

## Exploring A Simplified Index Within A Simplified Market.

Simplifying an index and a market clarifies things. Let's assume a three-company fictional index to learn things. Below is the three-company index. The total market value is \$290.91 billion dollars. Royal Bank is the largest of the three companies at \$148.21 billion market value and represents 51% of the total market value. Bell Canada is the smallest of the three at a \$55.74 billion market value.

<b>Company Name</b>	<b>Number of Shares</b>	<b>Price per Share</b>	<b>Market Value</b>	<b>Market Capitalization Weight</b>
Royal Bank	1.44B	103.28	\$148.21B	51%
Canadian National Railway	721.4M	120.55	\$86.96B	30%
Bell Canada	898.8M	62.02	\$55.74B	19%
<b>Market Value (Billion)</b>			<b>\$290.91</b>	<b>100%</b>
Source: Yahoo Finance June 12 / 19				

Let's also assume there are only three asset managers and they manage all savers' money. In other words, the three asset managers are the only participants in this market. Let's also assume that one manager is passive and two are active. We have a three-company index and three participants in the market.

Let's input some numbers. Let's say the passive manager manages 20% of all money, active 1 manager manages 45% of all money, and active 2 manager manages 35% of all money. Because the three managers manage all the money in the market, the combined portfolios must add to \$290.91 billion. The three managers together own all the shares.

We have:

Passive manager manages 20% x \$290.91 billion = \$58.18 billion

Active manager 1 manages 45% x 290.91 billion = \$130.91 billion

Active manager 2 manages 35% x 290.91 billion = \$101.82 billion

Let's assume at the start, for comparison purpose, they all hold passive positions. Each asset manager holds a passive position in each company. Here is what their portfolios would look like. We show both share and dollar positions.

Asset Manager	% of Money Managed	Dollars Managed Billions	Market Position							
			Shares Owned - Market Position				Dollars Owned - Market Position			
			Royal Bank	CNR	Bell Canada	Royal Bank	CNR	Bell Canada		
Passive Manager	20%	\$58.29	288.0	144.3	179.8	29.74	17.39	11.15	58.29	
Total Passive		\$58.29	288.0	144.3	179.8	29.74	17.39	11.15	58.29	
Active 1 Manager	45%	\$131.14	648.0	324.6	404.5	66.93	39.13	25.08	131.14	
Active 2 Manager	35%	\$102.00	504.0	252.5	314.6	52.05	30.44	19.51	102.00	
Total Active		\$233.15	1152.0	577.1	719.0	118.98	69.57	44.59	233.15	
Total Shares			1440.0	721.4	898.8					
<b>Market Value (Billion)</b>	<b>100%</b>	<b>\$291.43</b>	<b>148.72</b>	<b>86.96</b>	<b>55.74</b>	<b>148.72</b>	<b>86.96</b>	<b>55.74</b>	<b>291.43</b>	

### What Can We Learn?

1. Total shares per company and total dollars managed by the asset managers are finite.
2. All can hold a passive position.
3. Gains and losses are finite. If share values increase by 10% each, there is \$29.143 billion of gain to be shared among the three asset managers.

### Let's Get Active

Let's assume Active 1 Manager has a positive view of Bell Canada and decides to establish an overweight position. They increase their investment of Bell Canada to 500 shares. We have the following:

Asset Manager	Active Position									
	Shares Owned - Active Position					Dollar Owned - Active Position				
	Royal Bank	CNR	Bell Canada			Royal Bank	CNR	Bell Canada	BCE Overweight	CNR Overweight
Passive Manager	288.0	144.3	179.8			29.74	17.39	11.15	58.29	
Total Passive	288.0	144.3	179.8			29.74	17.39	11.15	58.29	
Active 1 Manager	648.0	275.5	500.0			66.93	33.21	31.01	131.14	5.93
Active 2 Manager	504.0	301.7	219.0			52.05	36.37	13.58	102.00	-5.93
Total Active	1152.0	577.2	719.0			118.98	69.57	44.59	233.15	0.00
Total Shares	1440.0	721.5	898.8							
<b>Market Value (Billion)</b>	<b>148.72</b>	<b>86.97</b>	<b>55.74</b>			<b>148.72</b>	<b>86.96</b>	<b>55.74</b>	<b>291.43</b>	

