5.3%	5.3%	7.9%	10.0%	12.9%	14.8%	17.5%	17.5%	17.6%	17.8%	18.6%	18.7%	20.2%	22.7%	32.0%
		60% DP	100% HIT 30% DP | 60% HIT 50% DP / 50% HIT 60% DP	30.00%	1.2%	2.5%	2.7%	4.9%	4.9%	7.4%	9.4%	12.1%	13.9%	16.4%	16.4%	16.5%	16.7%	17.4%	17.5%	18.9%	21.3%	30.0%
			70% HIT 40% DP	28.00%	1.1%	2.4%	2.5%	4.6%	4.6%	6.9%	8.7%	11.3%	13.0%	15.3%	15.3%	15.4%	15.6%	16.3%	16.4%	17.7%	19.8%	28.0%
			90% HIT 30% DP	27.00%	1.0%	2.3%	2.4%	4.4%	4.4%	6.7%	8.4%	10.9%	12.5%	14.8%	14.8%	14.9%	15.0%	15.7%	15.8%	17.1%	19.1%	27.0%
	If HIT x DP is < 50% of DP, then rating = 50% of DP	50% DP	50% HIT 50% DP	25.00%	1.0%	2.1%	2.3%	4.1%	4.1%	6.2%	7.8%	10.1%	11.6%	13.7%	13.7%	13.8%	13.9%	14.5%	14.6%	15.8%	17.7%	25.0%
			80% HIT 30% DP | 60% HIT 40% DP	24.00%	0.9%	2.0%	2.2%	4.0%	4.0%	5.9%	7.5%	9.7%	11.1%	13.1%	13.2%	13.2%	13.4%	13.9%	14.0%	15.2%	17.0%	24.0%
			70% HIT 30% DP	21.00%	0.8%	1.8%	1.9%	3.5%	3.5%	5.2%	6.6%	8.5%	9.7%	11.5%	11.5%	11.6%	11.7%	12.2%	12.3%	13.3%	14.9%	21.0%
		40% DP	100% HIT 20% DP | 50% HIT 40% DP	20.00%	0.8%	1.7%	1.8%	3.3%	3.3%	5.0%	6.2%	8.1%	9.3%	10.9%	11.0%	11.0%	11.1%	11.6%	11.7%	12.6%	14.2%	20.0%
			90% HIT 20% DP | 60% HIT 30% DP	18.00%	0.7%	1.5%	1.6%	3.0%	3.0%	4.5%	5.6%	7.3%	8.4%	9.8%	9.9%	9.9%	10.0%	10.5%	10.5%	11.4%	12.8%	18.0%
			80% HIT 20% DP	16.00%	0.6%	1.4%	1.4%	2.6%	2.6%	4.0%	5.0%	6.5%	7.4%	8.8%	8.8%	8.8%	8.9%	9.3%	9.3%	10.1%	11.3%	16.0%
		30% DP	50% HIT 30% DP	15.00%	0.6%	1.3%	1.4%	2.5%	2.5%	3.7%	4.7%	6.1%	7.0%	8.2%	8.2%	8.3%	8.4%	8.7%	8.8%	9.5%	10.6%	15.0%
			70% HIT 20% DP	14.00%	0.5%	1.2%	1.3%	2.3%	2.3%	3.5%	4.4%	5.7%	6.5%	7.7%	7.7%	7.7%	7.8%	8.1%	8.2%	8.8%	9.9%	14.0%
			60% HIT 20% DP	12.00%	0.5%	1.0%	1.1%	2.0%	2.0%	3.0%	3.7%	4.8%	5.6%	6.6%	6.6%	6.6%	6.7%	7.0%	7.0%	7.6%	8.5%	12.0%
		20% DP	100% HIT 10% DP | 50% HIT 20% DP	10.00%	0.4%	0.8%	0.9%	1.6%	1.6%	2.5%	3.1%	4.0%	4.6%	5.5%	5.5%	5.5%	5.6%	5.8%	5.8%	6.3%	7.1%	10.0%
			90% HIT 10% DP	9.00%	0.3%	0.8%	0.8%	1.5%	1.5%	2.2%	2.8%	3.6%	4.2%	4.9%	4.9%	5.0%	5.0%	5.2%	5.3%	5.7%	6.4%	9.0%
			80% HIT 10% DP	8.00%	0.3%	0.7%	0.7%	1.3%	1.3%	2.0%	2.5%	3.2%	3.7%	4.4%	4.4%	4.4%	4.5%	4.6%	4.7%	5.1%	5.7%	8.0%
			70% HIT 10% DP	7.00%	0.3%	0.6%	0.6%	1.2%	1.2%	1.7%	2.2%	2.8%	3.2%	3.8%	3.8%	3.9%	3.9%	4.1%	4.1%	4.4%	5.0%	7.0%
			60% HIT 10% DP	6.00%	0.2%	0.5%	0.5%	1.0%	1.0%	1.5%	1.9%	2.4%	2.8%	3.3%	3.3%	3.3%	3.3%	3.5%	3.5%	3.8%	4.3%	6.0%
		10% DP	50% HIT 10% DP	5.00%	0.2%	0.4%	0.5%	0.8%	0.8%	1.2%	1.6%	2.0%	2.3%	2.7%	2.7%	2.8%	2.8%	2.9%	2.9%	3.2%	3.5%	5.0%
		0% DP	Zero Exposure to Environment or Disadvantaged Population	0.00%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
					4%	8%	9%	16%	16%	25%	31%	40%	46%	55%	55%	55%	56%	58%	58%	63%	71%	100%
					< $5m	$5-15m	$26,000	$20,000	$15-30m	$30-50m	$16,000	$50-100m	$10,000	$8,000	$6,000	$4,000	$2000-3000m	$3000-4000m	$100-250m	$1000m	$250-500m	$500-1000m
					Quantity of Output																	

HIT = exposure to High Impact Theme such as education, health care, climate
DP = exposure to Disadvantaged Population

Zone in which new green construction projects and conversions of assets to green or low-income use will be located

Zone in which portfolios of existing assets in high impact themes will be located

Indicates boundaries of four segments

Impact ratings are created by filling in the matrix with the multiples of the corresponding values on each axis.

The resulting ratings of the Quantity of Impactful Outputs which an asset is capable of producing provide a consistent ranking of the potential quantity of impactful outputs created by assets of all types, across multiple combinations of "quantity of output" and "percentage impactful".

The green area in Table 7 indicates the zone in which the percentage of outputs which are impactful is above the average for any given level of output.

There are three types of asset which require further work to fit into the ranking matrix:

- Projects focused on *new construction* (for example new green buildings) or *conversion* of existing assets to green or impactful use (for example conversion of land to sustainable use). The financial return on these types of activity does not come from revenue growth. Rather, the financial value created comes from the change in value of the asset upon completion or conversion. As these types of activity are concentrated in climate (green construction, conversion to green use) or a high impact social theme combined with a high exposure to a disadvantaged population (new build low income housing) they are likely to be located in the top part of the Table 7 matrix indicated by the red border. The quantity can possibly be measured by the value of the final asset, upon completion of construction or conversion. Work needs to be done in this area to calibrate this measure with the revenue-based measure used in the rest of the chart.

- Assets which *support an existing stock* of a high impact asset but which have little or no growth are *not adding* to the inventory of impactful assets required to meet the SDGs. None-the-less supporting these assets is worthwhile. As these assets have low-to-zero organic growth the methodology used here will give them a low-to-zero score. Work is needed to determine where in the rating matrix to place these stocks of existing-but-not-growing impactful assets. My initial thought is that they belong in the upper left of the matrix, where they will get an output score of no more than half that of a correspondingly scaled asset with growth, but will be given full recognition of their high exposure to High Impact Themes and Disadvantaged Populations. This area of the ranking matrix is indicated by the dashed orange border in Table 7.

- Assets which have a positive impact on a Disadvantaged Population (DP) without any exposure to High Impact Themes (HIT). These are the type of generalist growth assets which create jobs for lower income populations and so contribute to SDGs 1 (no Poverty), 8 (descent work and economic growth) and 10 (reduced inequalities), without the double-benefit of also bringing positive impacts such as improved education or healthcare. Work is needed to determine where to place these assets in the matrix. My initial thought is that the 'percentage impactful' rating of an asset (HIT x DP) should not be less than half its exposure to a Disadvantaged Population. So if (HIT x DP) > 50% of DP, the rating is (HIT x DP). If (HIT x DP) < 50% DP, the rating is 50% of DP. For social impact, the downside limit on weightings this creates gives greater weight to exposure to Disadvantaged Populations than to High Impact Themes.

Note that environmentally impactful assets do not require the double measure of (HIT x DP) and are rated in Table 7 on their exposure to HIT alone.

Now that we have created a matrix which rates the Quantity of Impactful Outputs, we can progress to completing the map of the Impact Opportunity Space that was begun with Chart 4. To do this is a simple matter of re-arranging the x- and y- axis of Table 7.

The first step in moving from the matrix rating the Quantity of Impactful Outputs in Table 7 to a mapping of the Impact Opportunity Space as per Chart 4 is to re-arrange the x-axis of Table 7.

The x-axis in Table 7 is based on a low-to-high ordering of the Quantity of Output scores.

To map the Impact Opportunity Space, the x-axis instead needs to be based on a low-to-high ordering of the levels of revenue that correspond to each Quantity of Output score.

This re-ordering of the x-axis is made in Table 8 below.

In Table 8 the green area of the matrix, in which the percentage of assets which are impactful is above the average for any given level of output, no longer forms a diagonal across the matrix. Suggestively, it now looks like an inverted version of the Impact Opportunity Space.

The second step in moving from the Matrix rating the Quantity of Impactful Outputs to a mapping of the Impact Opportunity Space is to replace the y-axis of Table 8 (the 'percentage impactful' scores) with a ranking of the Quantity of Impactful Outputs scores in the body of Table 8 ordered low-to-high, from 0% to 100%.

The effect of this is to apply a different scale factor to the y-axis so that the 702 data points in Table 8 'compress down' within the new grid framed by, on the x-axis, the Quantity of Output indicators ordered by revenue and on the y-axis, the Quantity of Impactful Outputs ordered from 0% to 100%.

Table 9 (page 20) shows the results of this re-positioning of the ratings of the Quantity of Impactful Outputs within the two axis of the Impact Opportunity Space.

Table 9 is a complete map of the Impact Opportunity Space showing the location of all possible assets as determined by (i) the quantity of outputs an asset has the potential to produce and (ii) the percentage of the outputs which are likely to be impactful.

As previously noted, the shape of the Impact Opportunity Space is determined by the relationship between scale and the contribution of organic growth to financial returns.

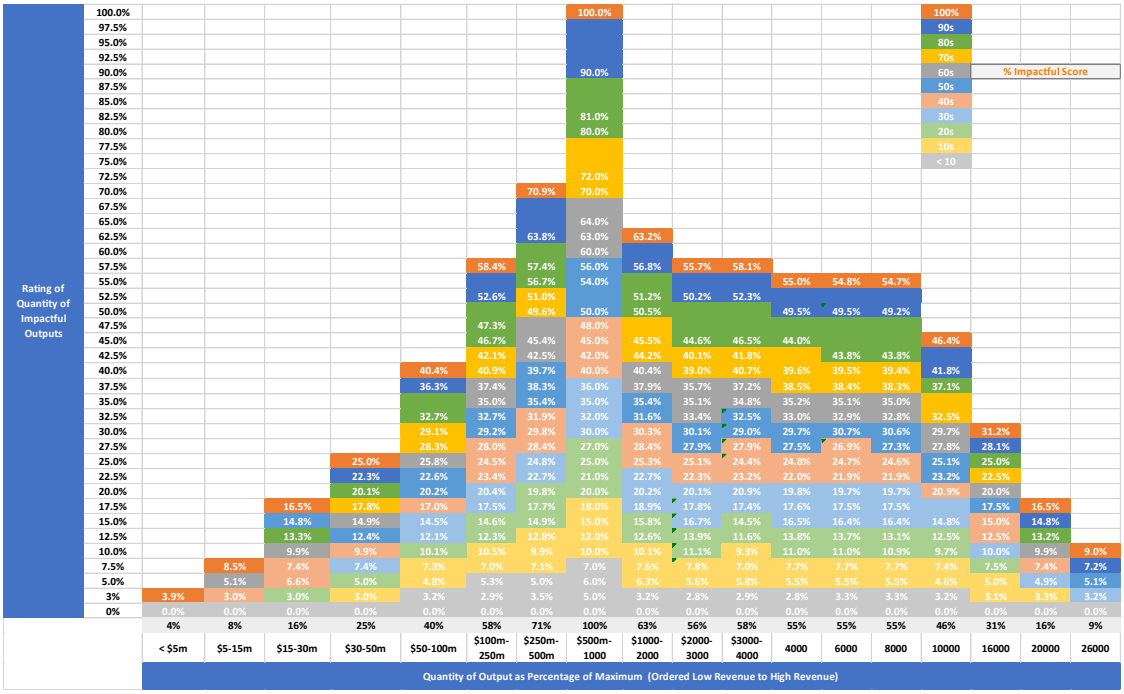
The area underneath the curve, within the Impact Opportunity Space, represents the totality of opportunities to create primary impact.

