

**BEFORE THE
SURFACE TRANSPORTATION BOARD**

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Ex Parte No. 761

HEARING ON REVENUE ADEQUACY

Ex Parte No. 722

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RAILROAD REVENUE ADEQUACY

**SUPPLEMENTAL TESTIMONY OF PROFESSOR KEVIN MURPHY, PH.D.,
PROFESSOR MARK ZMIJEWSKI, PH.D., AND MATTHEW WARREN ON
BEHALF OF CN, NORFOLK SOUTHERN RAILWAY COMPANY, AND
UNION PACIFIC RAILROAD COMPANY**

Pursuant to the Board's December 16, 2019 order in the above-captioned dockets, Union Pacific Railroad Company ("Union Pacific"), Norfolk Southern Railway Company ("NS"), and the U.S. rail operating affiliates of Canadian National Railway Company (collectively "CN") respectfully submit this supplement to the testimony presented on December 13, 2019 by Professor Kevin Murphy, Ph.D., George J. Stigler Distinguished Service Professor of Economics at the University of Chicago Booth School of Business, Professor Mark Zmijewski, Ph.D., Professor Emeritus at the University of Chicago Booth School of Business, and Matthew J. Warren, Partner, Sidley Austin LLP.

First, as Exhibit 1 to this filing, Professors Murphy and Zmijewski have prepared a detailed Technical Appendix that explains their methodology for deriving the data that was presented to the Board on December 13, 2019. As was explained at the hearing, the Professors analyzed two measures of financial

performance and three comparison groups. The first financial performance measure, “STB ROIC,” replicated the STB’s revenue adequacy methodology in all respects.¹ The Professors calculated an accounting return on investment for Class I railroads and all S&P 500 companies² that matches the way the Board calculates return on investment for Class I railroads in its annual revenue adequacy determinations, using STB data for the Class I railroads and publicly available data for the S&P 500. The Professors also calculated industry-average cost of capital (“COC”) for each S&P 500 company, using the same methodology that the Board uses today.³ From that, the Professors calculated the difference between the STB ROIC and the COC for each firm—a calculation that mirrors the Board’s annual revenue adequacy calculations in the Ex Parte 552 docket. The Professors then compared the distribution of STB ROIC minus COC for a subset of the S&P 500 (comparison group) to the weighted average STB ROIC minus COC for the Class I railroads.

The second financial performance measure, “Adjusted STB ROIC,” makes two adjustments to the STB ROIC calculation, which the Professors believe would be appropriate to enable more meaningful comparisons between the financial

¹ See Exhibit 1 at 4-6 for a detailed explanation of the STB ROIC formula and how it was replicated.

² As explained at the hearing, financial services firms and real estate firms were excluded from the comparison group, because the nature of their business causes them to have substantially different capital structures from other firms. However, including these sectors in the comparison group does not change the conclusions.

³ See Exhibit 1 at 9-15 for a detailed explanation of the STB’s cost of capital formula and how it was replicated.

performance of the rail industry and that of other firms. The first of these adjustments is to include non-goodwill intangible assets in a company's investment base. The second is to remove the distorting impacts of deferred taxes in the STB's formula by removing annual deferred tax expense from the ROIC numerator and removing (in other words, adding back) accumulated deferred tax liabilities from the ROIC denominator.⁴

Exhibit 1 to the Professors' November 26, 2019 written testimony provided their calculated STB ROIC minus COC and Adjusted ROIC minus COC for each firm in the S&P 500 between 2006 and 2018. The Professors analyzed three subsets of the S&P 500 companies as particularly useful comparison groups. The first comparison group was the complete group of S&P 500 companies (not including real estate or financial services firms); this analysis presented a full picture of Class I railroads' financial performance relative to the broad group of firms with which Class I railroads compete for capital. The results were depicted in the graphs (replicated below) at Slides 19 and 24 of the Professors' presentation:

⁴ See Exhibit 1 at 6-8 for a detailed explanation of the Adjusted STB ROIC calculations.

