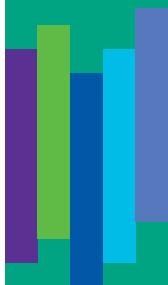




**INVESTMENT PRINCIPLES**  
INFORMATION SHEET FOR CFA PROFESSIONALS

**THE POWER OF  
COMPOUNDED RETURNS  
THE IMPACT  
OF VOLATILITY**



**2B**

## **IMPORTANT NOTICE**

The term "financial advisor" is used here in a general and generic way to refer to any duly authorized person who works in the field of financial services, including the following:

- Investment brokers
- Mutual fund brokers
- Scholarship plan dealers
- Exempt market dealers
- Portfolio managers
- Investment fund managers
- Life insurance agents
- Financial planners (F.P.I.)



Copyright © 2016 CFA Montreal. All rights reserved.  
Reproduction in whole or in part without written permission of  
CFA Society Montreal is prohibited.

# THE IMPACT OF VOLATILITY

The power of compounded returns is often illustrated with the assumption of a stable periodic rate of return, such as 3% or 6%, every year. In reality, even if an investor realizes an average yearly rate of return of 3% or 6% during her investment horizon, this return is unlikely to be stable. We will show that the uncertainty of investment returns reduces the effectiveness of return compounding. Understanding this aspect will help explain, later on, the full benefits of diversification.

## VOLATILITY AMPUTATES FINAL WEALTH

Given a choice, do investors prefer a rate of return of 10% each year for two years (scenario 1) or would they prefer a return of 20% followed by a return of 0% (scenario 2)? In both cases, the *average periodic return* (also called arithmetic return) is 10% ( $[10\% + 10\%] / 2 = [20\% + 0\%] / 2$ ). But the final wealth at the end of the second year will not be the same under each scenario. It is \$1,210 in scenario 1 for a total cumulative return of 21% while it is only \$1,200 in scenario 2 for a total cumulative return of 20%.

	SCENARIO 1		SCENARIO 2	
Time	Capital	Performance	Capital	Performance
Now	\$1,000		\$1,000	
Year One	\$1,100	10%	\$1,200	20%
Year Two	\$1,210	10%	\$1,200	0%
<b>Average Periodic Return</b>		<b>10%</b>		<b>10%</b>
<b>Total Cumulative Return</b>		<b>21%</b>		<b>20%</b>
<b>Average Compounded Return</b>		<b>10%</b>		<b>9.54%</b>

## THE POWER OF COMPOUNDED RETURNS

### The Impact of Volatility

2B

Thus the *average periodic return* does not determine final wealth unless the variability of returns—usually referred to as volatility—is nil as in scenario 1. What determines final wealth is the *average compounded return* (also called the geometric return). For example, the total return in scenario 1 is 21% because:

$$(1 + 10\%) \times (1 + 10\%) - 1 = 21\%$$

In this example, 10% is both the periodic and the compounded return. But to achieve a total cumulative return of 20% in scenario 2, the average compounded return must be 9.54% because:

$$(1 + 9.54\%) \times (1 + 9.54\%) - 1 = 20\%$$

An important general principle of portfolio management is that "volatility drains the ability to compound returns and to accumulate greater final wealth." More specifically:

**Average Compounded Return =  
Average Periodic Return – Adjustment  
for the Impact of Volatility**

The greater the volatility of periodic returns the larger the performance drain. For example, the average periodic yearly return for the Russell 1000 Total Return Index from 1990 to 2014 was 11.50% whereas the compounded return was only 9.82%. The difference is due to the volatility of the Russell 1000s periodic returns.

The fact that volatility drains compounded returns has important implications for portfolio management. It will help us understand, later on, the benefits of diversification and why we often combine different asset classes, such as fixed income and equities, using target weights (for example, 60%/40%), the need to rebalance a portfolio allocation back toward the target when allocation deviations occur because of the relative performance of asset classes, and the benefits of managing and/or limiting volatility to avoid extreme scenarios of negative returns.