Table 8 Table 7 Rating of Quantity of Impactful Outputs, with x-Axis Re-Based as Revenue Low-to-High

% Impactful	New Build Green Buildings and Conversion of land to sustainable use		100% exposure to both HIT and DP	100%	3.9%	8.5%	16.5%	25.0%	40.4%	58.4%	70.9%	100.0%	63.2%	55.7%	58.1%	55.0%	54.8%	54.7%	46.4%	31.2%	16.5%	9.0%
			100% HIT 90% DP/ 90% HIT 100% DP	90%	3.5%	7.6%	14.8%	22.3%	36.3%	52.6%	63.8%	90.0%	56.8%	50.2%	52.3%	49.5%	49.3%	49.2%	41.8%	28.1%	14.8%	8.1%
			90% HIT 90% DP	81%	3.1%	6.9%	13.3%	20.1%	32.7%	47.3%	57.4%	81.0%	51.2%	45.1%	47.0%	44.6%	44.4%	44.3%	37.6%	25.3%	13.3%	7.3%
			100% HIT 80% DP / 80% HIT 100% DP	80%	3.1%	6.8%	13.2%	19.8%	32.3%	46.7%	56.7%	80.0%	50.5%	44.6%	46.5%	44.0%	43.8%	43.8%	37.1%	25.0%	13.2%	7.2%
			90% HIT 80% DP / 80% HIT 90% DP	72%	2.8%	6.1%	11.9%	17.8%	29.1%	42.1%	51.0%	72.0%	45.5%	40.1%	41.8%	39.6%	39.5%	39.4%	33.4%	22.5%	11.9%	6.5%
			100% HIT 70% DP / 70% HIT 100% DP	70%	2.7%	5.9%	11.5%	17.3%	28.3%	40.9%	49.6%	70.0%	44.2%	39.0%	40.7%	38.5%	38.4%	38.3%	32.5%	21.9%	11.5%	6.3%
			80% HIT 80% DP	64%	2.5%	5.4%	10.5%	15.9%	25.8%	37.4%	45.4%	64.0%	40.4%	35.7%	37.2%	35.2%	35.1%	35.0%	29.7%	20.0%	10.5%	5.8%
			90% HIT 70% DP / 70% HIT 90% DP	63%	2.4%	5.3%	10.4%	15.6%	25.4%	36.8%	44.7%	63.0%	39.8%	35.1%	36.6%	34.7%	34.5%	34.5%	29.2%	19.7%	10.4%	5.7%
			100% HIT 60% DP / 60% HIT 100% DP	60%	2.3%	5.1%	9.9%	14.9%	24.2%	35.0%	42.5%	60.0%	37.9%	33.4%	34.8%	33.0%	32.9%	32.8%	27.8%	18.7%	9.9%	5.4%
			80% HIT 70% DP / 70% HIT 80% DP	56%	2.2%	4.7%	9.2%	13.9%	22.6%	32.7%	39.7%	56.0%	35.4%	31.2%	32.5%	30.8%	30.7%	30.6%	26.0%	17.5%	9.2%	5.1%
			90% HIT 60% DP / 60% HIT 90% DP	54%	2.1%	4.6%	8.9%	13.4%	21.8%	31.5%	38.3%	54.0%	34.1%	30.1%	31.4%	29.7%	29.6%	29.5%	25.1%	16.9%	8.9%	4.9%
	If HIT x DP is < 50% of DP, then rating = 50% of DP	100% DP	100% HIT 50% DP / 50% HIT 100% DP | 40% HIT 100% DP	50%	1.9%	4.2%	8.2%	12.4%	20.2%	29.2%	35.4%	50.0%	31.6%	27.9%	29.0%	27.5%	27.4%	27.3%	23.2%	15.6%	8.2%	4.5%
			70% HIT 70% DP	49%	1.9%	4.2%	8.1%	12.1%	19.8%	28.6%	34.7%	49.0%	30.9%	27.3%	28.5%	27.0%	26.9%	26.8%	22.7%	15.3%	8.1%	4.4%
			80% HIT 60% DP / 60% HIT 80% DP	48%	1.9%	4.1%	7.9%	11.9%	19.4%	28.0%	34.0%	48.0%	30.3%	26.8%	27.9%	26.4%	26.3%	26.3%	22.3%	15.0%	7.9%	4.3%
		90% DP	90% HIT 50% DP / 50% HIT 90% DP | 40% HIT 90% DP	45%	1.7%	3.8%	7.4%	11.2%	18.2%	26.3%	31.9%	45.0%	28.4%	25.1%	26.1%	24.8%	24.7%	24.6%	20.9%	14.1%	7.4%	4.1%
			70% HIT 60% DP / 60% HIT 70% DP	42%	1.6%	3.6%	6.9%	10.4%	17.0%	24.5%	29.8%	42.0%	26.5%	23.4%	24.4%	23.1%	23.0%	23.0%	19.5%	13.1%	6.9%	3.8%
		80% DP	100% HIT 40% DP | 80% HIT 50% DP / 50% HIT 80% DP | 40% HIT 80% DP	40%	1.5%	3.4%	6.6%	9.9%	16.1%	23.4%	28.4%	40.0%	25.3%	22.3%	23.2%	22.0%	21.9%	21.9%	18.6%	12.5%	6.6%	3.6%
			90% HIT 40% DP | 60% HIT 60% DP	36%	1.4%	3.1%	5.9%	8.9%	14.5%	21.0%	25.5%	36.0%	22.7%	20.1%	20.9%	19.8%	19.7%	19.7%	16.7%	11.2%	5.9%	3.2%
		70% DP	70% HIT 50% DP / 50% HIT 70% DP	35%	1.4%	3.0%	5.8%	8.7%	14.1%	20.4%	24.8%	35.0%	22.1%	19.5%	20.3%	19.3%	19.2%	19.1%	16.2%	10.9%	5.8%	3.2%
			80% HIT 40% DP	32%	1.2%	2.7%	5.3%	7.9%	12.9%	18.7%	22.7%	32.0%	20.2%	17.8%	18.6%	17.6%	17.5%	17.5%	14.8%	10.0%	5.3%	2.9%
		60% DP	100% HIT 30% DP | 60% HIT 50% DP / 50% HIT 60% DP	30%	1.2%	2.5%	4.9%	7.4%	12.1%	17.5%	21.3%	30.0%	18.9%	16.7%	17.4%	16.5%	16.4%	16.4%	13.9%	9.4%	4.9%	2.7%
			70% HIT 40% DP	28%	1.1%	2.4%	4.6%	6.9%	11.3%	16.4%	19.8%	28.0%	17.7%	15.6%	16.3%	15.4%	15.3%	15.3%	13.0%	8.7%	4.6%	2.5%
			90% HIT 30% DP	27%	1.0%	2.3%	4.4%	6.7%	10.9%	15.8%	19.1%	27.0%	17.1%	15.0%	15.7%	14.9%	14.8%	14.8%	12.5%	8.4%	4.4%	2.4%
		50% DP	50% HIT 50% DP	25%	1.0%	2.1%	4.1%	6.2%	10.1%	14.6%	17.7%	25.0%	15.8%	13.9%	14.5%	13.8%	13.7%	13.7%	11.6%	7.8%	4.1%	2.3%
			80% HIT 30% DP | 60% HIT 40% DP	24%	0.9%	2.0%	4.0%	5.9%	9.7%	14.0%	17.0%	24.0%	15.2%	13.4%	13.9%	13.2%	13.2%	13.1%	11.1%	7.5%	4.0%	2.2%
			70% HIT 30% DP	21%	0.8%	1.8%	3.5%	5.2%	8.5%	12.3%	14.9%	21.0%	13.3%	11.7%	12.2%	11.6%	11.5%	11.5%	9.7%	6.6%	3.5%	1.9%
		40% DP	100% HIT 20% DP | 50% HIT 40% DP	20%	0.8%	1.7%	3.3%	5.0%	8.1%	11.7%	14.2%	20.0%	12.6%	11.1%	11.6%	11.0%	11.0%	10.9%	9.3%	6.2%	3.3%	1.8%
			90% HIT 20% DP | 60% HIT 30% DP	18%	0.7%	1.5%	3.0%	4.5%	7.3%	10.5%	12.8%	18.0%	11.4%	10.0%	10.5%	9.9%	9.9%	9.8%	8.4%	5.6%	3.0%	1.6%
			80% HIT 20% DP	16%	0.6%	1.4%	2.6%	4.0%	6.5%	9.3%	11.3%	16.0%	10.1%	8.9%	9.3%	8.8%	8.8%	8.8%	7.4%	5.0%	2.6%	1.4%
		30% DP	50% HIT 30% DP	15%	0.6%	1.3%	2.5%	3.7%	6.1%	8.8%	10.6%	15.0%	9.5%	8.4%	8.7%	8.3%	8.2%	8.2%	7.0%	4.7%	2.5%	1.4%
			70% HIT 20% DP	14%	0.5%	1.2%	2.3%	3.5%	5.7%	8.2%	9.9%	14.0%	8.8%	7.8%	8.1%	7.7%	7.7%	7.7%	6.5%	4.4%	2.3%	1.3%
			60% HIT 20% DP	12%	0.5%	1.0%	2.0%	3.0%	4.8%	7.0%	8.5%	12.0%	7.6%	6.7%	7.0%	6.6%	6.6%	6.6%	5.6%	3.7%	2.0%	1.1%
		20% DP	100% HIT 10% DP | 50% HIT 20% DP	10%	0.4%	0.8%	1.6%	2.5%	4.0%	5.8%	7.1%	10.0%	6.3%	5.6%	5.8%	5.5%	5.5%	5.5%	4.6%	3.1%	1.6%	0.9%
			90% HIT 10% DP	9%	0.3%	0.8%	1.5%	2.2%	3.6%	5.3%	6.4%	9.0%	5.7%	5.0%	5.2%	5.0%	4.9%	4.9%	4.2%	2.8%	1.5%	0.8%
			80% HIT 10% DP	8%	0.3%	0.7%	1.3%	2.0%	3.2%	4.7%	5.7%	8.0%	5.1%	4.5%	4.6%	4.4%	4.4%	4.4%	3.7%	2.5%	1.3%	0.7%
			70% HIT 10% DP	7%	0.3%	0.6%	1.2%	1.7%	2.8%	4.1%	5.0%	7.0%	4.4%	3.9%	4.1%	3.9%	3.8%	3.8%	3.2%	2.2%	1.2%	0.6%
			60% HIT 10% DP	6%	0.2%	0.5%	1.0%	1.5%	2.4%	3.5%	4.3%	6.0%	3.8%	3.3%	3.5%	3.3%	3.3%	3.3%	2.8%	1.9%	1.0%	0.5%
		10% DP	50% HIT 10% DP	5%	0.2%	0.4%	0.8%	1.2%	2.0%	2.9%	3.5%	5.0%	3.2%	2.8%	2.9%	2.8%	2.7%	2.7%	2.3%	1.6%	0.8%	0.5%
		0% DP	Zero Exposure to Environment or Disadvantaged Population	0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
					4%	8%	16%	25%	40%	58%	71%	100%	63%	56%	58%	55%	55%	55%	46%	31%	16%	9%
					< $5m	$5-15m	$15-30m	$30-50m	$50-100m	$100m-250m	$250m-500m	$500m-1000	$1000-2000	$2000-3000	$3000-4000	$4,000	$6,000	$8,000	$10,000	$16,000	$20,000	$26,000
					Quantity of Output (Ordered Low Revenue to High Revenue)																	

70.9%	Environmental growth equity, 100% HIT Rev $250-500m	58.4%	New build green buildings 100% HIT at moderate scale	51.0%	Debt of Growth Equity Company 90% HIT 80% DP Rev $250-500m
52.6%	Health Fund Growth Equity, 100% HIT 90% DP Rev $100-250m	31.2%	Existing Green Buildings at larger scale	35.0%	Sovereign Bond, 50% of budget spent on health, ed & other social, 70% popn DP
50.0%	Generalist Growth Equity 0% HIT 100% DP Rev $500-1000m	25.0%	Existing sustainable farmland smaller scale	6.0%	Sovereign Bond, 60% of budget spent on health, ed & other social, 10% popn DP
21.9%	Health Fund Larger Established Companies 100% HIT 40% DP Rev $8000m	3.9%	New build low income housing, 100% HIT, 100% DP small scale		
20.2%	Emerging Market Generalist Growth Equity, 0% HIT 100% DP Rev $50-100m				
8.5%	Growth Equity 100% HIT 100% DP, Rev $5-15m	40.0%	Mid Sized listed company, 100% HIT, 40% DP Rev $500-1000m		
7.1%	Growth Equity 100% HIT, 10% DP Rev $250-500m	4.9%	Large Established listed company, 100% HIT 30% DP Rev $20,000m		
1.0%	Growth Equity 50% HIT 50% DP, Rev <$5m	1.6%	Large Established listed company, 10% HIT 20% DP Rev $20,000m		
0.0%	LBO Fund, larger companies, 0% HIT 0% DP Rev $20,000m				

Table 9 Map of the Impact Opportunity Space



The position of an asset within the Impact Opportunity Space mapped by Table 9 is determined by:

(i) The revenue band in which the asset is located (x-axis), which speaks to the raw quantity of outputs the asset has the potential to create, and

(ii) The percentage of the output of the asset which is exposed to High Impact Themes and Disadvantaged Populations, indicated in Table 9 by the colored bands, which speaks to how much of the output is in fact impactful.