Figure 1
STB ROIC Minus COC of Railroads and S&P 500 Companies

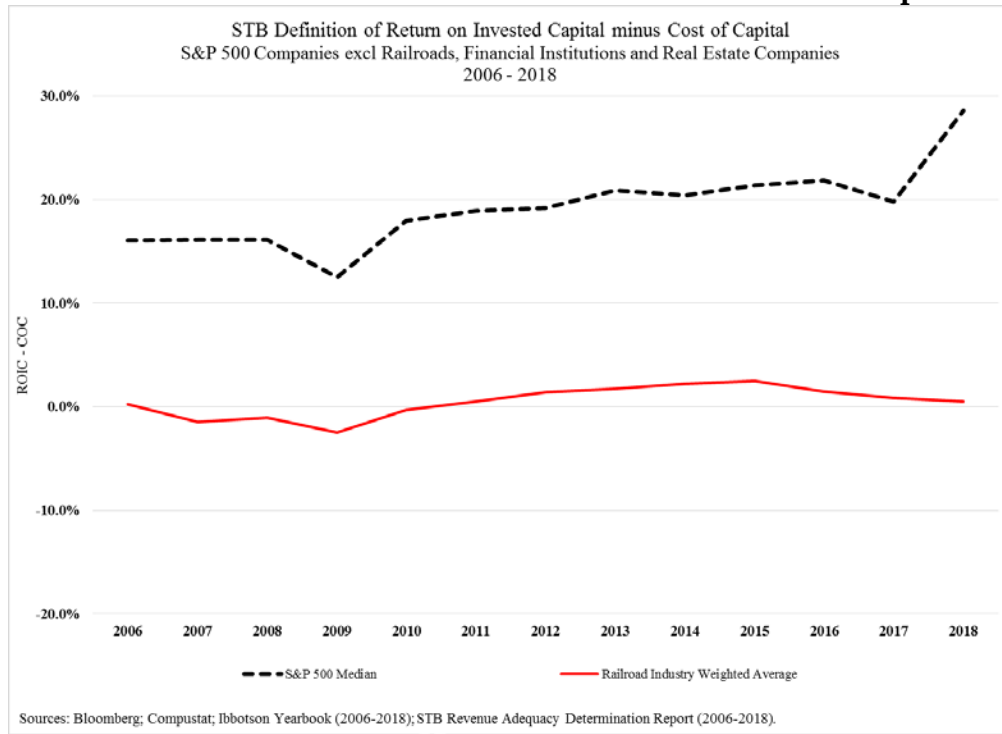
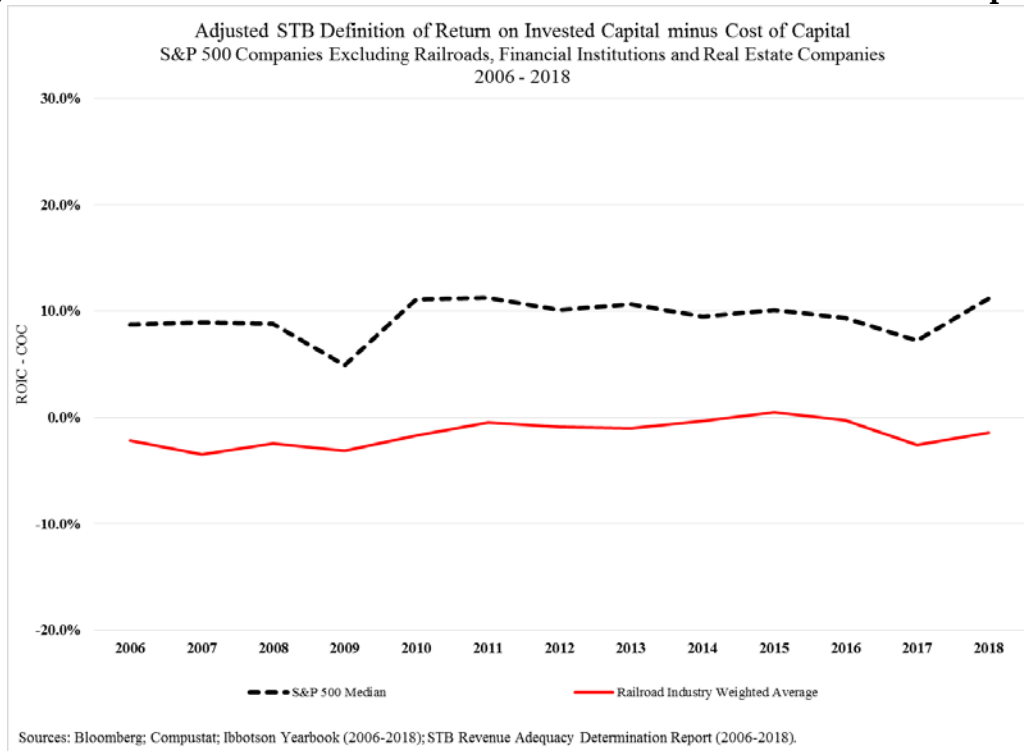


Figure 2
Adjusted STB ROIC Minus COC of Railroads and S&P 500 Companies



The second comparison group was the S&P 500 Industrials Sector (the sector in which railroads are classified); this analysis provides a more granular comparison to a smaller group of companies in more similar industries. The results were depicted in the graphs (replicated below) at Slides 20 and 25 of the Professors' presentation:

Figure 3
STB ROIC Minus COC of Railroads and S&P 500 Industrials

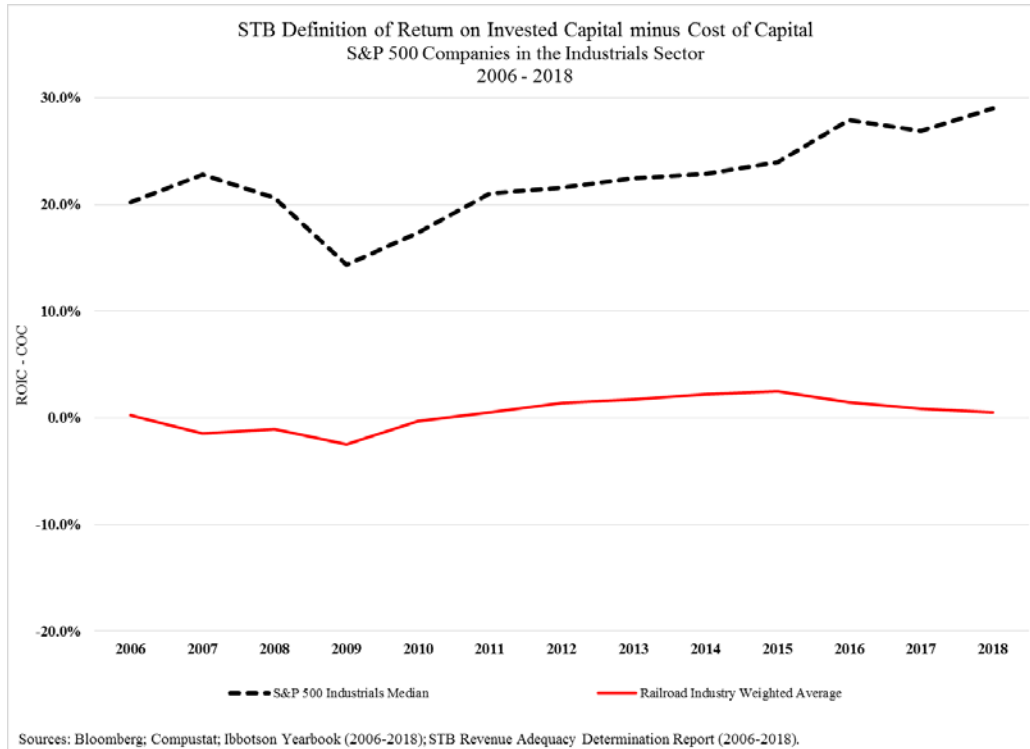
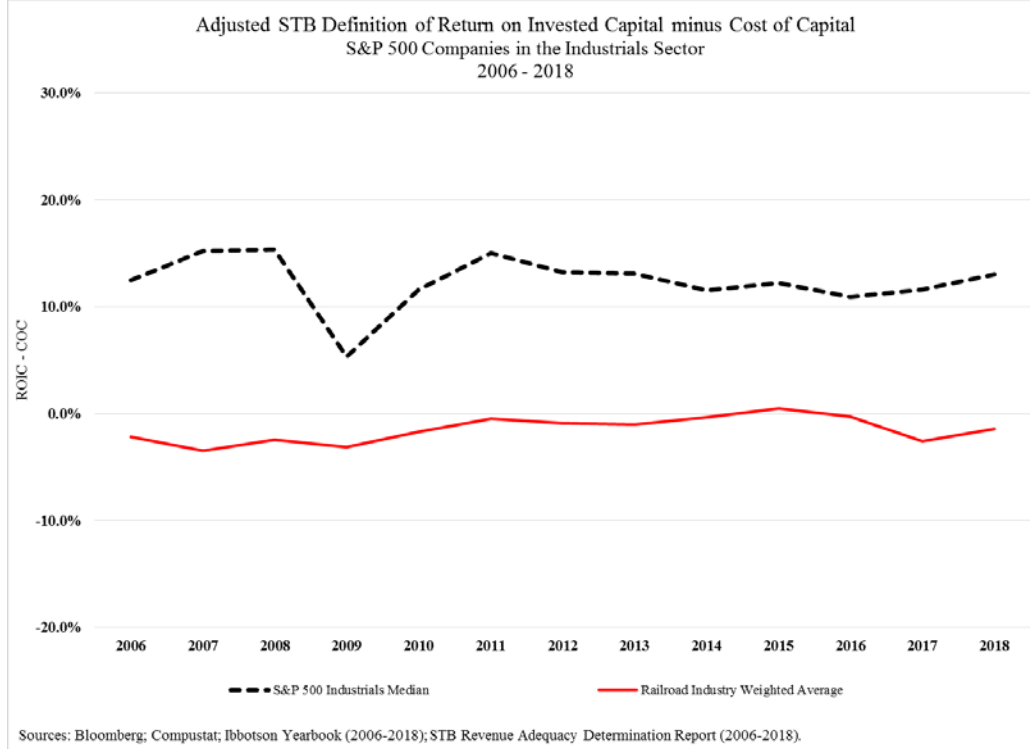


