

Company Size and Return¹⁰⁵

In previous versions of the Stocks, Bonds, Bills, and Inflation® (SBBI®) Yearbook the discussions in this chapter used data from the Center for Research in Security Prices (CRSP) to demonstrate various concepts about company size and return (i.e., the “size effect”). Starting with the 2020 SBBI® Yearbook®, these concepts are demonstrated using the Morningstar/Ibbotson Associates SBBI Large Stock series and SBBI Small Stock series.^{106, 107, 108}

One of the most remarkable discoveries of modern finance is the finding of a relationship between company size and return, generally referred to as the “size effect.” The size effect is based on the empirical observation that companies of smaller size tend to have higher returns than do larger companies.

A 1981 study by Rolf Banz examined the returns of New York Stock Exchange (NYSE) small-cap companies compared to the returns of NYSE large-cap companies over the period 1926–1975.¹⁰⁹ What Banz found was that the returns of small-cap companies were greater than the returns for large-cap companies. Banz’s 1981 study is often cited as the first comprehensive study of the size effect. Banz found

105 This chapter is an overview of the relationship between size and return that is limited to analyzing the relative historical performance of “large-cap stocks” and “small-cap stocks,” and does not include the much-expanded analyses of the “size effect” as it relates to the development of cost of equity capital found on the Kroll Cost of Capital Navigator platform at kroll.com/costofcapitalnavigator. The Cost of Capital Navigator guides the analyst through the process of estimating the cost of equity capital, a key component of any valuation analysis. The Cost of Capital Navigator, U.S. Cost of Capital Module includes the critical information and data from the 1999–2022 CRSP Deciles Size Study and Risk Premium Report Study that were previously published in the *Valuation Handbook – U.S. Guide to Cost of Capital* from 2014 to 2017, and, before that, in the Ibbotson Associates/Morningstar *Stocks, Bonds, Bills, and Inflation® (SBBBI®) Valuation Yearbook and Risk Premium Report*, respectively, from 1999 to 2013. The valuation data and information in the Cost of Capital Navigator is the actual “as published” valuation data from those former publications. The 1999–2013 Ibbotson Associates/Morningstar size premia, industry risk premia, and other valuation data that are available within the Cost of Capital Navigator are used with permission from Morningstar, Inc. The Cost of Capital Navigator is web-based, so you can access it from your desktop, laptop, or tablet. To learn more and to purchase the Cost of Capital Navigator, visit kroll.com/costofcapitalnavigator. CRSP® is a registered trademark and service mark of Center for Research in Security Prices, LLC and has been licensed for use by Kroll, LLC. The Kroll publications and services are not sponsored, sold or promoted by CRSP®, its affiliates or its parent company. To learn more about CRSP, visit www.crsp.org.

The focus of the Stocks, Bonds, Bills, and Inflation® (SBBBI®) Yearbook is to analyze the historical performance data of U.S. asset classes, as represented by the seven Morningstar/Ibbotson Associates "SBBBI®" series. The seven SBBBI® indices are: (i) SBBBI® U.S. Large Stocks, (ii) SBBBI® U.S. Small Stocks, (iii) SBBBI® U.S. Long-Term Corporate Bonds, (iv) SBBBI® U.S. Long-Term Government Bonds, (v) SBBBI® U.S. Intermediate-Term Government Bonds, (vi) SBBBI® U.S. 30-Day Treasury Bills, and (vii) SBBBI® U.S. 1-Month Treasury Bills. For more information on the SBBBI® series, see Chapter 3, "Description of the Basic Series".

107 U.S. Inflation. For detailed information about the SBBI® series, see Chapter 3, "Description of the Basic Series." The CRSP Deciles Size Study and Risk Premium Report Study, both of which provide size premia and other risk premia based upon data licensed from the Center for Research in Security Prices (CRSP) at the University of Chicago Booth School of Business, are available on the Kroll Cost of Capital platform at kroll.com/costofcapitalnavigator.

A detailed discussion of company size and return (and size premia) based upon CRSP deciles 1-10 and the 10th decile split (10a, 10b, 10w, 10x, 10y, and 10z) is available in the Resources Library of the Cost of Capital Navigator at kroll.com/cost-of-capital-navigator (subscription required).

109 Rolf W. Banz, "The Relationship between Return and Market Value of Common Stocks," *Journal of Financial Economics* (March 1981): 3–18. This paper is often cited as the first comprehensive study of the size effect.

that there is a significant (negative) relationship between size and historical equity returns as size decreases, returns tend to increase, and vice versa.

Possible Explanations for the Greater Returns of Smaller Companies

Some valuation analysts treat small firms as equivalent to scaled-down large firms. This is likely an erroneous assumption.

There are theoretical reasons for the greater returns of smaller companies (i.e., the “size effect”), which might include: (i) small stocks are less liquid (with higher associated transaction costs), (ii) small stocks are riskier and harder to diversify, (iii) small stocks have higher betas which tend to be underestimated, (iv) investors must do more analysis per dollar invested, (v) investment data is less available.