The colored bands running across the Impact Opportunity Space in Table 9 correspond to the "percentage impactful" scores on the y-axis in Tables 7 and 8. These bands can be thought of as indicating the extent to which an asset is taking advantage of the potential quantity of output offered by the revenue band in which it is located to create outputs which are impactful.

Following the path of the colored bands across the Impact Opportunity Space provides insight into the process creating the quantity of impact.

For example, the dark orange band at the top of each bar indicates the location of assets with 'percentage impactful' scores of 100%. These assets are either (i) focused 100% on both disadvantaged populations and high impact themes or (ii) focused 100% on the environment. The perfect assets, it would appear!

Actually no, as the quantity of output, driven by the organic growth and scale characteristics of the business, must also be taken into account.

At both ends of Table 9 there are assets 100% focused on both disadvantaged populations and high impact themes which create only a small quantity of impactful outputs because the business lacks either scale (left tail) or organic growth (right tail).

From the colored bands running across Table 9 we can draw inferences about the location of opportunities to create primary impact.

- The key determinant of the quantity of primary impact an asset is likely to create depends on both factors measured by the Impact Opportunity Space: the Quantity of Outputs and the Percentage of Outputs which are Impactful. Neither dimension, by itself, is an accurate guide.
- The opportunity to create the largest quantity of impactful outputs *per asset* appears to be centered in the vicinity of assets with revenue in the $500-1000m range[8].
- While the largest opportunity per asset appears to be centered in the vicinity of assets with revenue in the $500-1000m range, the location of assets capable of creating a meaningful quantity of primary impact is very widely disbursed across the revenue spectrum on the x-axis. No one part of the Impact Opportunity Space has a monopoly on generating primary impacts with which to achieve the SDGs.
- Maximizing the total primary impact created depends on capturing all the opportunities to create impact within the Impact Opportunity Space. Achieving the SDGs will benefit greatly from capturing opportunities to create impact across the entire spectrum.
- The significant influence of the potential Quantity of Outputs on the quantity of primary impact created means that it is a mistake to focus only on those assets with a high exposure to High Impact Themes. For example, assets with 'percentage impactful' scores in the 30s (light blue) in the $500-1000m range have higher Quantity of Impactful Output scores than assets with 'percentage impactful' scores in the 40s, 50s and even up to 100 in other revenue brackets.
- Impact is an attribute of multiple assets across all different classes of asset. There is no single, separate, class of impact assets.

The insights available from the full mapping of the Impact Opportunity Space, illustrated in Table 9, are the *sixth step* in solving the impact puzzle.

[8] A lot more data is required to create an accurate map of the Impact Opportunity Space.

Step 7 Interpreting the Impact Opportunity Space

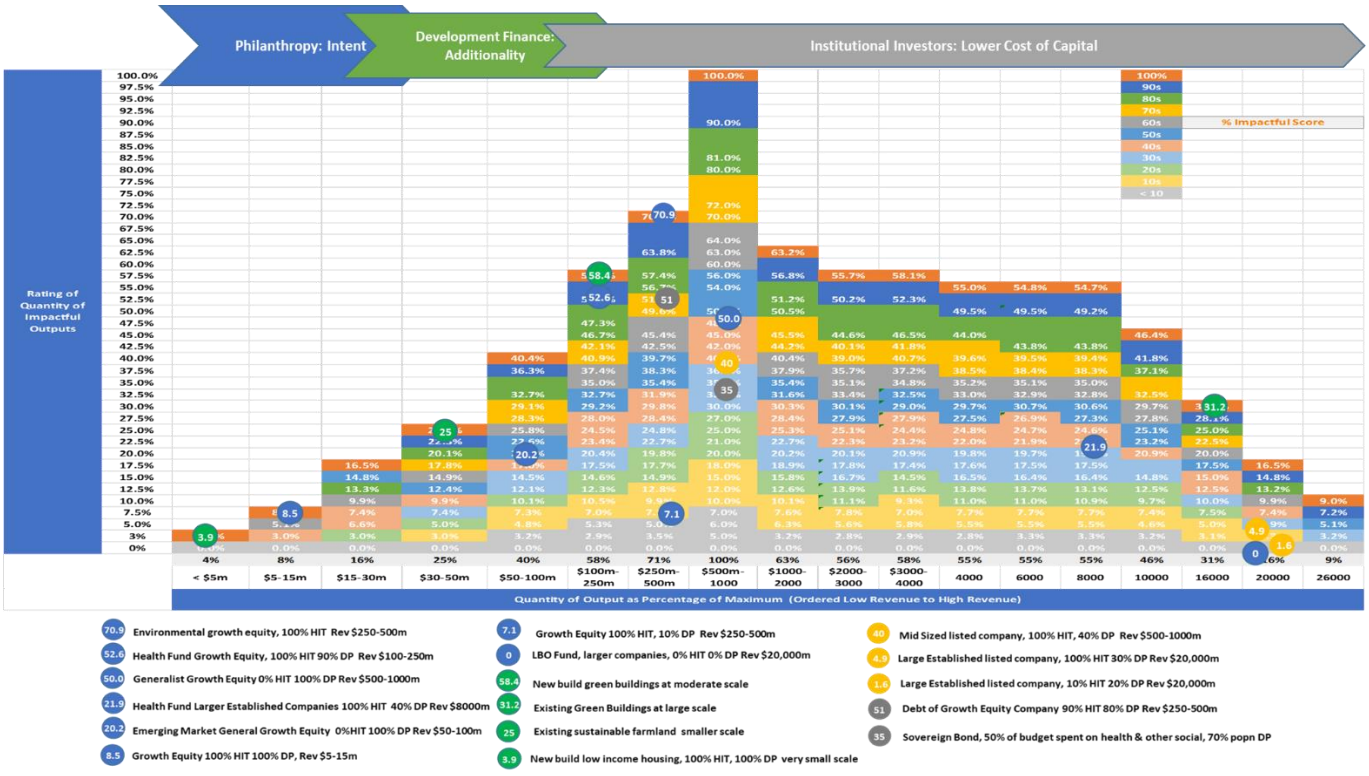
Our next step is to extend the interpretation of the Impact Opportunity Space by creating a logical and descriptive connection between the Impact Opportunity Space and (i) different types of asset and (ii) the mandates of different types of investor.

In Chart 7 the impact quantity ratings of a variety of asset sub-types are overlaid onto the Impact Opportunity Space from Table 9 and headings related to the mandates of different types of investor are also added.

The positioning of the blue dots representing types of private equity assets, the yellow dots representing types of public equity and the grey dot '51' representing the debt of a type of growth equity company are all located consistently in relation to each other and consistent with the logic of the Impact Opportunity Space. This consistency reflects the fact that the way in which these assets create a quantity of primary outputs is consistent with the logic of the x-axis – the combination of organic growth and scale.

The positioning of (i) the green dots representing different types of new construction, conversion of assets to impactful use and stocks of impactful assets which create no additional impact and (ii) the grey dot '35' representing a sovereign bond, is less intuitive. The weaker intuitive logic to their location in Chart 7 reflects the fact that the way in which these assets create a quantity of primary outputs is not fully aligned with the logic of the x-axis (as noted above) and more work is needed to calibrate them with the Impact Opportunity Space framework.

Chart 7 Map of the Impact Opportunity Space with the Addition of Descriptors



The descriptive headings are indicative of three interpretive points which are not directly discernable from the information in Chart 7.

In addition to the two structural factors of (i) scale increasing from left-to-right and (ii) the contribution of organic growth declining from left-to-right, there are reasonable grounds for thinking that, in a less precise way, (iii) exposure to High Impact Themes and Disadvantaged Populations declines from left-to-right, (iv) financial risk declines from left-to-right over the initial few columns of the Impact Opportunity Space before normalizing over the remainder of the Space and (v) financial return increases from left-to-right over the initial few columns of the Impact Opportunity Space before normalizing over the remainder of the Space.

Confirming points (iii), (iv) and (v) will require empirical work to map large numbers of assets into the Impact Opportunity Space to identify patterns. However, experience leads me to believe that all three are likely to be true in a general sense.

Generally, it is easier to concentrate exposure to a single factor in a smaller asset than it is in a larger asset. Achieving larger and larger scale eventually necessitates diffusion of focus, especially in terms of exposure to Disadvantaged Populations.

Generally, smaller assets are the location of first time funds, start-up businesses, new ideas and innovative business models. As assets gain in size, they are generally moving from concepts to working models; from working models to proof of concept; from proof of concept to scalability; and from scalability to established corporatized businesses with both scale and full C-Suite functionality. As an asset moves through this progression, risk declines.

Generally, quite small activities with limited scalability have sub-commercial returns. Potential return increases with scalability. Smaller activities with the potential to scale but lacking proof of concept have the potential to generate commercial returns, but also carry higher risk, so risk-adjusted the expected return may not be commercially attractive. Once activities have grown to the stage where there is proof of concept, returns begin to normalize around commercial levels.

The Impact Opportunity Space mapped in Chart 7 does not reflect the availability of investable opportunities.

Of the five transitions that occur as we move left-to-right across the Impact Opportunity Space, transition (iii), the concentration in High Impact Themes and the Disadvantaged, has the most potential to cause the investable Impact Opportunity Space to deviate from the conceptual Impact Opportunity Space illustrated in Chart 7.

Given the expected decline in the concentration of focus on High Impact Themes and Disadvantaged Populations as one moves to the right in Chart 7 it may be the case that, for example, investable opportunities in the light orange through dark orange bands representing “percentage impactful” scores of 40%-100% are quite scarce in larger revenue brackets, causing the investable Impact Opportunity Space and the ability to create meaningful quantities of primary impact to be more limited than Chart 7 suggests.

An empirical exercise to overlay the Impact Opportunity Space with a map of the dollar value of investable opportunities in each segment of the Space would be a very valuable exercise.

Moving left-to-right across Chart 7 the five transitions, of scale, contribution of organic growth, focus on high impact themes and the disadvantaged, financial risk and financial return, lead to segmentation of the Impact Opportunity Space into zones of preferred activity, which correspond to the mandates of different types of investors.

Philanthropic and mission-driven investors will have a preference for assets which require intent at the asset level. Such assets are in a high impact location and are important for the welfare of the affected community or the environment in a locality, but suffer from lack of commercial scalability, leading to a sub-commercial return and risk profile. There is a concentration of assets with this profile in the initial, small-scale low-revenue, segments of the Impact Opportunity Space.

Development Finance organizations (DFIs) have a preference for assets which currently have a sub-commercial risk/return profile but which benefit the environment or the disadvantaged and which have the potential to achieve both scale and a commercial risk and return profile, in order to attract commercial funding for further scaling. By taking the additional risk, DFIs can met their requirement for additionality. There is a concentration of assets with this profile in the segments in which the Impact Opportunity Space has a steep growth curve, between about $30-$500m revenue.

Institutional investors have no constraints of intent or additionality and simply seek to maximize impact within the constraints of risk and return targets. Conceptually, this enables them to invest anywhere across the Impact Opportunity Space as long as the asset combines with the portfolio in a way that is consistent with risk and return targets. In practice, institutional investors will find it difficult to invest in many assets in the preferred activity zones of philanthropies and DFIs for reasons of both risk, return and scale.

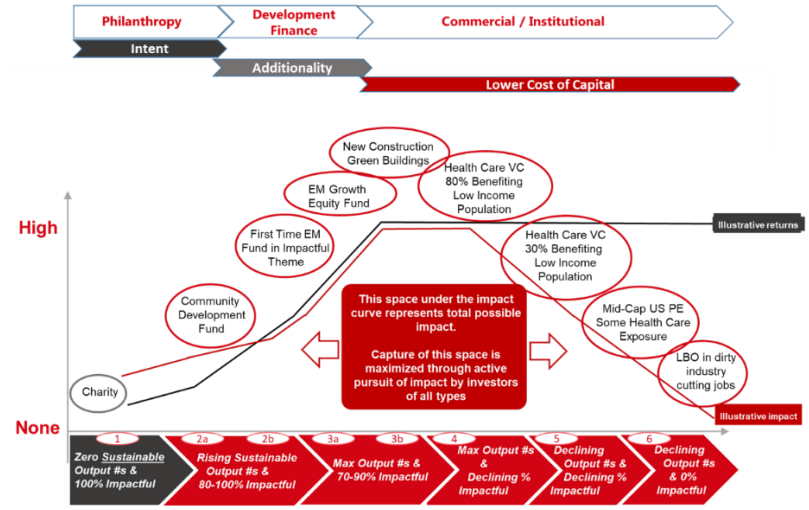
The three arrows at the top of Chart 7 give a rough indication of where the zones of preferred activity might lie for philanthropies, DFIs and institutional investors.