Figure 4
Adjusted STB ROIC Minus COC of Railroads and S&P 500 Industrials



The third comparison group was a group of major Class I railroad customers, defined as companies that have at least \$1 million in annual revenue shipments on either CN, Norfolk Southern, or Union Pacific; this comparison shows whether Class I railroad returns on investment above cost of capital are somehow outpacing those of Class I railroad customers. The results were depicted in the graphs (replicated below) at Slides 21 and 26 of the Professors' presentation:

Figure 5
STB ROIC Minus COC of Railroads and Rail Customers

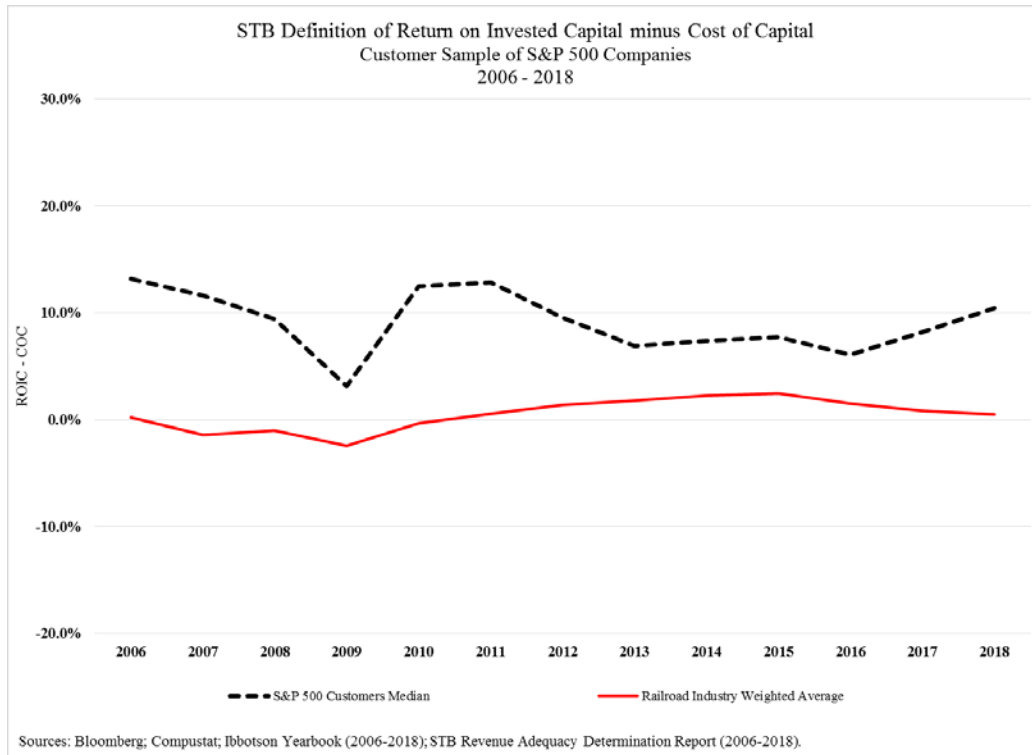
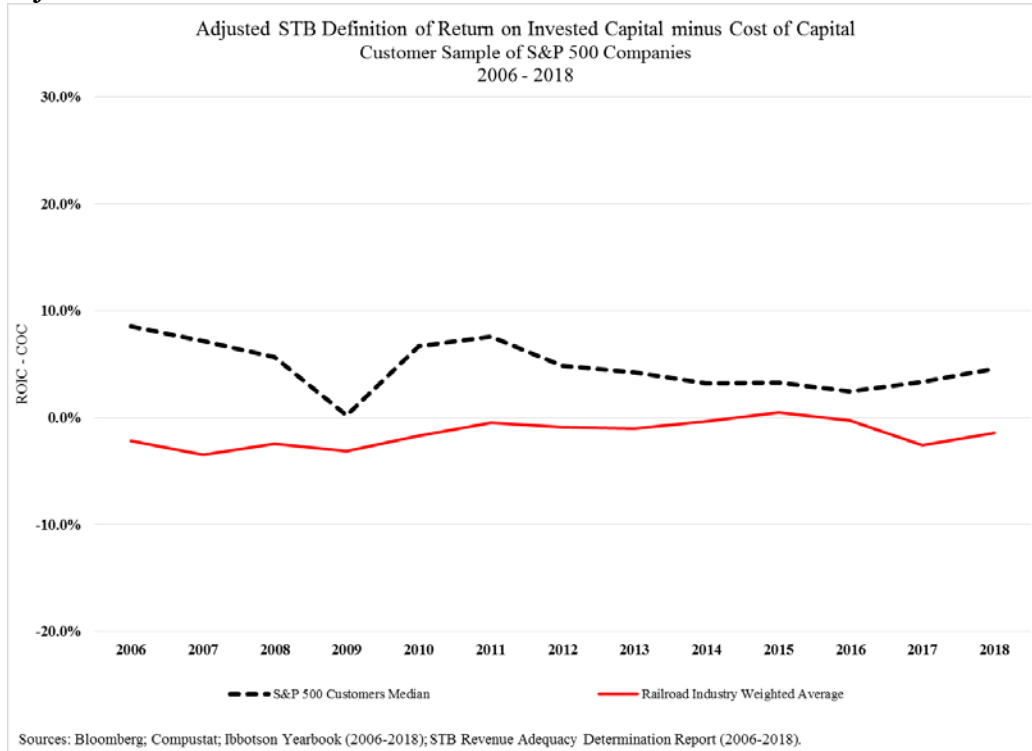