Valuation analysts also cite more practical reasons that small firms have risk characteristics that differ from those of large firms. For example, large firms may have greater ability to enter the market of the small firm and take market share away. Large companies likely have more resources to “weather the storm” in economic downturns. Large firms can generally spend more cash on R&D, advertising, and typically even have greater ability to hire the “best and brightest”. Larger firms may have greater access to capital, broader management depth, and less dependency on just a few customers. A larger number of analysts typically follow large firms relative to small firms, so there is probably more information available about large firms. Small firms have fewer resources to fend off competition and redirect themselves after changes in the market occur.¹¹⁰

Any one of these differences (not an all-encompassing list) would tend to increase investors’ required rate of return to induce them to invest in small companies rather than investing in large companies.

The size effect is not without controversy, nor is this controversy something new. Traditionally, small companies are believed to have greater required rates of return than large companies because small companies are inherently riskier. It is not clear, however, whether this is due to size itself, or to other factors closely related to or correlated with size, and thus the qualification that Banz noted in his 1981 article remains pertinent today:^{111, 112}

“It is not known whether size [as measured by market capitalization] per se is responsible for the effect or whether size is just a proxy for one or more true unknown factors correlated with size.”

¹¹⁰ M. S. Long and J. Zhang, “Growth Options, Unwritten Call Discounts and Valuing Small Firms”, EFA 2004 Maastricht Meetings Paper no. 4057, March 2004. Available at <http://www.ssrn.com/abstract=556203>.

¹¹¹ Even after controlling for size, research suggests that liquidity is still a systematic factor and a predictor of returns. See: Ibbotson, Roger G., and Daniel Y.-J. Kim, “Liquidity as an Investment Style: 2018 Update,” available at www.zebacapm.com Updated version of: Ibbotson, Roger G., Chen, Zhiwu, Kim, Daniel Y.-J., and Hu, Wendy Y. “Liquidity as an Investment Style,” *Financial Analysts Journal*, May/June 2013.

¹¹² Liquidity” is discussed in detail in Chapter 9, “Liquidity Investing.”

Aspects of the Company Size Effect

The company size phenomenon is remarkable in several ways. First, the greater risk of small-cap stocks does not, in the context of the capital asset pricing model, fully account for their higher returns over the long term. In the capital asset pricing model (CAPM), only systematic, or beta risk, is rewarded; small-cap stock returns have exceeded those implied by their betas.

Second, the calendar annual return differences between small- and large-cap companies are serially correlated. This suggests that past annual returns may be of some value in predicting future annual returns. Such serial correlation, or autocorrelation, is practically unknown in the market for large-cap stocks and in most other equity markets but is evident in the size premium series.

Third, the size effect is seasonal. For example, small-cap stocks outperformed large-cap stocks in January in a large majority of the years. Such predictability is surprising and suspicious in light of modern capital market theory. These three aspects of the size effect – long-term returns in excess of systematic risk, serial correlation, and seasonality – will be discussed in the following sections.

The Size Effect: Empirical Evidence

Summary statistics of annual total returns for Large-Cap stocks and Small-Cap stocks are shown in Exhibit 7.1 over the 1926–2022 period. The differences in return between large-cap stocks and small-cap stocks is apparent.¹¹³

For example, the annual arithmetic mean return of large-cap stocks was 12.0% over the 1926–2022 period, while the annual arithmetic mean return of small-cap stocks was 16.0%.

Note that this increased return comes at a price: risk (as measured by standard deviation) increases from 19.8% for large-cap stocks to 31.2% for small-cap stocks. The relationship between risk and return is a fundamental principle of finance. History tells us that small companies are riskier than large companies. Investors are compensated for taking on this additional risk by the higher returns provided by small companies.

¹¹³ Traditionally, researchers have used market value of equity (i.e., market capitalization, or simply “market cap”) as a measure of size in conducting historical rate of return studies. However, market cap is not the only measure of size that can be used to predict return, nor is it necessarily the best measure of size to use. In the Kroll Cost of Capital Navigator platform, the size effect is examined in relation to eight measures of company size (including market cap): (i) market capitalization, (ii) book value of equity, (iii) 5-year average net income, (iv) market value of invested capital (MVIC), (v) total assets, (vi) 5-year average EBITDA, (vii) sales, and (viii) number of employees. The Cost of Capital Navigator guides the analyst through the process of estimating the cost of equity capital, a key component of any valuation analysis. The Cost of Capital Navigator: U.S. Cost of Capital Module includes the critical information and data from the 1999–2022 CRSP Deciles Size Study and Risk Premium Report Study, as published in the former *Valuation Handbook – U.S. Guide to Cost of Capital* from 2014 to 2017, and, before that, in the former Ibbotson Associates/Morningstar *Stocks, Bonds, Bills, and Inflation® (SBBBI®) Valuation Yearbook and Risk Premium Report*, respectively, from 1999 to 2013. The valuation data and information in the Cost of Capital Navigator is the actual “as published” valuation data from those former publications. The 1999–2013 Ibbotson Associates/Morningstar size premia, industry risk premia, and other valuation data that are available within the Cost of Capital Navigator are used with permission from Morningstar, Inc. To learn more or subscribe to the Cost of Capital Navigator, visit kroll.com/costofcapitalnavigator.