Each of these types of investor makes a different contribution to developing the Impact Opportunity Space.

Without philanthropies' requirement for intent, less commercially scalable assets in the far left of the Impact Opportunity Space would receive much less support. Without DFIs' requirement for additionality, assets with the potential to scale commercially but with less proof of concept or a generally higher risk profile would receive much less support. Without the large volume of capital institutional investors bring to bear, creating meaningful differentiation in the cost of capital between more impactful assets and less impactful assets will not occur.

Chart 8 is a stylized version of Chart 7, including an indication of both the impact and return profiles of assets.

Chart 8 Stylized Interpretation of the Impact Opportunity Space



The insights provided by exploring the five transitions occurring across the Impact Opportunity Space (scale, contribution of organic growth, focus on high impact themes and the disadvantaged, financial risk and financial return) and linking these transitions to the behavior of different types of investor is the *seventh step* in solving the impact puzzle.

At this, the seventh step, we have:

- A framework with which to think about the relative ability of assets to create a quantity of impactful primary outputs.
- A methodology with which to score the ability of assets to create a quantity of impactful primary outputs.
- A map of the Impact Opportunity Space which we can use to (i) direct our search for the assets which create the greatest quantity of impactful primary outputs and (ii) think strategically about how to create the maxim total quantity of impactful primary outputs.
- An understanding of how the mandates of different types of investors cause them to (i) be active in different parts of the Impact Opportunity Space and (ii) contribute differently to creating a dynamic Impact Eco-System.

Knowing all the above you might think that, aside from getting enough data to make the shift from conceptual to operational (no small task), there are no barriers to investors incorporating impact into the management of their portfolios.

Unfortunately, this conclusion is incorrect.

Step 8 Unbundling to Align the Implementation of Impact and Portfolio Management

In the process of developing the Integro Impact fund for Morgan Stanley I met with many institutional investors across the globe. These meetings had two common threads. The first was that the clients of these institutional investors were interested in having impact, in some form, incorporated into the management of their portfolios. Enough clients that the institutions were actively seeking ways to respond. The second thread was that, despite actively seeking ideas, they were having difficulty implementing an impact strategy.

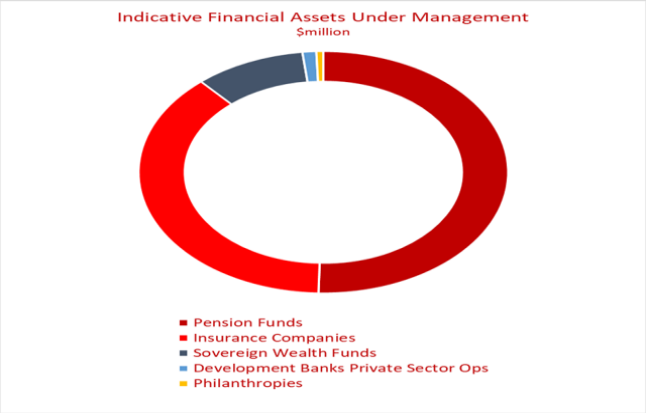
The difficulty institutional investors are experiencing in following through on client interest in impact is a significant problem.

Charts 7 and 8 above indicate that the contribution of institutional investors to developing the Impact Opportunity Space is to provide a sufficient volume of capital to ensure that impact is priced.

As Chart 9 makes clear, only institutional investors have enough capital under management to alter the pricing of assets in a meaningful way. Achieving the pricing of impact across all capital markets is not something that philanthropies or DFIs can achieve.

If institutional investors face barriers to following through on client demand to incorporate impact into portfolio management, it is important that these barriers be removed so that impact can be priced.

Chart 9 Indicative Financial Assets Under Management



My interactions with institutional investors lead me to believe that these investors face two barriers to integrating impact into the management of their portfolios. Both barriers are of a technical, operational, nature and arise from the current design of impact.

These barriers are that, as currently articulated, impact investment:

(i) Addresses only the impact profile of individual assets. Current approaches to impact cannot be used to assess the impact profile of classes of assets.

(ii) Fails to separate analysis focused on predicting the characteristics of an asset (risk, return, quantity of impact created) from mandate-based screening used by investor's to select those assets most likely to help them achieve their objectives (level of risk tolerance, return target, type of impact targeted). Current approaches to impact bundle these two quite different analytical steps into a single step with a

single measure. The result of this is that the single bundled measure is not aligned with the needs of all investors, particularly institutional investors.

These two structural problems with current approaches to impact investing arise from the incubation of impact investing amongst philanthropies and NGOs. The resulting design meets the needs of these types of entity, but not the needs of all types of investor.

Different mandates result in different objectives and different approaches to portfolio management. Due to mandate differences, philanthropies, NGOs and DFIs manage their portfolios in a different way to institutional investors.

To gain traction with institutional investors impact investing needs to be reconfigured in a way that is compatible with the mandates and portfolio management practices of investors of all types.

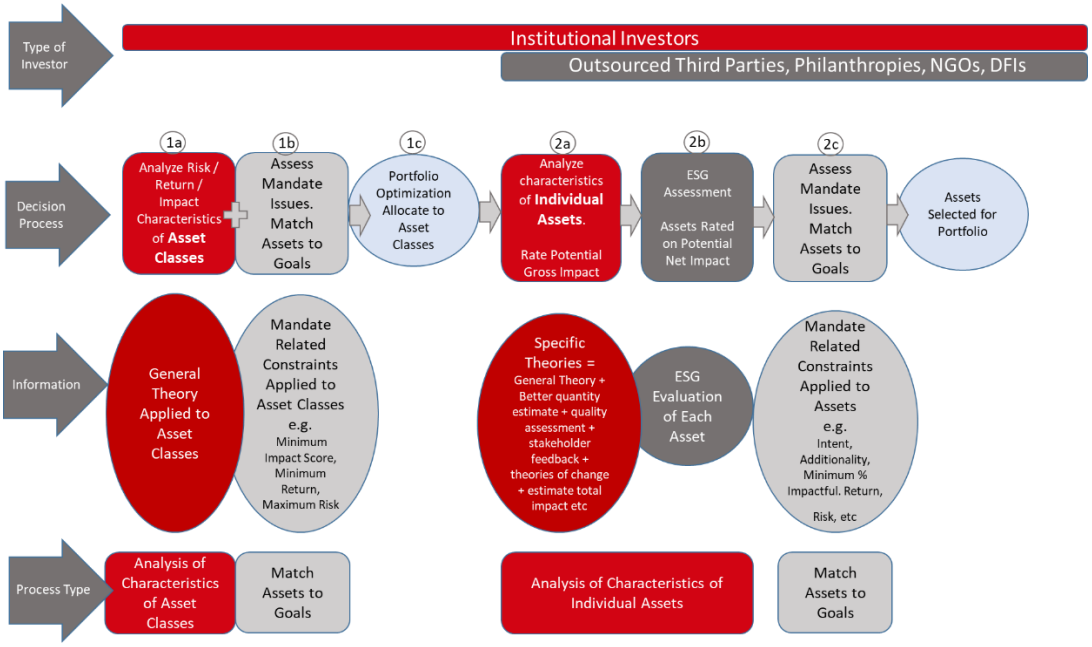
Philanthropies and DFIs manage their mission-driven portfolios one-asset-at-a-time, focusing on the acquisition of new assets.

Institutional investors optimize across the entire portfolio, actively managing both existing and new assets and, due to the size of their portfolios and the complexity of this exercise, focus on asset classes as the decision point for the initial allocation capital rather than on individual assets.

The mandates of Philanthropies and DFIs differ considerably from those of institutional investors. By combining the two distinct analytical steps of predictive analysis and mandate-based-screening into a single analysis and a single rating, some of the mandate considerations of philanthropies and DFIs have become blended with predictive factors in current approaches to impact. This effectively locks elements of the mandates of philanthropies and DFIs into the definition of impact, creating implementation problems for institutional investors with quite different mandates.

The decision making process for an institutional investor's portfolio is illustrated in Chart 10.

Chart 10 The Process of Portfolio Management



Two points to note are that:

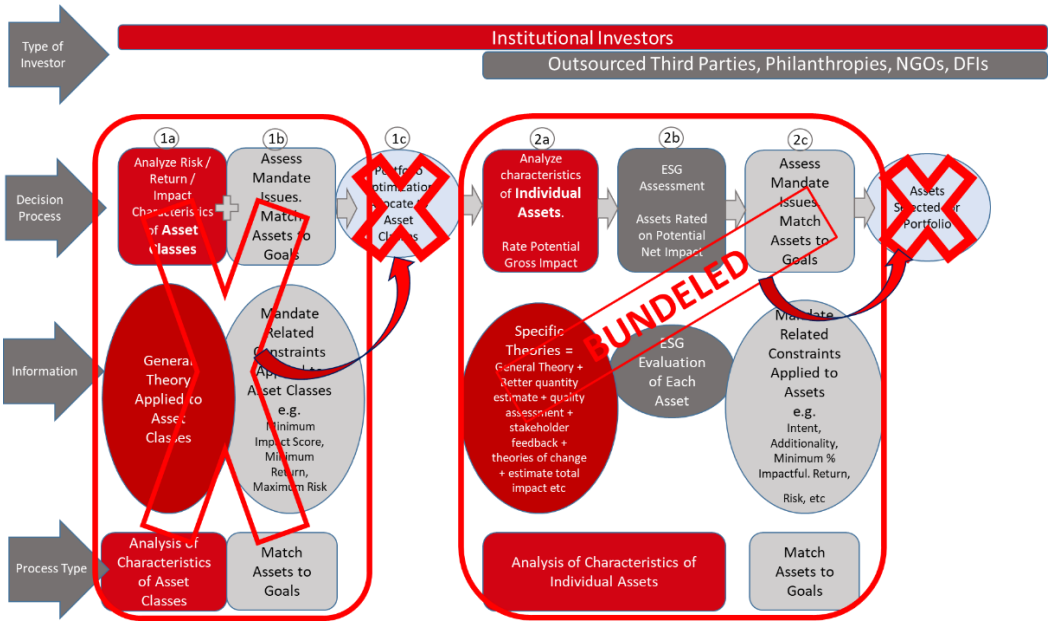
- Generally, the staff of institutional investors are occupied with analysis at the portfolio and asset class level. The selection of individual assets is outsourced to third party managers. This makes an investment approach focused solely on individual assets very difficult to integrate into institutional decision making as the steps of the investment process on which the staff of institutional investors are focused, steps 1a, 1b and 1c, deal with asset classes not individual assets.
  To remove this first barrier hindering the integration of impact into institutional portfolio management, we need to find an impact methodology which can describe the impact characteristics of both individual assets and classes of assets.
- Analyzing assets to predict their characteristics in terms of expected return, risk and quantity of impactful outputs (steps 1a, 2a and 2b) is a quite separate exercise from the design of screens such as targets, exclusions and exposure limits used to ensure that the assets selected for the portfolio are those which will help the investor to meet its goals (steps 1b and 2c).

To align and integrate with portfolio management, impact needs to be designed in a way which is consistent with the investment process described in Chart 10.

Unfortunately, the inability to describe the impact of asset classes and the bundling of predictive analysis with mandate-based-screening which characterizes the current design of impact investing results in the situation illustrated in Chart 11:

- Lack of ability to describe the impact of asset classes places the entire initial process of capital allocation, steps 1a through 1c, beyond the influence of impact investing.
- The bundling of predictive analysis and mandate-based-screening makes it impossible for many investors, particularly institutional investors, to both include impact in their decision making and create optimal portfolios which enable them to meet all their goals.

Chart 11 Misalignment of the Current Design of Impact with Portfolio Management



The recognition that, to unlock institutional capital and achieve the pricing of impact, we need to unbundle and reconfigure impact in a way that fully aligns impact investing with portfolio management is the *eighth step* in solving the impact puzzle.

Step 9 Describing the Impact of Both Individual Assets and Classes of Assets: Developing a General Theory

By both design and good fortune the approach to describing impact developed in Sections 2 through 7 and outlined in Chart 5 can be applied to both classes of assets and individual assets.

As the original motivation underlying the approach to impact described in this note was to identify the *types* of investment most likely to create the largest additional numbers of primary outputs such as jobs, the resulting approach to impact is a generalist and top-down one.