Figure 4
Adjusted STB ROIC Minus COC of Railroads and Rail Customers



While the Board also could consider analyzing other comparison groups within the S&P 500, the broad measure, the industrial sector-specific measure, and an illustrative rail customer measure of relative financial performance all indicate that Class I railroads' ROIC minus COC are significantly below the median of the comparison group.

Some parties have suggested that Class I railroads' relatively low ROIC relative to other firms in the S&P 500 is inconsistent with the performance of Class I railroad stock prices relative to other firms. As the Professors explained, changes in a company's stock price do not indicate whether the company is earning an economic return above or below its cost of capital. Changes in a company's stock price result from changes in investors' expectations of the company's future performance and do not indicate whether the company is earning an economic return that is above or below its cost of capital. As Professor Kalt has explained to the Board in prior filings in the Ex Parte 722 proceeding, changes in stock price are not a measure of return on current investment: "Equity shares in a firm are fundamentally claims on going-forward expected cash flows; prospects of such cash flows can readily find willing investors and yield rising prices for stock in the company even if the company's overall revenues provide little or no return on past, sunk investments."⁵

⁵ See Reply Comments of AAR, Kalt V.S. at 11, Ex Parte 722 (filed Nov. 4, 2014); see also *id.*, Brinner V.S at 16 ("[T]he strong stock market performance of the rail industry since 2000 reflects an increase of the railroads' ROIC from very low to modest levels. But the actual ROIC is still subpar, particularly when compared to other firms with similar WACC [Weighted Average Cost of Capital]. Purchasers of

In addition, as Mr. Group explained in his testimony, while Class I railroads' stock price performance has mostly improved in recent years to reach a price-to-earnings basis that is more in line with the overall market, he estimates that Class I railroad returns on a replacement cost basis are well below the industry's cost of capital. Dec. 13, 2019 Tr. at 49-50, 54-55.

Lastly, the Board asked several questions about the statutory scheme governing revenue adequacy and the impact that the statutory language should have on how the Board measures revenue adequacy. The Association of American Railroads has addressed these statutory questions in its supplemental testimony being filed today, and CN, Norfolk Southern, and Union Pacific adopt the AAR's pleading on these points. As AAR explains, the plain language of the statutory text confirms that Congress's primary purpose was for the Board to promote the revenue adequacy of all Class I railroads, including a reasonable and economic profit and revenue levels sufficient to "permit the raising of needed equity capital" and "attract and retain capital in amounts adequate to provide a sound transportation system." 49 U.S.C. § 10704(a); AAR Supplemental Comments at 3-20. Consideration of Class I railroad financial performance to that of other competitors for capital in the financial markets would help the Board fulfill this statutory duty to assess whether Class I railroads are earning "a reasonable and economic profit or return (or both)

railroad stock benefitted from the improvement in earnings since 2000, when railroads had very weak profits. But the favorable stock performance is not a sign of excess profitability today.").

on capital employed in the business” and whether their returns “permit the raising of needed equity capital.”

Respectfully submitted,

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EXHIBIT 1

TECHNICAL APPENDIX

TECHNICAL APPENDIX

To

The Testimony of Professor Kevin Murphy, Professor Mark Zmijewski, and Matthew Warren

Before

The Surface Transportation Board

SAMPLES, DEFINITIONS, AND DATA SOURCES

A-1. This Appendix describes the calculation methodology and data sources used to develop the analysis that Professor Kevin Murphy and Professor Mark Zmijewski presented in their written testimony of November 26, 2019 and their oral testimony of December 13, 2019 before the Surface Transportation Board (“STB”). As discussed at the hearing and in oral testimony, the basis of the Professors’ analysis is an application of the STB’s methodology for measuring railroad revenue adequacy to other firms in the S&P 500,¹ and a comparison of how railroad financial performance compares to the financial performance of the firms in the S&P 500 and different groups of firms in the S&P 500.

A-2. The STB measure of financial performance used in the STB’s Annual Revenue Adequacy Determinations² compares a company’s accounting-based (or financial statement-based) rate of return on invested capital (“ROIC”) to that company’s industry economic cost of capital

¹ The S&P 500 stock market index, maintained by S&P Dow Jones Indices, comprises 505 common stocks issued by 500 large-cap companies and traded on American stock exchanges. S&P U.S. Indices Methodology Update, January 21, 2015.

² See, for example, Surface Transportation Board, Railroad Adequacy – 2018 Determination, Docket No. EP 552 (Sub-No. 23), September 5, 2019 (“STB 2018 Revenue Adequacy Determination”).

(“COC”);³ more specifically, it determines whether ROIC minus COC is negative or positive. We replicated that measure of financial performance for the S&P 500 companies excluding railroads, financial institutions, and real estate companies. We analyzed the period from 2006 through 2018. Exhibit A1 presents a list of the S&P 500 companies for each year in the analysis. As shown in this exhibit, because the S&P 500 has turnover in its membership, the S&P 500 includes 775 companies during 2006 through 2018 period.⁴ If a company is a member of the S&P 500 in a given year, that year is marked with 1 and 0 otherwise. The companies marked with an asterisk next right to the company’s ticker are financial institutions or real estate companies, which we exclude from our analyses because financial institutions and real estate companies have substantially different capital structures, assets, and business models than other companies in the S&P 500.