4. If an active manager wants to overweight, they must trade with an active manager willing to underweight. In this example, active 2 manager must underweight by the same number of shares. Active 1 manager overweights Bell Canada by 94.5 million shares and active 2 manager must underweight by 94.5 million shares. The number of shares managed actively is a finite at 719 million. (Compare dark yellow in active position with blue in market position)

5. Because dollars managed per asset manager and in total is finite, an overweight position in one company must result in an underweight position in at least one other company by the same asset manager. In this example we assume that each manager wants a passive position in Royal Bank. Active 1 manager's overweight position in Bell Canada necessitates an underweight position in CNR. Active 1 manager has only \$33.21 billion remaining to invest in CNR after investing in Royal Bank and Bell Canada. Active 1 manager has a \$5.93 billion underweight position in CNR,

offset by a \$5.93 billion overweight position in BCE. Points 4 and 5 lead to a fundamental conclusion. **Over and underweight dollar and share positions net to zero among active participants.**

6. The exact opposite holds true for Active 2 manager. Active 2 manager must be underweight Bell Canada by the exact dollar amount that Active manager 1 is overweight. And, they are overweight CNR by the exact amount Bell Canada is underweight. The over and under weight positions offset among the two active managers.

7. Because all share and dollar positions among active managers net to zero, the combined portfolio of the group of all active managers is a market capitalization weighted portfolio. **This explains why the group of active participants must average the market return pre-cost.**

8. For every winning position there is a losing position. If Bell Canada outperforms the market (the market weighted return of the three companies combined), Active 1 manager outperforms the market return and Active 2 manager underperforms the market return by the same dollar amount. This is before any costs.

9. The passive manager will always have the number 2 spot in performance pre-cost in this three-asset manager example. This would be the middle spot in a multi-participant market pre-cost. Post-cost return performance will always be in the number 1 or 2 spot.

10. All active managers can move to a market capitalization weighted portfolio at the same time without an imbalance of shares. Asset managers overweight shares of a company would trade with their counterparts who are underweight the same company. The demand and supply of shares would be equal.

11. A market capitalization weighted index is the only true index. Let's use the example of an equal weighted index. An equal weighted index places the same weight on each company regardless of its size. In our three-company index example, each company would be weighted 33.3%. If all three asset managers wanted to move to a portfolio that held 33.3% of money managed in each company, there would be excess demand for shares of CNR and BCE and excess supply of shares in Royal Bank. There would be a share imbalance. All can't hold an equal weighted portfolio in our example. Let's expand our example to many participants but still a three-company market. Let's say, for some reason, many, but not all, want to move to equal weighted positions. The price of Royal Bank would have to fall to encourage those who were not moving to an equal weighted position to buy the excess supply of Royal Bank and the price of CNR and BCE would have to rise to encourage those who were not moving to an equal weighted position to sell into the excess demand of CNR and BCE. Again, if all participants were to move to a market capitalization weighted position, there is no excess supply or demand. Those overweight a position sell to those underweight a position.

13. Both active managers in our example will explain how they will outperform the market and why savers should trust them with their savings. Always, over any time period being measured, at least one of them will be wrong pre-cost. After cost, both could be wrong. The data suggests that both likely will be wrong over long-term measurements.

12. All these points hold true regardless of the number of participants in the market or components in the index.

### **What Is The Main Conclusion?**

Simplifying an index and a market allows for intuitive conclusions that are not apparent when studying a real-world market. Many conclusions derive from the fact that shares per company and dollars managed are both finite numbers at a given time. It is readily apparent that overweight and underweight positions held by active participants offset each other and that the combined portfolios of active participants is a market capitalization weighted portfolio. By definition, each passive participant holds a market capitalization weighted portfolio. Each passive participant receives the market return pre-cost. The group of active participants, or the combined portfolio of all active participants, receive the market return pre-cost. Once this is understood, everything else falls in place.