While the approach to impact described in Chart 5 can be applied to both classes of assets and individual assets, it is in fact stronger when dealing with asset classes.

To see why this is requires a discussion of the difference between specific theories and a general theory.

Specific theories describe the behavior of single variables. A general theory is developed from specific theories to explain in a more generalized way the behavior of all variables in a group.

To create a general theory from specific theories, the following conditions need to be met:

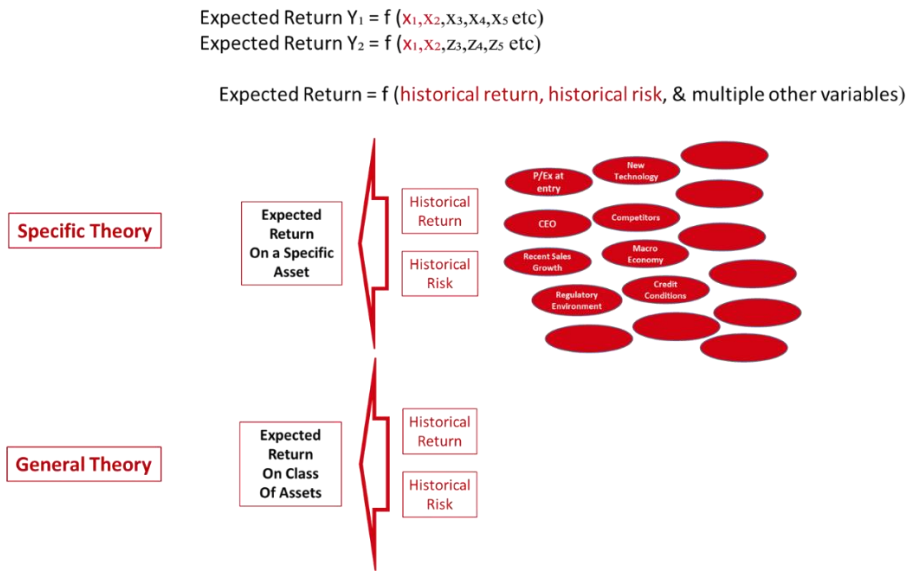
- There needs to be a sub-set of factors which are relevant to the behavior of all variables whose behavior the general theory seeks to explain.
- The information content of this sub-set of factors needs to be high enough that it can explain the behavior of all variables to a useful extent.

Chart 12 illustrates the development of a general theory from specific theories in the case of risk and return. The specific theories are rich in data explaining the behavior of each particular asset. While the behavior of each asset (Y_1, Y_2) is explained by a different specific theory, two factors are consistently relevant to the behavior of each asset, appear in the specific theory of each asset and between them have enough information content to be useful to describe the general behavior of both assets.

As an example from my own experience of the difference between using a general theory and specific theories, in the 1980s I held the position of Manager, Risk Management and Process Discipline at the Colonial Group in New Zealand. New Zealand had just deregulated its financial markets and we were introducing new products and services. We acquired a portfolio modeling tool from William F. Sharpe Associates to which we were able to add New Zealand data.

We used this tool to design portfolios of different risk and return profiles and, by inserting future expectations, reallocate capital between asset classes in existing portfolios. The data used by the portfolio modeling tool was historical (or expected) return, volatility, distribution, correlation, liquidity and transaction costs of each asset class.

Chart 12 Developing a General Theory from Specific Theories in the Case of Risk and Return



This was the data which drove the major reallocations of capital.

Compared to the data used to select individual assets it is a highly simplified data set.

For example, the real estate team had files of data on building permits, expected construction completion dates, occupancy rates, expected demand from different sectors and trends in required features and floorplans that were used to make acquisition, sale and refurbishment decisions. In short, a large amount of highly granular, asset-specific information.

The real estate team's data files on individual assets are the financial investment analog of most current approaches to impact. Detailed, granular, asset specific.

If you had taken that granular, asset-specific data to the portfolio asset allocation team and said, "model this", the response would have been a blank stare. The detail is too overwhelming to model.

Similarly, if the asset allocation team had taken their simplified tool kit of expected return, volatility and correlation to the real estate team and said "based on this data, we think you should buy x building" the response would have been "that's far too simplistic".

The decision-making processes for investing in an individual asset and for allocating capital between different asset classes are very different.

The general theory of impact described by Chart 5 includes only four variables and, in particular, it excludes a number of variables which are regarded as important by many current approaches to impact.

Why are variables which are commonly regarded as important to describing the impact characteristics of an asset excluded from the general theory?

In answering this question, it is key to keep in mind the difference between using specific theories to describe individual assets and a general theory to describe all assets in a class.

Many factors are relevant to the assessment of an individual asset. However, only those that are both common to all assets and have sufficient explanatory power can be included in the general theory. The factors discussed in the bullet points below are relevant to describing the impact characteristics of individual assets and, for this reason, are included in many approaches to impact. However, as they do not generalize to all assets in a particular class of asset, they must be excluded from the general theory used to describe the impact characteristics of classes of assets.

- Asset-level commercial indicators. Factors such as the quality of a company's management and quality of project execution are specific to individual assets and so need to be excluded from the general theory.
- ESG. While ESG is relevant to net impact, ESG characteristics are specific to individual assets, not asset classes, and so ESG needs to be excluded from the general theory.
- Quality of impact outputs. The quality of impact outcomes is as important as the quantity. For example, if one hundred children acquire access to education, but this education is poor quality, little impact has been achieved. However, like ESG the quality of outcomes are specific to individual assets, not to asset classes. For example, within education there will be both excellent schools and weak schools and so the quality of impact needs to be excluded from the general theory.
- Mandate specific constraints. While factors such as intent, additionality and the percentage of outputs which are impactful are relevant to selecting assets which meet the mandate requirements of individual investors, these factors are not universally relevant to, or a part of, the mandates of all investors and so are excluded from the general theory. Mandate factors are discussed further in Step 10 below.

To gain insight into the practical importance of having a general theory of impact which enables impact to be integrated into steps 1a, 1b and 1c of Chart 10, we can look at a couple of simplified examples of portfolio modeling.

To illustrate how the use of an impact quantity rating matrix such as Table 7 might affect the portfolio asset allocation of investors, Tables 10 and 11 illustrate what the process might look like in the case of, respectively, a large institutional investor and a high net worth Family Office.

This exercise abstracts from risk and return and simply focuses on maximizing the impact quantity rating while staying within pre-set exposure limits.

In Tables 10 and 11 the asset class exposure ranges come from on-line information on the asset allocations of State Pension Funds and families. The major difference between the allocations is that State funds have more fixed income exposure and less exposure to illiquid alternatives. The caps on the exposure to asset sub-classes are my own invention and are intended to ensure diversification and, in the case of sub-asset classes with a smaller investable universe, avoid unrealistically large allocations that would be difficult to achieve.

Both portfolios begin with the objective of creating a portfolio which: stays within exposure limits, favors larger asset classes for reasons of liquidity and which takes no account of impact. Following this objective, the initial asset allocation (light blue header 'Current Weighting') is (i) within exposure limits (ii) favors larger sub-asset classes over smaller ones and (iii) is made without regard to impact.

Now impact is introduced into the decision-making process and the new objective is to maximize the impact quantity rating while staying within exposure limits.

With this new objective, both institutional investors and families mange to almost double the impact quantity rating of their portfolios.

To achieve this result institutions re-allocate 53% of their portfolio to higher-rated assets, of which 14% is to high impact quantity assets (rating > 20%). Families re-allocate 62% of their portfolios to higher-rated assets, of which 46% are high impact assets.

Table 10 Example of Portfolio Re-Allocation for an Institutional Investor

	Asset Classes	Range	Cap	Impact Rating	Sub-Asset Classes	Current Weighting	Check not Over-Weight	Portfolio Impact rating	Revised Weighting	Check not Over-Weight	Revised Portfolio Impact Rating	Re-allocation to a higher rated asset	Re-allocation to high impact assets
State Pension Fund Asset Allocation	Listed Equity	30-40%	32%	1.6%	Large Cap developed markets	27.0%		0.43%			0.0%	-27.0%	
			16%	9.0%	Mid Cap developed markets	9.50%		0.86%	16%		1.4%	6.5%	
			4%	9.0%	Small Cap developed markets	2.00%		0.18%	4%		0.4%	2.0%	
			4%	20.0%	Mid Cap Developed Markets High Impact Sectors	1.00%	39.5%	0.20%	4%	24.0%	0.8%	3.0%	3.00%
		10-20%	20%	14.5%	Emerging Markets, Generalist mid to large cap	10.00%	10.0%	1.45%	20%	20.0%	2.9%	10.0%	
	Debt	25-35%	28%	7.5%	Sovereign Developed Markets	6.00%		0.45%	8%		0.6%	2.0%	
			18%	1.6%	Large Cap developed markets	12.25%		0.20%			0.0%	-12.3%	
			18%	9.0%	Mid Cap Developed Markets	5.25%		0.47%	18%		1.6%	12.8%	
			7%	20.0%	Developed Market High Impact Sectors	10.00%	33.5%	2.00%	7%	33.0%	1.4%	-3.0%	-3.00%
		1-3%	3%	25.0%	Sovereign Emerging Markets	2.00%	2.0%	0.50%	3%	3.0%	0.8%	1.0%	1.00%
	Private Equity	3-10%	10%	0.0%	Developed Market LBO	3.00%		0.00%			0.0%	-3.0%	
			10%	7.0%	Developed Market Buyout	3.00%		0.21%			0.0%	-3.0%	
			5%	15.0%	Developed Market Growth	2.00%		0.30%	5%		0.8%	3.0%	
			3%	20.0%	Mid Market High Impact Sectors	1.00%	9.0%	0.20%	3%	8.0%	0.6%	2.0%	2.00%
		1-2%	2%	25.0%	Emerging Markets Generalist	1.00%	1.0%	0.25%	2%	2.0%	0.5%	1.0%	1.00%
	Real Assets	3-10%	10%	0.0%	Existing Developed Market Commercial RE, not Green	5.00%		0.00%			0.0%	-5.0%	
			10%	25.0%	Existing Developed Market Commercial RE, Green, mid scale			0.00%	3%		0.8%	3.0%	3.00%
			2%	31.2%	New Build Green, large scale			0.00%	2%		0.6%	2.0%	2.00%
			3%	25.0%	Existing Sustainable Farm Land, mid scale			0.00%	3%		0.8%	3.0%	3.00%
			2%	31.2%	Conversion of land to sustainable use, large scale		5.0%	0.00%	2%	10.0%	0.6%	2.0%	2.00%
					Total Portfolio 100%	100.00%	100.0%		100.00%	100%		0.0%	
					Portfolio Impact rating			7.70%			14.47%		
					Proportion of portfolio re-allocated to assets with a higher impact rating							53.3%	
					Increase in exposure to high impact assets (rating > 20%)								14%

Table 11 Example of Portfolio Re-Allocation for a Family Office

	Asset Classes	Range	Cap	Impact Rating	Sub-Asset Classes	Current Weighting	Check not Over-Weight	Portfolio Impact rating	Revised Weighting	Check not Over-Weight	Revised Portfolio Impact Rating	Re-allocation to a higher rated asset	Re-allocation to high impact assets
Family Office Asset Allocation	Listed Equity (50 cap)	30-50%	35%	1.6%	Large Cap developed markets	12.0%		0.19%			0.0%	-12.0%	
			20%	9.0%	Mid Cap developed markets	12.0%		1.08%	3%		0.2%	-9.5%	
			10%	9.0%	Small Cap developed markets	8.0%		0.72%	3%		0.2%	-5.5%	
			10%	20.0%	Mid Cap Developed Markets High Impact Sectors	3.0%	35.0%	0.60%	10%	15.0%	2.0%	7.0%	7.00%
		10-20%	20%	14.5%	Emerging Markets, Generalist mid to large cap	15.0%	15.0%	2.18%	20%	20.0%	2.9%	5.0%	
	Debt	10-20%	15%	7.5%	Sovereign Developed Markets	5.0%		0.38%			0.0%	-5.0%	
			15%	1.6%	Large Cap developed markets	5.0%		0.08%			0.0%	-5.0%	
			15%	9.0%	Mid Cap Developed Markets	5.0%		0.45%			0.0%	-5.0%	
			10%	20.0%	Developed Market High Impact Sectors	3.0%	18.0%	0.60%	10%	10.0%	2.0%	7.0%	7.00%
		1-5%	5%	25.0%	Sovereign Emerging Markets		0.00%	0.00%	5%	5.0%	1.3%	5.0%	5.00%
	Private Equity (20 cap)	10-20%	15%	0.0%	Developed Market LBO	6.0%		0.00%			0.0%	-6.0%	
			15%	7.0%	Developed Market Buyout	4.0%		0.28%			0.0%	-4.0%	
			15%	15.0%	Developed Market Growth	4.0%		0.60%	10%		1.5%	6.0%	
			10%	20.0%	Mid Market High Impact Sectors	2.0%	16.00%	0.40%	10%	20.0%	2.0%	8.0%	8.00%
		1-10%	10%	25.0%	Emerging Markets Generalist	4.0%	4.00%	1.00%	10%	10.0%	2.5%	6.0%	6.00%
	Real Assets	8-20%	15%	0.0%	Existing Developed Market Commercial RE, not Green	5.0%		0.00%			0.0%	-5.0%	
			15%	25.0%	Existing Developed Market Commercial RE, Green, mid scale	2.0%		0.50%	10%		2.5%	8.0%	8.00%
			5%	31.2%	New Build Green, large scale			0.00%	5%		1.6%	5.0%	5.00%
			5%	25.0%	Existing Sustainable Farm Land, mid scale	5.0%		1.25%			0.0%	-5.0%	-5.00%
			5%	31.2%	Conversion of land to sustainable use, large scale		12.00%	0.00%	5%	20.0%	1.6%	5.0%	5.00%
					Total Portfolio 100%	100.0%	100%		100.00%	100%		0.0%	
					Portfolio Impact rating			10.30%			20.22%		
					Proportion of portfolio re-allocated to assets with a higher impact rating							62.0%	
					Increase in exposure to high impact assets (rating > 20%)								46%

After re-allocation both groups have improved their portfolio's impact quantity ratings enough to be located in the higher-rated green shaded part of the rating matrix (refer Table 12).