A-3. After calculating an STB ROIC minus COC for firms in the S&P 500, we then developed three comparison groups to assess railroads’ relative financial performance: (a) the S&P 500 companies excluding railroads, financial institutions, and real estate companies; (b) the S&P 500 Industrials Sector, the industry sector that includes railroads;⁵ and (c) customers of Canadian

³ “Pursuant to those procedures, which are essentially mechanical, a railroad is considered revenue adequate under 49 U.S.C. § 10704(a) if it achieves a rate of return on net investment (ROI) equal to at least the current cost of capital for the railroad industry.” Surface Transportation Board, Railroad Revenue Adequacy – 2018 Determination, September 5, 2019.

⁴ Only 283 companies (37%) were members of the S&P 500 in every year from 2006 through 2018. 140 companies (18%) were members of the S&P 500 for nine to twelve years, 126 companies (16%) were members of the S&P 500 for five to eight years, and 226 companies (29%) were members of the S&P 500 for one to four years.

⁵ Industry Sectors are based on the Global Industry Classification Standard (“GICS”). GICS “was developed by S&P Dow Jones Indices, ..., and MSCI. ... The GICS structure consists of 11 Sectors, 24 Industry groups, 69 Industries and 158 sub-industries.” The railroads are included in the Industrial Sector 20. GICS® Global Industry Classification Standard accessed on November 10, 2019 at https://www.spglobal.com/marketintelligence/en/documents/112727-gics-mapbook_2018_v3_letter_digitalspreads.pdf

National, Norfolk Southern, and/or Union Pacific in the S&P 500 that account for at least \$1 million of combined revenue in the last year.⁶ In our analyses, we calculate each railroad's financial performance (measured by ROIC minus COC) relative to the financial performance (measured by ROIC minus COC) of a comparison group by calculating each railroad's percentile in the distribution of that comparison group. In addition, we calculate the financial performance of the railroad industry, weighted average ROIC minus COC (Industry Weighted Average), and calculate the relative financial performance of the railroad industry as a whole in the same manner.

I. Return on Invested Capital (ROIC)

A-4. Naturally, a company's ROIC minus COC requires the calculation of that company's ROIC and industry cost of capital. ROIC does not have a single generally accepted or standard definition. The STB has developed a specific definition for ROIC to use to calculate the financial performance of the railroads; thus, we use the STB definition for ROIC. We also use an alternative definition of ROIC ("Adjusted STB ROIC"), which we believe is a more useful measure of accounting-based financial performance for assessing the financial performance of the railroads based on ROIC minus COC.

⁶ I was provided with a list of S&P 500 customers from Canadian National Railway Company, Norfolk Southern Railway Company, and Union Pacific Railroad Company. The customer companies with a combined 2018 revenue greater than \$1million are selected as S&P 500 customers for ranking.

a. Return on Invested Capital (ROIC) – STB definition

A-5. The STB’s Annual Revenue Adequacy Determinations⁷ define ROIC as follows:⁸

$$\text{STB ROIC} = \frac{\text{Adjusted Net Railway Operating Income}}{\text{Tax Adjusted Net Investment Base}}$$

where adjusted Net Railway Operating Income is defined as:

$$\begin{aligned} & \text{Consolidated Net Railway Operating Income} \\ & + \text{Interest Income from Working Capital Allowance – Cash Portion} \\ & + \text{Income Taxes Associated with Non-Rail Income and Deductions} \\ & + \text{Gain or (Loss) from Transfer/Reclassification to Nonrail-Status (Net of Income Taxes)} \\ & = \text{Adjusted Net Railway Operating Income} \end{aligned}$$

and where Tax Adjusted Net Investment Base is defined as:⁹

$$\begin{aligned} & \text{Combined Investment in Railroad Property Used in Transportation Service} \\ & - \text{Interest During Construction} \\ & - \text{Other Elements of Investment} \\ & + \text{Net Rail Assets of Rail Related Affiliates} \\ & + \text{Working Capital Allowance}^{10} \\ & - \text{Accumulated Deferred Income Tax Credits} \\ & = \text{Tax Adjusted Net Investment Base} \end{aligned}$$

⁷ See, for example, STB 2018 Revenue Adequacy Determination, Appendix B.

⁸ For 2017, the STB adjusted this formula because the decrease in the federal income tax rate (2017 Tax Cut and Jobs Creation Act) resulted in a revaluation of deferred income taxes on the balance sheet (companies, like the railroads, with a net deferred tax liability position on their balance sheet recorded a reduction of that liability, which decreased the provision for income taxes and thus, increased income, in that year). The adjustment had the effect of essentially eliminating this reduction in income tax. “By decision served on July 27, 2018, the Board explained that its revenue adequacy determination, among other calculations for 2017, would be affected by the carriers’ revaluation of their deferred tax liabilities as a result of the Tax Cuts and Jobs Act. R.R. Revenue Adequacy—2017 Determination... The Board adopted this proposal in Railroad Revenue Adequacy—2017 Determination, EP 552 (Sub-No. 22) et al., slip op. at 6-9 (STB served Dec. 6, 2018), and, consistent with that decision, the revenue adequacy determination here reflects the adjustments made in the carriers’ Schedule 250 filings,” STB 2017 Revenue Adequacy Determination, December 21, 2018, footnote 2.

⁹ The Tax Adjusted Net Investment Base is calculated using the average of the beginning (end of prior year) and ending (end of current year) balances for each year.

¹⁰ The STB defines the Working Capital Allowance as lesser Cash Working Capital Required and Cash and Temporary Cash Balance. Cash Working Capital Required is defined as Days of Working Capital Required (Days of

A-6. For the railroads, we use the same data sources and measurement of the inputs for the calculation of railroads' ROIC as those in the STB's Revenue Adequacy Determinations; thus, our railroad ROICs are numerically identical to those reported in the STB Revenue Adequacy Determinations for all years in the analysis from 2006 through 2018.¹¹ The data source used to measure ROIC for the S&P 500 companies is Compustat,¹² which is publicly available and widely used in peer reviewed academic studies. For S&P 500 companies, Adjusted Net Railway Operating Income is equal to operating income ("Earnings Before Interest and Taxes" ("EBIT")) minus income taxes ("Income Tax Provision") plus marginal income tax on non-operating income (expense). Tax Adjusted Net Investment Base for the S&P 500 companies is equal to Net Property, Plant & Equipment ("PPE") plus Inventory plus Working Capital Allowance¹³ minus Accumulated Deferred Income Tax Credits.¹⁴ The formula for measuring ROIC using Compustat data is as follows:

Operating Revenue in Current Operating Assets + 15 days - Days of Operating Expenses in Current Operating Liabilities) multiplied by Average Daily Expenditures.