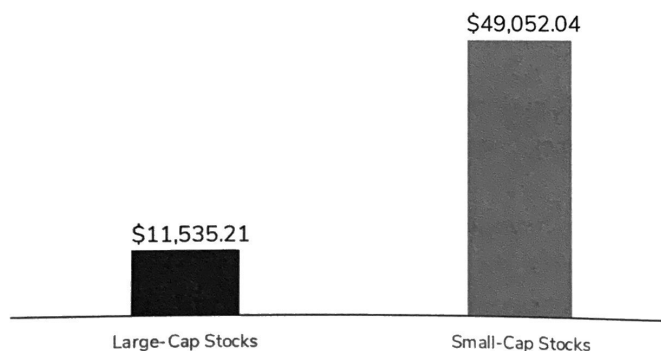
Exhibit 7.1: Summary Statistics of Large-Cap Stocks and Small-Cap Stocks (%)
1926–2022

	<u>Geometric Mean (%)</u>	<u>Arithmetic Mean (%)</u>	<u>Standard Deviation (%)</u>
Large-Cap Stocks	10.1	12.0	19.8
Small-Cap Stocks	11.8	16.0	31.2

Source of underlying data: Morningstar, Inc. Used with permission. All rights reserved. Calculations by Kroll. © Kroll, LLC. Series used: (i) "IA SBBI® US Large Stock TR USD Ext" series. The "IA SBBI® US Large Stock TR USD Ext" return series is essentially the S&P 500 index. (ii) IA SBBI® US Small Stock TR USD series. For detailed information about these series, see Chapter 3, "Description of the Basic Series".

The differences in the performance of large-cap stocks and small-cap stocks can have important implications for investors. Exhibit 7.2 is a graphical depiction of the value of \$1 invested at the end of 1925 in large-cap and small-cap stocks and held through December 31, 2022 (a total of 97 years).

Exhibit 7.2: The Value of \$1 Invested in Large-Cap and Small-Cap Stocks, 1926–2022
Index (Year-end 1925 = \$1.00)



Source of underlying data: Morningstar, Inc. Used with permission. All rights reserved. Calculations by Kroll. © Kroll, LLC. Series used: (i) "IA SBBI® US Large Stock TR USD Ext" series. The "IA SBBI® US Large Stock TR USD Ext" return series is essentially the S&P 500 index. (ii) IA SBBI® US Small Stock TR USD series. For detailed information about these series, see Chapter 3, "Description of the Basic Series".

Using the geometric (i.e., compound annual) returns in Exhibit 7.1, the terminal index values shown in Exhibit 7.2 can be calculated as:

$\text{Terminal Index Value} = (1 + \text{Geometric Mean Return})^n$
Where n is the number of periods (in this case, 97 years).

The value of \$1 invested over the 1926–2022 period in large-cap stocks is therefore calculated as:¹¹⁴

$$\$11,525.21 = (1 + 10.1\%)^{97}$$

The value of \$1 invested over the 1926–2022 period in small-cap stocks is calculated as:¹¹⁵

$$\$49,052.04 = (1 + 11.8\%)^{97}$$

Do Small-Cap Stocks Always Outperform Large-Cap Stocks?

The increased risk faced by investors in small stocks is quite real. It is important to note, however, that the risk/return profile is over the long-term. The long-term expected return for any asset class can be quite different from short-term expected returns. Investors in small-cap stocks should expect losses and periods of underperformance relative to large-cap stocks. While this might lead some market observers to speculate that there is no size premium, statistical evidence suggests that periods of smaller stocks' underperformance should be expected. The evidence also suggests that the longer small-cap companies are given to "race" against large-cap companies, the greater the chance that small-cap companies outpace their larger counterparts.

In Exhibit 7.3, a detailed summary of the results of various "races" between small-cap companies and large-cap companies is shown, where the holding periods are limited to exactly 1 month, 60 months (5 years), 120 months (10 years), 240 months (20 years), and 360 months (30 years). The entire January 1926–December 2022 period is examined, as well as three more recent start date windows: April 1981–December 2022, January 1990–December 2022, and January 2000–December 2022. All three of the three more recent periods are after Banz wrote his March 1981 article that identified the size effect, and so they are labeled "Post Banz".¹¹⁶

In Exhibit 7.3 the number of periods examined is shown first, followed by the outperformance percentage of the total periods in parentheses.

¹¹⁴ Difference due to rounding. The full-decimal value of the compound annual return of large-cap stocks over the 1926–2022 time period is 10.12262383%

¹¹⁵ Difference due to rounding. The full-decimal value of the compound annual return of small-cap stocks over the 1926–2022 time period is 11.77824584%

¹¹⁶ Banz, Rolf W. "The Relationship between Return and Market Value of Common Stocks". *Journal of Financial Economics* (March 1981): 3–18. Professor Banz's 1981 article is often cited as the first comprehensive study of the size effect.