Table 12 Re-positioning of Portfolios in the Rating Matrix After Including Impact in the Objectives

% Impactful																					
	New Build Green Buildings and Conversion of land to sustainable use		100% exposure to both HIT and DP	100%	3.9%	8.5%	9.0%	16.5%	16.5%	25.0%	31.2%	40.4%	46.4%	54.7%	54.8%	55.0%	55.7%	58.1%	58.4%	63.2%	70.9%	100.0%
			100% HIT 90% DP/ 90% HIT 100% DP	90%	3.5%	7.6%	8.1%	14.8%	14.8%	22.3%	28.1%	36.3%	41.8%	49.2%	49.3%	49.5%	50.2%	52.3%	52.6%	56.8%	63.8%	90.0%
			90% HIT 90% DP	81%	3.1%	6.9%	7.3%	13.3%	13.3%	20.1%	25.3%	32.7%	37.6%	44.3%	44.4%	44.6%	45.1%	47.0%	47.3%	51.2%	57.4%	81.0%
			100% HIT 80% DP / 80% HIT 100% DP	80%	3.1%	6.8%	7.2%	13.2%	13.2%	19.8%	25.0%	32.3%	37.1%	43.8%	43.8%	44.0%	44.6%	46.5%	46.7%	50.5%	56.7%	80.0%
			90% HIT 80% DP / 80% HIT 90% DP	72%	2.8%	6.1%	6.5%	11.9%	11.9%	17.8%	22.5%	29.1%	33.4%	39.4%	39.5%	39.6%	40.1%	41.8%	42.1%	45.5%	51.0%	72.0%
			100% HIT 70% DP / 70% HIT 100% DP	70%	2.7%	5.9%	6.3%	11.5%	11.5%	17.3%	21.9%	28.3%	32.5%	38.3%	38.4%	38.5%	39.0%	40.7%	40.9%	44.2%	49.6%	70.0%
			80% HIT 80% DP	64%	2.5%	5.4%	5.8%	10.5%	10.5%	15.9%	20.0%	25.8%	29.7%	35.0%	35.1%	35.2%	35.7%	37.2%	37.4%	40.4%	45.4%	64.0%
			90% HIT 70% DP / 70% HIT 90% DP	63%	2.4%	5.3%	5.7%	10.4%	10.4%	15.6%	19.7%	25.4%	29.2%	34.5%	34.5%	34.7%	35.1%	36.6%	36.8%	39.8%	44.7%	63.0%
			100% HIT 60% DP / 60% HIT 100% DP	60%	2.3%	5.1%	5.4%	9.9%	9.9%	14.9%	18.7%	24.2%	27.8%	32.8%	32.9%	33.0%	33.4%	34.8%	35.0%	37.9%	42.5%	60.0%
			80% HIT 70% DP / 70% HIT 80% DP	56%	2.2%	4.7%	5.1%	9.2%	9.2%	13.9%	17.5%	22.6%	26.0%	30.6%	30.7%	30.8%	31.2%	32.5%	32.7%	35.4%	39.7%	56.0%
			90% HIT 60% DP / 60% HIT 90% DP	54%	2.1%	4.6%	4.9%	8.9%	8.9%	13.4%	16.9%	21.8%	25.1%	29.5%	29.6%	29.7%	30.1%	31.4%	31.5%	34.1%	38.3%	54.0%
		100% DP	100% HIT 50% DP / 50% HIT 100% DP | 40% HIT 100% DP	50%	1.9%	4.2%	4.5%	8.2%	8.2%	12.4%	15.6%	20.2%	23.2%	27.3%	27.4%	27.5%	27.9%	29.0%	29.2%	31.6%	35.4%	50.0%
			70% HIT 70% DP	49%	1.9%	4.2%	4.4%	8.1%	8.1%	12.1%	15.3%	19.8%	22.7%	26.8%	26.9%	27.0%	27.3%	28.5%	28.6%	30.9%	34.7%	49.0%
			80% HIT 60% DP / 60% HIT 80% DP	48%	1.9%	4.1%	4.3%	7.9%	7.9%	11.9%	15.0%	19.4%	22.3%	26.3%	26.3%	26.4%	26.8%	27.9%	28.0%	30.3%	34.0%	48.0%
		90% DP	90% HIT 50% DP / 50% HIT 90% DP | 40% HIT 90% DP	45%	1.7%	3.8%	4.1%	7.4%	7.4%	11.2%	14.1%	18.2%	20.9%	24.6%	24.7%	24.8%	25.1%	26.1%	26.3%	28.4%	31.9%	45.0%
			70% HIT 60% DP / 60% HIT 70% DP	42%	1.6%	3.6%	3.8%	6.9%	6.9%	10.4%	13.1%	17.0%	19.5%	23.0%	23.0%	23.1%	23.4%	24.4%	24.5%	26.5%	29.8%	42.0%
		80% DP	100% HIT 40% DP | 80% HIT 50% DP / 50% HIT 80% DP | 40% HIT 80% DP	40%	1.5%	3.4%	3.6%	6.6%	6.6%	9.9%	12.5%	16.1%	18.6%	21.9%	21.9%	22.0%	22.3%	23.2%	23.4%	25.3%	28.4%	40.0%
			90% HIT 40% DP | 60% HIT 60% DP	36%	1.4%	3.1%	3.2%	5.9%	5.9%	8.9%	11.2%	14.5%	16.7%	19.7%	19.7%	19.8%	20.1%	20.9%	21.0%	22.7%	25.5%	36.0%
		70% DP	70% HIT 50% DP / 50% HIT 70% DP	35%	1.4%	3.0%	3.2%	5.8%	5.8%	8.7%	10.9%	14.1%	16.2%	19.1%	19.2%	19.3%	19.5%	20.3%	20.4%	22.1%	24.8%	35.0%
			80% HIT 40% DP	32%	1.2%	2.7%	2.9%	5.3%	5.3%	7.9%	10.0%	12.9%	14.8%	17.5%	17.5%	17.6%	17.8%	18.6%	18.7%	20.2%	22.7%	32.0%
		60% DP	100% HIT 30% DP | 60% HIT 50% DP / 50% HIT 60% DP	30%	1.2%	2.5%	2.7%	4.9%	4.9%	7.4%	9.4%	12.1%	13.9%	16.4%	16.4%	16.5%	16.7%	17.4%	17.5%	18.9%	21.3%	30.0%
			70% HIT 40% DP	28%	1.1%	2.4%	2.5%	4.6%	4.6%	6.9%	8.7%	11.3%	13.0%	15.3%	15.3%	15.4%	15.6%	16.3%	16.4%	17.7%	19.8%	28.0%
			90% HIT 30% DP	27%	1.0%	2.3%	2.4%	4.4%	4.4%	6.7%	8.4%	10.9%	12.5%	14.8%	14.8%	14.9%	15.0%	15.2%	15.8%	17.1%	19.1%	27.0%
	If HIT x DP is < 50% of DP, then rating = 50% of DP	50% DP	50% HIT 50% DP	25%	1.0%	2.1%	2.3%	4.1%	4.1%	6.2%	7.8%	10.1%	11.6%	13.7%	13.7%	13.8%	13.9%	14.5%	14.6%	15.8%	17.7%	25.0%
			80% HIT 30% DP | 60% HIT 40% DP	24%	0.9%	2.0%	2.2%	4.0%	4.0%	5.9%	7.5%	9.7%	11.1%	13.1%	13.2%	13.2%	13.4%	13.9%	14.0%	15.2%	17.0%	24.0%
			70% HIT 30% DP	21%	0.8%	1.8%	1.9%	3.5%	3.5%	5.2%	6.6%	8.5%	9.7%	11.5%	11.5%	11.6%	11.8%	12.2%	12.3%	13.3%	14.9%	21.0%
		40% DP	100% HIT 20% DP | 50% HIT 40% DP	20%	0.8%	1.7%	1.8%	3.3%	3.3%	5.0%	6.2%	8.1%	9.3%	10.9%	11.0%	11.1%	11.1%	11.6%	11.7%	12.6%	14.2%	20.0%
			90% HIT 20% DP | 60% HIT 30% DP	18%	0.7%	1.5%	1.6%	3.0%	3.0%	4.5%	5.6%	7.3%	8.4%	9.8%	9.9%	9.9%	10.0%	10.5%	10.5%	11.4%	12.8%	18.0%
			80% HIT 20% DP	16%	0.6%	1.4%	1.4%	2.6%	2.6%	4.0%	5.0%	6.5%	7.4%	8.8%	8.8%	8.8%	8.9%	9.3%	9.3%	10.1%	11.3%	16.0%
		30% DP	50% HIT 30% DP	15%	0.6%	1.3%	1.4%	2.5%	2.5%	3.7%	4.7%	6.1%	7.0%	8.2%	8.2%	8.3%	8.4%	8.7%	8.8%	9.5%	10.6%	15.0%
			70% HIT 20% DP	14%	0.5%	1.2%	1.3%	2.3%	2.3%	3.5%	4.4%	5.7%	6.5%	7.7%	7.7%	7.8%	7.8%	8.1%	8.2%	8.8%	9.9%	14.0%
			60% HIT 20% DP	12%	0.5%	1.0%	1.1%	2.0%	2.0%	3.0%	3.7%	4.8%	5.6%	6.6%	6.6%	6.6%	6.7%	7.0%	7.0%	7.6%	8.5%	12.0%
		20% DP	100% HIT 10% DP | 50% HIT 20% DP	10%	0.4%	0.8%	0.9%	1.6%	1.6%	2.5%	3.1%	4.0%	4.6%	5.5%	5.5%	5.5%	5.6%	5.8%	5.8%	6.3%	7.1%	10.0%
			90% HIT 10% DP	9%	0.3%	0.8%	0.8%	1.5%	1.5%	2.2%	2.8%	3.6%	4.2%	4.9%	4.9%	5.0%	5.0%	5.2%	5.3%	5.7%	6.4%	9.0%
			80% HIT 10% DP	8%	0.3%	0.7%	0.7%	1.3%	1.3%	2.0%	2.5%	3.2%	3.7%	4.4%	4.4%	4.4%	4.5%	4.6%	4.7%	5.1%	5.7%	8.0%
			70% HIT 10% DP	7%	0.3%	0.6%	0.6%	1.2%	1.2%	1.7%	2.2%	2.8%	3.2%	3.8%	3.8%	3.9%	3.9%	4.1%	4.1%	4.4%	5.0%	7.0%
			60% HIT 10% DP	6%	0.2%	0.5%	0.5%	1.0%	1.0%	1.5%	1.9%	2.4%	2.8%	3.3%	3.3%	3.3%	3.3%	3.5%	3.5%	3.8%	4.3%	6.0%
		10% DP	50% HIT 10% DP	5%	0.2%	0.4%	0.5%	0.8%	0.8%	1.2%	1.6%	2.0%	2.3%	2.7%	2.7%	2.8%	2.8%	2.9%	2.9%	3.2%	3.5%	5.0%
		0% DP	Zero Exposure to Environment or Disadvantaged Population	0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
					4%	8%	9%	16%	16%	25%	31%	40%	46%	55%	55%	55%	56%	58%	58%	63%	71%	100%
					< $5m	$5-15m	$26,000	$20,000	$15-30m	$30-50m	$16,000	$50-100m	$10,000	$8,000	$6,000	$4,000	$2000-3000	$3000-4000	$100m-250m	$1000-2000	$250m-500m	$500m-1000
					Quantity of Output																	

HIT = exposure to High Impact Themes such as climate, education, health care
DP = exposure to a Disadvantaged Population

70.9%	Environmental growth equity, 100% HIT Rev $250-500m	58.4%	New build green buildings at scale
52.6%	Health Fund Growth Equity, 100% HIT 90% DP Rev $100-250m	31.2%	Existing Green Buildings at scale
50.0%	Generalist Growth Equity 0% HIT 100% DP Rev > $500m	25.0%	Existing sustainable farmland moderate scale
21.9%	Health Fund Larger Established Companies 100% HIT 40% DP Rev $8000m	3.9%	New build low income housing, 100% HIT, 100% DP small scale
8.5%	Growth Equity 100% HIT 100% DP, Rev $5-15m		
7.1%	Growth Equity 100% HIT, 10% DP Rev $250-500m	40.0%	Mid Sized listed company, 100% HIT, 40% DP Rev $500-1000m
6.6%	VC 100% HIT 40% DP, Rev $15-30m	4.9%	Large Established listed company, 100% HIT 30% DP Rev $20,000m
1.0%	Growth Equity 50% HIT 50% DP, Rev <$5m	1.6%	Large Established listed company, 10% HIT 20% DP Rev $20,000m
0.0%	LBO Fund, larger companies, 0% HIT 0% DP Rev $20,000m		

51.0%	Debt of Growth Equity Company 90% HIT 80% DP Rev $250-500m
35.0%	Sovereign Bond, 50% of budget spent on health, ed & other social, 70% popn DP
6.0%	Sovereign Bond, 60% of budget spent on health, ed & other social, 10% popn DP

Families are able to achieve a higher portfolio impact quantity rating than institutions because of their greater risk tolerance (greater allocation to illiquid alternatives) and because their smaller portfolio size allows them flexibility to place a greater percentage of their portfolios into smaller-but-higher-impact asset classes.