¹¹ STB 2006 Revenue Adequacy Determination, May 6, 2008; STB 2007 Revenue Adequacy Determination, September 26, 2008; STB 2008 Revenue Adequacy Determination, October 26, 2009; STB 2009 Revenue Adequacy Determination, November 10, 2010; STB 2010 Revenue Adequacy Determination, January 2, 2014; STB 2011 Revenue Adequacy Determination, January 2, 2014; STB 2012 Revenue Adequacy Determination, January 2, 2014; STB 2013 Revenue Adequacy Determination, September 2, 2014; STB 2014 Revenue Adequacy Determination, September 8, 2015; STB 2015 Revenue Adequacy Determination, September 8, 2016; STB 2016 Revenue Adequacy Determination, September 6, 2017; STB 2017 Revenue Adequacy Determination, December 21, 2018; STB 2018 Revenue Adequacy Determination, September 5, 2019.

¹² Compustat is a "comprehensive database with standardized, historical and point-in-time data, with flexible delivery options to power your quantitative research and analysis... [with] history back to the 1950s, and extended interim history back to 1962." Source: https://www.spglobal.com/marketintelligence/en/documents/compustat-brochure_digital.pdf.

¹³ To calculate Working Capital Allowance, I follow the methodology outlined in Schedule 245 to the railroads' Class I Railroad Annual Report R-1.

¹⁴ I calculate Tax Adjusted Net Investment Base using the average of the beginning (end of prior year) and ending (end of current year) balances for each year.

$$ROIC = \frac{ebit - txt + \tau * nopi}{Average(ppent + invt + Min(Max(\frac{rectr}{revt} * 360 + 15) - \frac{ap}{xopr - dp} * 360, 0) * \frac{xopr - dp}{360}, che) - txndbl)}$$

where:

Compustat mnemonic (ebit)	= Earnings Before Interest and Taxes
Compustat mnemonic (txt)	= Income Taxes – Total
Compustat mnemonic (nopi)	= Non-Operating Income (Expense)
τ	= Marginal Tax Rate; 37.5% (2006-2017) and 24% (2018)
Compustat mnemonic (ppent)	= Property, Plant and Equipment - Total (Net)
Compustat mnemonic (invt)	= Inventories – Total
Compustat mnemonic (rectr)	= Receivables – Trade
Compustat mnemonic (revt)	= Revenue – Total
Compustat mnemonic (ap)	= Accounts Payable – Trade
Compustat mnemonic (xopr)	= Operating Expenses – Total
Compustat mnemonic (dp)	= Depreciation and Amortization, and
Compustat mnemonic (che)	= Cash and Short-Term Investments
Compustat mnemonic (txndbl)	= Net Deferred Tax Liability.

b. Return on Invested Capital (ROIC) – Adjusted STB ROIC Definition

A-7. Also, we propose and analyze an adjusted STB definition of ROIC, which we believe is a more appropriate ROIC measure to use when comparing a company’s accounting-based ROIC to its economic cost of capital. The definition of Adjusted STB ROIC makes one adjustment to the STB definition of Adjusted Net Railway Operating Income (i.e. to the STB ROIC numerator) and two adjustments to the STB definition of Tax Adjusted Net Investment Base (i.e. to the STB ROIC denominator). The adjustment to the STB definition of Adjusted Net Railway Operating Income (STB ROIC numerator) is eliminating the effect of deferred income taxes in the Provision of Income Taxes. The two adjustments to the STB definition of Tax Adjusted Net Investment Base (STB ROIC denominator) are: (a) eliminating the effect of Deferred Tax Liabilities in the calculation of the Net Investment Base; and (b) including the company’s

investments in non-goodwill intangible assets. The resulting formula for Adjusted STB ROIC is:¹⁵

$$\text{Adjusted STB ROIC} = \frac{\text{Adjusted Net Railway Operating Income} + \text{Deferred Tax Expense}}{\text{Tax Adjusted Net Investment Base} + \text{Deferred Tax Liabilities} + \text{Non-Goodwill Intangible Assets}}$$

Stated in terms of Compustat data items, the resulting formula for Adjusted STB ROIC is:

$$\text{Adjusted STB ROIC} = \frac{ebit - txt + \tau * nopi + txdi}{\text{Average} \left(ppent + invt + \text{Min} \left(\text{Max} \left(\left(\frac{rectr}{revt} * 360 + 15 \right) - \frac{ap}{xopr - dp} * 360, 0 \right) * \frac{xopr - dp}{360}, che \right) - txndbl + txndbl + intano \right)}$$

where:

Compustat mnemonic (txdi) = Income Taxes - Deferred

Compustat mnemonic (intano) = Other Intangibles

All other Compustat data items are as defined previously.

A-8. One of these adjustments, i.e. adding the company's investments in non-goodwill intangible assets in the calculation of the STB definition of Tax Adjusted Net Investment Base, has no meaningful effect on the railroads' ROICs, and thus, no meaningful effect on the ROIC minus COC measure of financial performance used by the STB. This adjustment has no meaningful effect on railroads' ROICs because railroads do not have substantial investments in non-goodwill intangible assets. However, this adjustment can have a meaningful effect on the ROIC of other S&P 500 companies who have substantial investments in non-goodwill intangible assets.¹⁶

¹⁵ Adding Deferred Tax Liabilities to the denominator of the Adjusted STB ROIC has the effect of eliminating the deduction of Deferred Tax Liabilities used in the STB definition of ROIC.

¹⁶ Examples of non-goodwill intangible assets include assets such as patents, copyrights, trademarks, computer software, licenses, films, and import quotas. Accounting rules generally require companies to expense – as opposed

A-9. One such company is JM Smucker Company (“Smucker”). For example, in 2016, Smucker’s total assets included \$1.6 billion in net property and equipment and \$6.1 billion in non-goodwill intangible assets.¹⁷ Using the STB definition, Smucker’s 2016 Tax Adjusted Net Investment Base is \$171.3 million. The value of Smucker’s 2016 Tax Adjusted Net Investment Base is substantially less than the book value of its net property and equipment because the STB calculation subtracts Accumulated Deferred Income Tax Credits, which were \$2.4 billion for Smucker in 2016. Using the STB definition, Smucker’s Adjusted Operating Income is \$958.8 million and its 2016 ROIC is over 550% ($5.597 = \$958.8 / \171.3).

