



# Attribution Calculations

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## Return Attribution Aims



Identify sources of  
**superior portfolio  
performance**



Explain the **difference**  
**between the portfolio**  
**return, and the**  
**benchmark return**

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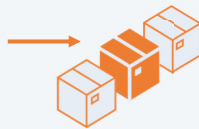
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## Attribution Process

Compares the total return of the manager's actual investment holdings with **the return for a predetermined benchmark portfolio**



**ALLOCATION EFFECT**



**SELECTION EFFECT**



**INTERACTION EFFECT**

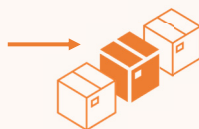
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## Attribution Effects Overview



### **ALLOCATION EFFECT**

An equity benchmark has 20% energy stock allocation, but portfolio holds 15%



### **SELECTION EFFECT**

A portfolio holds different weights in individual energy stocks than the energy subsector of the benchmark



### **INTERACTION EFFECT**

The previous effects are considered in isolation, so this is a balancing figure

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## Attribution Calculations – Sample Portfolio

Sector	Portfolio Weight	Benchmark Weight	Portfolio Return	Benchmark Return
Consumer Staples	20.0%	30.0%	7.0%	13.0%
Technology	45.0%	45.0%	25.0%	12.0%
Materials	35.0%	25.0%	-6.0%	-2.0%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>10.6%</b>	<b>8.8%</b>

WEIGHTED AVERAGE OF SECTOR RETURNS

**PORTFOLIO EXCESS RETURN = 10.6% – 8.8% = 1.8%**

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## Calculating Allocation Effect

$$= \sum \left( \text{Portfolio Sector Weight} - \text{Benchmark Sector Weight} \right) \times \left( \text{Benchmark Sector Return} - \text{Total Benchmark Return} \right)$$

Sector	Portfolio Weight	Benchmark Weight	Benchmark Return	Allocation Effect
Consumer Staples	20.0%	30.0%	13.0%	-0.4%
Technology	45.0%	45.0%	12.0%	0.0%
Materials	35.0%	25.0%	-2.0%	-1.1%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>8.8%</b>	<b>-1.5%</b>

Underweight and sector outperformance

Equal weight; no allocation effect

Overweight, and sector underperformance

**NEGATIVE COMBINED ALLOCATION EFFECT**

Indicates decisions resulted in reduced portfolio return

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## Calculating Selection Effect

$$= \sum \left( \text{Portfolio Sector Return} - \text{Benchmark Sector Return} \right) \times \text{Benchmark Sector Weight}$$

Sector	Portfolio Return	Benchmark Return	Benchmark Weight	Selection effect
Consumer Staples	7.0%	13.0%	30.0%	-1.8%
Technology	25.0%	12.0%	45.0%	5.9%
Materials	-6.0%	-2.0%	25.0%	-1.0%
<b>Total</b>	<b>10.6%</b>	<b>8.8%</b>	<b>100.0%</b>	<b>3.1%</b>

Underperformance  
in consumer stocks

Great success in  
picking tech stocks

Security selection had  
a negative impact

### POSITIVE SELECTION EFFECT

Active decisions in security selection helped performance

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## Interaction Effect



**-1.5%**

COMBINED ALLOCATION EFFECT

**1.6%**

DIFFERENCE BETWEEN  
CALCULATED RETURNS

**3.1%**

COMBINED SELECTION EFFECT

**1.8%**

ACTUAL PORTFOLIO  
EXCESS RETURN

**0.2%**

MISSING

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## Calculating Interaction Effect

$$= \sum \left( \text{Portfolio Sector Weight} - \text{Benchmark Sector Weight} \right) \times \left( \text{Portfolio Sector Return} - \text{Benchmark Sector Return} \right)$$

Sector	Portfolio Weight	Benchmark Weight	Portfolio Return	Benchmark Return	Interaction Effect
Consumer Staples	20.0%	30.0%	7.0%	13.0%	0.6%
Technology	45.0%	45.0%	25.0%	12.0%	0.0%
Materials	35.0%	25.0%	-6.0%	-2.0%	-0.4%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>10.6%</b>	<b>8.8%</b>	<b>0.2%</b>

Selection was negative, but underweight creates positive interaction effect

POSITIVE INTERACTION EFFECT

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## Calculating Factor Tilt Attribution

$$= \sum \left( \text{Portfolio Factor Exposure} - \text{Benchmark Factor Exposure} \right) \times \text{Factor Return}$$

Factor	Portfolio Exposure	Benchmark Exposure	Factor Return	Return from Factor Tilts
Size	1.45	1.00	3.0%	1.35%
Value	1.05	1.00	-3.4%	-0.17%
Momentum	1.80	0.75	5.1%	5.36%
Quality	1.20	0.85	-2.3%	-0.81%
<b>Total</b>				<b>5.73%</b>

Factors could be ESG too

Returns generated from factor tilts

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