Table 12 shows the movement of the two portfolios to higher positions within the impact quantity rating matrix.

While these examples illustrate the logic of the portfolio re-allocation process that follows upon the inclusion of impact as an objective in the asset allocation process (steps 1a, 1b and 1c of Chart 10), I believe the examples over-state what is likely to be achieved in practice as they are highly simplified and omit several important considerations.

- In a full portfolio optimization exercise there are further constraints in addition to exposure limits, such as expected return, expected volatility, correlation and illiquidity. These additional constraints will limit the extent to which investors can re-allocate their portfolios to achieve higher impact ratings.
- The size constraint of some of the smaller sub-asset classes may prove to be more limiting than suggested in these examples.
- Time will be needed to make re-allocations. Repositioning large portfolios to improve their impact quantity ratings will be a gradual process. It will take time to identify higher rated assets to bring into portfolios. Positions will need to be sold gradually so as to not disrupt markets.

Despite the various limitations on portfolio re-allocation, achieving the SDGs does not require re-allocations of the magnitude occurring in these examples. Institutional investors have around $81 trillion in assets and the SDGs are estimated to require $9.6 trillion of private capital to achieve.

An initial exercise which modeled the effect on portfolio allocation of including impact as a decision variable in an optimization framework also resulted in a significant increase in the allocation of capital to more impactful assets, while remaining within the constraints set by risk and return requirements.

Chart 13 shows the results of this initial experiment.

Initially, constraints were set to keep the results within the bounds of the typical asset class exposures of a US institution with over $1 billion in assets. The initial optimization only considered risk and return and excluded impact.

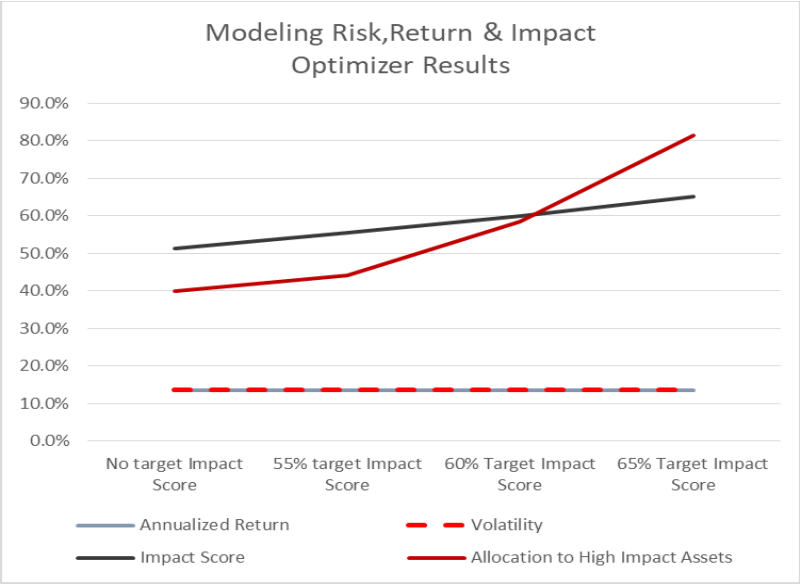
The risk and return profile selected in the initial optimization was then used as a constraint (risk could not be higher nor return lower) in future optimizations in which the model sought to achieve successively increased targets for the impact score. The consistent flat lines representing risk and return in Chart 13 indicate that these constraints were met.

At the point at which the model could identify no further opportunities to increase impact, the impact score had been increased by 27% and around 40% of the portfolio had been re-allocated to assets with higher impact scores than the original assets.

The lower percentage of assets re-allocated in the optimization exercise (Chart 13) compared to the simpler manual exercise (Tables 10 and 11) may reflect the effect of the additional constraints imposed by meeting return and risk targets.

While the 40% re-allocation is also likely to be more than can be achieved in practice due to issues of size, availability and liquidity, it is still well above the movement of capital required to meet the SDGs.

Chart 13 Increasing Portfolio Impact by Optimizing in Three Dimensions of Risk/Return/Impact



Without the ability to describe the impact characteristics of classes of assets, institutional investors will have difficulty thinking about impact in a way which aligns with the crucial initial steps in portfolio management.

If impact cannot be embedded in these initial steps, incorporating impact bottom-up individual-asset-by-individual-asset will be a very slow process. The practical outcome is likely to be that impact is considered only in a specific carve-out of the portfolio and fails to influence the management of total assets-under-management.

Recognizing that to fully mobilize institutional capital impact needs to be able to deal with asset classes and, that to do this we need a general theory of impact, is the *ninth step* in solving the impact puzzle.

Step 10 Basing the Definition of Impact on Predictive Analysis Only, and excluding Mandate-Based Screens from the Definition

To grow successfully beyond the philanthropic and DFI spaces, impact needs to be designed in a way that meets the needs of all investors.

A core element of institutional portfolio management is that the analysis of assets is conducted in two different ways for two different purposes:

- Investors need to know characteristics of assets such as risk, return, correlation, liquidity and quantity of impactful outputs. This analysis examines past experience under a range of different conditions and projects this past experience onto expected future conditions. The purpose of this analysis is to help investors to predict the future behavior of assets. The results of this predictive analysis are used by investors of all types, regardless of their mandates, as input to investment decision making.
- Investors need to identify which assets are most likely to help them achieve their objectives such as target return, maximum risk tolerance, target liquidity and particular type of impact desired. To do this, investors develop screens based upon the objectives set by their individual mandates. Investors apply these mandate-based screens to the characteristics of assets identified in the predictive analysis, to find those assets which are most likely to help them achieve their objectives.

While the predictive analysis of the characteristics of assets is common to all investors, the mandate-based screens are individual to each investor as each investor has a different mandate.

The two activities, establishing the characteristics of assets and selecting the combination of assets which are the best fit for the mandate, are kept quite separate.

The same analysis of the characteristics of assets is used by investors of all types, regardless of their mandates. It is free from any consideration of the particular needs and value judgements of individual investor mandates.

Referring to Chart 10 above:

- Steps 1a and 2a and 2b are the steps in which analysis is undertaken to establish the characteristics of assets. Step 1a establishes the characteristics of asset classes using the general theory and Steps 2a and 2b use specific theories to establish the characteristics of individual assets.
- Steps 1b and 2c are the mandate related steps. These steps are typically structured as filters or constraints on the portfolio formation process such as return targets, risk limits, exposure limits and requirements for certain types of impact. The information from steps 1a,2a and 2b is passed through these mandate-related screens to create a portfolio designed to meet the goals of the particular investor.

For ten factors used in investment decisions, Table 13 considers in which part of the decision process each factor belongs and addresses the following questions:

- Can a factor be used to predict the characteristics of an asset such as risk, return and quantity of primary impact created?
- Can a factor be part of the mandate screening process, used to identify assets which best enable an investor to meet its goals?
- If a factor is used to predict characteristics, can it be used to predict the characteristics of both asset classes and individual assets, or only the characteristics of individual assets?

Table 13 suggests that three factors commonly used in impact strategies cannot be used to predict the characteristics of assets and are purely mandate-related. That is, they help investors to select the assets best suited to their objectives and so are part of mandate-based screens, but play no role in generating predictions of the characteristics of an asset such as the quantity of primary impact an asset is likely to create. These three factors are intent, additionality and exclusions based on SRI considerations.

The other seven factors in Table 13 are relevant to creating predictions of the characteristics of assets such as return, risk and the quantity of primary impact created.

The other seven factors can also be used to create filters or screens which guide investors in achieving their mandates. However, when used in this way, the factor is not the output of analysis to establish the characteristics of an asset. Rather, it is being expressed as a constraint which must be met, such as a minimum return target or a requirement for a particular type of impact.

Table 13 Predictive Role versus Mandate-Screen Role of Various Factors

	Use to Predict Characteristics		Use in Mandate Screens
	Asset Classes	**Individual Assets**	
Intent	Generally no role in predicting the quantity of impactful outputs		Yes
Additionality	Generally no role in predicting the quantity of impactful outputs		Yes
SRI exclusions	Generally no role in predicting the quantity of impactful outputs		Yes
Percentage of Output Impactful	Yes, but *not* as a limitation	Yes, but *not* as a limitation	If expressed as a limitation
Exposure to Specific Themes	Yes, but *not* as a limitation	Yes, but *not* as a limitation	If expressed as a limitation
Scale	Yes, but *not* as a limitation	Yes, but *not* as a limitation	If expressed as a limitation
Risk	Yes, but *not* as a limitation	Yes, but *not* as a limitation	If expressed as a limitation
Return	Yes, but *not* as a limitation	Yes, but *not* as a limitation	If expressed as a limitation
ESG	No, ESG is specific to individual assets	Yes	If expressed as a limitation
Quality of Impact	No, Quality is specific to individual assets	Yes	If expressed as a limitation

Of the seven factors which can be used to predict the characteristics of assets two, ESG and the Quality of Impact, can be used to predict the characteristics of individual assets but not the characteristics of asset classes as ESG and quality are specific to individual assets as noted above.

Intent and additionality are currently embedded in most definitions of impact, so it is important to understand why Table 13 considers them to be relevant as mandate factors but not relevant as predictive factors.

Intent Intent is a very useful constraint on the activities of entities whose mandate requires them to only be involved in activities which have difficulty scaling commercially. For such mandates, the quantity of primary impact created is of less importance than that the impact be focused in these difficult situations. As it is easier to create a larger quantity of primary impact in a more easily scalable activity, if the constraint of intent was absent these entities would be tempted to operate in areas outside their mandates.

Philanthropic entities traditionally focus on activities which are difficult to scale on a commercial basis (hence the need for philanthropy) and, because of this difficulty in scaling, their activities will achieve numerically smaller impact outputs than scalable activities which can be entered into by DFIs and institutional investors.

Philanthropies, due to their mission-specific focus, cannot seek to simply maximize impact on a broad portfolio of assets without constraints as such an approach would lead them into areas outside their stated mission.

To anchor them in the difficult-to-commercially-scale space in which their mission is focused, philanthropic entities need a method by which mission-relevant impact outputs are given greater value than non-mission-relevant impact outputs.

At the extreme end of this ranking process, the idea that 'some impact is not impact' is quite reasonable for a mission-focused entity. For other types of entity, it is neither reasonable nor necessary.

To date, most of the thought in developing impact investing has come from the philanthropic end of the spectrum and the concept of 'intent' has been developed. To count as impact, outputs must be intentionally created, not simply a 'by-product' of an activity: 'There is no impact without intent'.

But is there really no impact without intent? How does intent drive the quantity of impactful outputs produced by an asset such as jobs, or the increase in pupils in education, or positive environmental outcomes?

Think of the quantity of impactful primary outputs produced by an asset as the dependent variable 'y' and express it as an equation, where the x's are the explanatory variables:

$$y = f(x_1, x_2, x_3, x_4, \text{etc.})$$

It is very difficult to imagine that, as a *general* rule, one of the most powerful explanatory variables for the quantity of impact created by an asset, for example jobs or additional access to education, will be intent.

My first job out of university was in the Economic Research Department of the Reserve Bank of New Zealand building macro econometric models. I did not see then – and do not expect to see – 'intent' as an explanatory variable in any modelling of the *general case* for job creation or access to social goods.