A-10. Including Smucker’s non-goodwill intangible assets in the calculation of its 2016 Tax Adjusted Net Investment Base, increases Smucker’s 2016 ROIC denominator to \$6,493.5 million, which reduces its 2016 ROIC to 14.8% ($0.1477 = \$958.8 / \$6,493.5$). The Smucker’s example illustrates the bias of not including non-goodwill intangible assets in the ROIC calculation, which results in overstating a company’s ROIC. Because none of the railroads have meaningful non-goodwill intangible assets, this adjustment has no effect for assessing the financial performance of the railroads but it has a substantial effect for assessing the financial performance of the railroads relative to other companies that may have substantial non-goodwill intangible assets.

to capitalize – expenditures that result in such assets but require companies to record the value of non-goodwill intangible assets when they acquire another company.

¹⁷ The non-goodwill intangible assets consist of “Customer and contractual relationships, Patents and technology, and Trademarks”. See 2016 JM Smucker Annual Report, p. 57.

c. Industry Weighted Average Return on Invested Capital (ROIC)

A-11. In addition to analyzing the ROIC minus COC for each of the railroads, we also analyze ROIC minus COC based on an Industry Weighted Average ROIC. We calculate the Industry Weighted Average ROIC as the weighted average ROIC of the seven railroads listed in the STB Revenue Adequacy Determinations.¹⁸

II. Industry Cost of Capital (COC)

A-12. We use the STB definition of the cost of capital to measure the cost of capital for the railroads and companies in the S&P 500. The STB outlines its cost of capital methodology in the STB's Railroad Cost of Capital Decisions:¹⁹

$$\begin{aligned} & \text{Industry Cost of Debt} \quad \quad \quad \times \text{Industry Debt Weight} \\ & + \text{Industry Cost of Preferred Equity} \times \text{Industry Preferred Equity Weight} \\ & + \text{Industry Cost of Common Equity} \times \text{Industry Common Equity Weight} \\ & = \text{Industry Cost of Capital} \end{aligned}$$

¹⁸ In mathematical terms, we define the Industry Weighted Average ROIC in each year equal to the sum of the seven railroads' STB ROIC numerators divided by the sum of the seven railroads' STB ROIC denominators using the reported ROIC components in the STB Revenue Adequacy Determinations. For example, based on the STB 2018 Revenue Adequacy Determination, Appendix B, the 2018 Industry Weighted Average ROIC is 12.70% = $(5,859,642 + 3,124,995 + 820,915 + 364,179 + 2,774,609 + 472,522 + 6,383,168) / (49,292,436 + 23,714,297 + 10,668,213 + 4,535,569 + 23,850,288 + 3,503,522 + 40,396,642)$, where \$5,859,642, \$3,124,995, \$820,915, \$364,179, \$2,774,609, \$472,522, and \$6,383,168 refer to the 2018 Adjusted Net Railway Operating Income (in USD thousand) for BNSF Railway, CSX Corporation, Grand Trunk Corporation, Kansas City Southern, Norfolk Southern Corporation, Soo Line Corporation, and Union Pacific Corporation, respectively; and where \$49,292,436, \$23,714,297, \$10,668,213, \$4,535,569, \$23,850,288, \$3,503,522, and \$40,396,642 refer to the 2018 Tax Adjusted Net Investment Base (in USD thousand) for BNSF Railway, CSX Corporation, Grand Trunk Corporation, Kansas City Southern, Norfolk Southern Corporation, Soo Line Corporation, and Union Pacific Corporation, respectively.

¹⁹ See, for example, Surface Transportation Board Decision, Railroad Cost of Capital – 2018, Docket No. EP 558 (Sub-No. 22), August 6, 2019 ("STB 2018 Cost of Capital Decision"). To estimate the railroad cost of capital, STB relies on inputs from the Association of American Railroads ("AAR") who "calculated the cost of capital for a 'composite railroad' based on criteria developed in the Railroad Cost of Capital – 1984, 1 I.C.C.2d 989 (1985)," STB 2008 Cost of Capital Decision, p. 2.

where Industry Cost of Debt, Industry Cost of Preferred Equity, and Industry Cost of Common Equity, as well as their respective weights, are determined based on individual railroads' accounting and market data. In the following paragraphs, I provide further details on how STB measures each component of the Industry Cost of Capital.

A-13. The STB measures the Industry Cost of Debt based on individual railroads' cost of bonds and cost of equipment trust certificates ("ETCs").²⁰ The cost of bonds is the market value weighted average yield of the publicly traded bonds of all railroads. The cost of ETCs is the market value weighted average yield of the railroads ETCs.²¹ In calculating the cost of bonds and cost of ETCs, the STB also considers the flotation cost²² associated with the issuance of such securities and adds the flotation costs to the respective estimates of the costs of bonds and ETCs. The market value weighted average of cost of bonds and cost of ETC is the Industry Cost of Debt. The STB measures Debt Weight based on railroads' combined market values of debt, common equity, and preferred equity.

²⁰ ETC is "a debt instrument that allows a company to take possession of and enjoy the use of an asset while paying for it over time. The debt issue is secured by the equipment or physical asset. During this time, the title for the equipment is held in trust for the holders of the issue." See, <https://www.investopedia.com/terms/e/equipmenttrustcertificate.asp>. In addition to the cost of bonds and cost of ETCs, the STB also considers the cost of (i) conditional sales agreements and (ii) capitalized leases and miscellaneous debt, however, these debt instruments either have minimal value or are not publicly traded, so they have insignificant effect on the Industry Cost of Debt calculations.

²¹ ETCs are not actively traded on the secondary markets and their yield and market values are estimated by adding a spread to the yield of other securities that are actively traded such as government securities with similar maturity.

²² "Flotation costs are incurred by a publicly traded company when it issues new securities, and includes expenses such as underwriting fees, legal fees and registration fees." See, <https://www.investopedia.com/terms/f/flotationcost.asp>. The calculation of flotation cost is based on the difference in yields between a new issue with flotation cost and an issues without flotation cost. For more details see, for example, STB 2018 Cost of Capital Decision, p. 6 and Table 7.

A-14. The STB measures the Cost of Preferred Equity as the market value weighted average of the dividend yields (dividend divided by market price of preferred stock) for the preferred stock of the individual railroads.²³ The STB measures the Preferred Equity Weight based on railroads' combined market values of debt, common equity, and preferred equity.