The *general* rule is more likely to be that the variables with the most explanatory power in determining the quantity of impactful outputs created by an asset are predictive factors such as: (i) the business model which shapes the potential of an activity to create outputs, (ii) the thematic/population location of an asset which determines the proportion of outputs which are addressing an underserved population or the environment and (iii) ESG compliance to limit negative outcomes.

In the majority of cases, the business model, the thematic/population location and ESG compliance can be assessed without reference to intent.

However, within the sub-set of activities which take place in difficult-to-commercially-scale spaces, the spaces which are the focus of philanthropy, the fact that the activity is occurring at all may be very dependent on intent – on the mission of the promotors to be active in that space – and so intent will have power as an explanatory variable. But this is a special case, not the general case.

Expressed another way, due to their mandate, philanthropies seek those impacts for which intent has meaningful explanatory power. These impacts will be a sub-set of the total set of possible impactful activities.

Intent is thus not a factor which helps us to predict the quantity of impactful outputs an asset is likely to create and is, rather, a mandate-related filter which enables philanthropic investors to remain anchored within the difficult-to-commercially-scale space which is the realm of philanthropy.

As a way of preventing philanthropic entities from straying from their mission to work in difficult-to-commercially-scale spaces, 'intent' is a relevant constraint to place on the optimization of impact. However, intent is not a constraint that is relevant to optimizing impact outcomes for non-mission-driven entities.

Additionality The mandate of DFIs is to make a difference at a regional or global level through working with the private sector. This requires identifying activities which either have commercial scale or which can scale commercially, and which will also create impact. The need for commercial scalability makes a constraint such as intent unworkable for DFIs.

However, DFIs are supposed to work in areas which are seen as too difficult or too risky by institutional investors. In optimizing its impact, a DFI will seek commercial scalability but will accept more risk than an institutional investor.

To ensure that DFIs stay in this commercially-scalable-but-riskier space, additionality – the requirement that the DFI not be doing something that an institutional investor would willingly do – is a relevant constraint on the optimization of impact outputs.

I have experience managing a portfolio with an additionality constraint from the years I managed the private equity funds portfolio of the IFC, the part of the World Bank Group focused on private sector development, investing in private equity funds across emerging markets. The objectives of the portfolio were:

- To achieve commercial returns in order to get proof of concept and attract commercial capital. When we started the Funds Group in 2000 there was no proof of concept that private equity could work successfully in emerging markets.
- To create positive development outcomes, measured by jobs created and taxes paid.

These objectives had to be achieved within constraints:

- All investments had to be compliant with environmental, social and governance (ESG) standards set by IFC.
- IFC needed to meet an additionality test in order to invest. This meant that IFC's presence in the transaction was necessary in order to meet at least one of three additionality criteria: (i) IFC's presence was necessary for the transaction to happen; (ii) IFC's presence was necessary for the transaction to happen at a meaningfully larger scale as IFC mobilized other capital; and (iii) IFC's presence meaningfully improved the quality of the transaction, particularly with regard to ESG standards.

At the time I left the Funds Group it had succeeded in meeting its objectives. Proof of concept for private equity in emerging markets had been achieved, with a portfolio net internal rate of return at that time of over 19% over fourteen years combined with volatility two thirds that of the index. Job creation was running at over 15% compound annual growth rate compared to lower single digit rates on average in the countries in which the portfolio was invested, and the portfolio's ESG compliance was one of the best in IFC.

However, these numbers could have been better, particularly the quantity of development outcomes, if we had not been required to comply with the additionality test. Over the years there were many funds with good potential to create positive outcomes at scale in which the IFC Funds Group was unable to invest as IFC had no role that provided additionality.

Additionality was a constraint with which IFC needed to comply as its shareholders wanted it to support less proven investments in less proven locations that required assistance to achieve proof of concept.

Additionality was not relevant to the quantity of positive development outputs that IFC was likely to achieve, it was relevant to IFC's role in achieving those outputs.

IFC's shareholders valued a larger quantity of impact outputs over a smaller quantity of outputs, but they did not value all impact outputs equally. The shareholders valued outputs in which IFC had a role much more highly than they valued outputs achieved without additionality.

While IFC's shareholders' value system determines IFC's mandate, it clearly does not determine the mandate of other investors, particularly institutional investors.

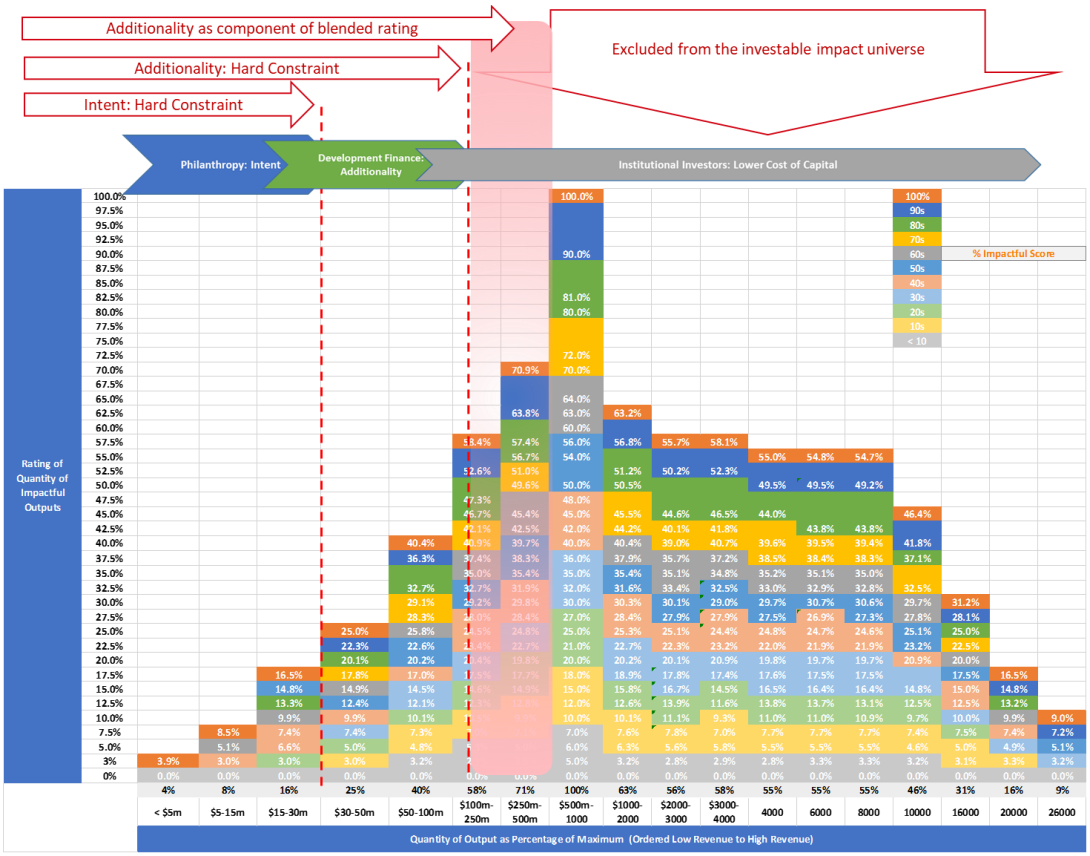
As additionality was not relevant to determining the quantity of impactful outcomes such as jobs created or additional access to healthcare, another investor without IFC's mandated requirement for additionality could have made investments that resulted in a larger quantity of impactful outputs.

Having explained why intent and additionality are relevant as mandate-related *screens* but not as *predictors* of the ability of assets to create a quantity of impactful outputs, we now get to the crux of the problem created when mandate-related screens are blended with predictive factors.

When mandate-related screens are incorporated into the assessment of the characteristics of assets, they become a binding constraint for all investors, regardless of whether or not the screen is relevant to the mandates of all investors.

The effect of blending mandate requirements – screens - into the impact ratings or assessment of assets is illustrated in Chart 14.

Chart 14 The Effect of Including Mandate-Related Screens into the Impact Ratings of Assets



Blending mandate screens into impact ratings has the effect of excluding some part of the Impact Opportunity Space from consideration by investors. As maximizing total impact requires that all opportunities to create impactful outputs are captured, eliminating parts of the Impact Opportunity Space from consideration creates a barrier to maximizing total impact.

Chart 14 indicates that incorporating mandate-related screens into the impact rating of assets will reduce the quantity of impactful outputs that can be achieved, potentially very significantly, as the screens remove parts of the Impact Opportunity Space from consideration by investors. How severe this effect is will depend on the way in which mandate-related screens are incorporated into ratings:

- A hard commitment to intent as a requirement for impact – for example a requirement for intent to exist at the level of the asset itself – will eliminate most of the impact opportunity space from consideration.

- A softer intent requirement (for example intent exists at the level of the investor) combined with a strict undiluted commitment to additionality (for example the type of additionality requirement applied by the DFIs) will exclude assets beyond about $250 million in revenue.
- A softer intent requirement combined with an impact rating methodology in which additionality is incorporated as one of several rated attributes will extend the investable universe beyond assets with around $250 million in revenue. Exactly how far beyond will depend on the weighting given to additionality in the methodology.
- Any impact methodology which incorporates mandate-relevant factors into its ratings to a greater or lesser degree, rather than maintaining separation between predictive factors and mandate-relevant factors, will eliminate some part of the impact opportunity space from consideration by investors.

A very large quantity, possibly the majority, of impactful outputs such as jobs, access to socially beneficial things such as education and healthcare and environmental effects are located in the part of the impact opportunity space which is most likely to be excluded from the consideration of investors by methodologies which embed mandate-relevant screens.

Maximizing the total quantity of impactful outputs created requires the separation of predictive factors and mandate-related screens when rating the potential of assets to create impact. Recognizing the need for this separation is the *tenth step* in solving the impact puzzle.

Step 11 Bringing it All Together – Pricing Externalities

In discussing Chart 7 above it was suggested that each type of investor – philanthropies, DFIs, institutional - makes a different contribution to developing the Impact Opportunity Space.

In particular, if impact is incorporated into the decision making process which directs the large volume of capital mobilized by institutional investors (refer Chart 9), the resulting increase in the amount of capital directed toward more impactful assets has the potential to create a meaningful difference in the cost of capital between more-impactful and less-impactful assets.

Impact will be priced alongside risk and return.

The growing demand globally for the inclusion of impact in investment decisions from the savers who are the ultimate owners of capital and who form the client base of institutional investors suggests that the potential exits for impact to be priced in the near future.

The likelihood of this possibility becoming a reality is enhanced by the fact that the need for investors to take impact into account when making investment decisions does not solely depend upon their clients specifically requesting it as part of their portfolio mandate.

For all investors – the Market – to find it necessary to take impact into account requires only that enough money is being managed to impact criteria for it to have signaling effects on pricing. This tipping point might be reached when somewhere over a third of capital incorporates impact into its decision making.

Once this tipping point is reached and, assuming that the barriers to institutional investors responding to client requests discussed in Steps 8 to 10 have been solved, capital markets will shift to a new paradigm, pricing impact along with risk, return, illiquidity and other traditional factors.

This shift will be no small event.

It will represent a new form of market-based economy in which the old problem of externalities, addressed by Pigou in 1920 in The Economics of Welfare, is dealt with by markets in a more efficient and wide-ranging manner than has been possible to date.

Externalities occur when there is a misalignment between private costs and benefits and social costs and benefits.

Negative externalities occur when prices do not fully capture costs: private costs are lower than social costs.

Positive externalities occur when prices do not fully capture benefits: private benefits are lower than public benefits.

Functionally, negative externalities occur when a producer takes account of only the direct costs of and profits from production, ignoring the indirect costs to others from, for example, air pollution resulting from the production process. The social cost of production (the total cost), which includes both the direct and indirect costs, is larger than the private costs.

As a result of indirect costs – negative externalities – not being taken into account, more of a product is produced and consumed than would be the case if all costs were accounted for.

The most noticeable negative externalities, in which the difference between private costs and public costs are very large, occur with public goods and are due to problems of property rights and collective action.

Where externalities affect the atmosphere or the oceans, using market-based approaches anchored in property rights to cause the entities responsible for the externalities to bear the cost ('internalize' the cost) is extremely difficult: who owns the oceans that are being damaged?

If we all own something, ownership is very diffuse. How do we organize ourselves? How many individuals have the energy to put into the effort when each individual stake is a small part of the whole?

The impact-inclusive investment paradigm potentially offers a market-based solution to the collective bargaining problem in defense of diffuse property rights and public goods.

If enough investors individually decide that impact matters to how their capital is allocated, their collective market signal can cause impact to be priced and capital to be allocated on something closer to a total cost basis.

Recognizing that impact is so much more than simply the nuts and bolts of an approach to investment, that it has the potential to move market-based economies closer to operating on a total cost basis, is the *eleventh* and the *most exciting step* in solving the impact puzzle.