A-15. The STB measures the Cost of Common Equity by equally weighting a Capital Asset Pricing Model-based ("CAPM") and the Multi-Stage Discounted Cash Flow Model-based ("MSDCF") equity cost of capital. The STB measures the Common Equity Weight based on railroads' combined market values of debt, common equity, and preferred equity.

A-16. The CAPM has three inputs: beta, risk-free rate, and market risk premium. The STB measures an industry beta by regressing five years of merger-adjusted weekly returns of the portfolio of all publicly traded railroads over the weekly returns of the S&P 500 Index.²⁴ The STB measures the risk-free rate based on the average yield to maturity for a 20-year U.S. Treasury Bond.²⁵ The STB measures the market risk premium based on Ibbotson/Duff & Phelps Cost of Capital Valuation Handbook.²⁶ The CAPM equity cost of capital for the railroad industry is calculated as the risk-free rate plus the industry beta times the market risk premium.

²³ See, for example, STB 2018 Cost of Capital Decision, p. 11 and Table 13.

²⁴ See, for example, STB 2018 Cost of Capital Decision, p.8 and Table 9.

²⁵ See, for example, STB 2018 Cost of Capital Decision, p.7.

²⁶ See, for example, STB 2018 Cost of Capital Decision, pp. 7-8, "The Ibbotson SBBI Classic Yearbook, published by Morningstar, which was previously used as the source of the market risk premium for 2013 and 2014, has been discontinued. AAR replaced the former source with the Duff & Phelps' Valuation Handbook—U.S. Guide to Cost of Capital, as the source of the market risk premium for 2015 and 2016. However, in 2018, Duff & Phelps discontinued the publication of that book in hardcover form and replaced it with an online tool called the Cost of Capital Navigator. According to AAR, the Cost of Capital Navigator uses the same method as Ibbotson and provides the same data reflecting the market-risk premium."

A-17. The STB measures the MSDCF equity cost of capital using accounting and market data for the publicly traded railroads and the following methodology. Step one – create a cash flow forecast for each railroad using historical accounting data²⁷ and expected growth rates.²⁸ Step two – calculate each railroad’s discount rate that equates that railroad’s observed market value with the present value of its future cash flows from step one. Step three – calculate a market value weighted average of the discount rates determined in step two; the resulting estimate is the MSDCF equity cost of capital for the railroad industry.

A-18. Our data sources and measurement of the inputs for the cost of capital of the railroads are the same as those in the STB’s Cost of Capital Decisions.²⁹ Thus, our cost of capital estimates

²⁷ See, for example, STB 2018 Cost of Capital Decision, pp. 9-10 and Table 11. The cash flow (“CF”) is defined as income before extraordinary items (“IBEI”), minus capital expenditures (“CAPEX”), plus depreciation (“DEP”) and deferred taxes (“DT”). That is, $CF = IBEI - CAPEX + DEP + DT$. The MSDCF model assumes three stages. Cash flows are projected using different growth rates in each stage, however, all cash flows are derived starting with a base cash flow (“Base CF”) in the current year. The Base CF is the product of the CF ratio and the revenue for the current year, i.e. year zero. The CF ratio is measured by the ratio of the last five years of historical CF divided by the last five years of historical revenue. The cash flow projections are constructed as follows. In the first stage, years 1 to 5, the cash flows are calculated using Base CF and stage-one growth rate (“g-rate_1”). The estimated cash flows for years 1 to 5 are $Base\ CF \cdot (1+g-rate_1)$, $Base\ CF \cdot (1+g-rate_1)^2$, $Base\ CF \cdot (1+g-rate_1)^3$, $Base\ CF \cdot (1+g-rate_1)^4$, and $Base\ CF \cdot (1+g-rate_1)^5$, respectively. In the second stage, years 6 to 10, the cash flows are assumed to continue to grow at stage-two growth rate (“g-rate_2”). The estimated cash flows for years 6 to 10 are $Base\ CF \cdot (1+g-rate_1)^5 \cdot (1+g-rate_2)$, $Base\ CF \cdot (1+g-rate_1)^5 \cdot (1+g-rate_2)^2$, $Base\ CF \cdot (1+g-rate_1)^5 \cdot (1+g-rate_2)^3$, $Base\ CF \cdot (1+g-rate_1)^5 \cdot (1+g-rate_2)^4$, and $Base\ CF \cdot (1+g-rate_1)^5 \cdot (1+g-rate_2)^5$, respectively. Finally, in the third stage, years 11 and beyond, the cash flows are assumed to grow indefinitely at a constant rate (“g-rate_3”). The cash flow for year 11 is $Base\ CF \cdot (1+g-rate_1)^5 \cdot (1+g-rate_2)^5 \cdot (1+g-rate_3)$. The cash flow in year 11 is used to calculate the terminal value for each railroad.

²⁸ See, for example, STB 2018 Cost of Capital Decision, pp. 9-10 and Table 11. The MSDCF model assumes three stages with a different growth rate in each stage. The stage-one growth rate, g-rate_1, is railroad-specific and is based on earnings per share (“EPS”) forecasts. G-rate_1 is measured using the median of the long-term (three- to five-year) EPS growth rate forecasts published by the financial analysts following each publicly traded railroad. The source for g-rate_1 is the Institutional Brokers Estimate System (“I/B/E/S”). The stage-two growth rate, g-rate_2, is the same for all railroads and is calculated as the average of the individual stage-one growth rates. The stage-three growth rate, g-rate_3, is estimated based on the sum of the long-run historical growth in real Gross Domestic Product (“GDP”) and the long-run expected inflation.

²⁹ STB 2006 Cost of Capital Decision, STB 2007 Cost of Capital Decision, STB 2008 Cost of Capital Decision, STB 2009 Cost of Capital Decision, STB 2010 Cost of Capital Decision, STB 2011 Cost of Capital Decision, STB 2012 Cost of Capital Decision, STB 2013 Cost of Capital Decision, STB 2014 Cost of Capital Decision, STB 2015

for the railroad industry are numerically identical to those reported by STB in all years from 2006 to 2018.

A-19. We measure the industry cost of capital for the S&P 500 companies for each two-digit Standard Industry Classification (“SIC”) code.³⁰ The data source used to measure the industry cost of capital for the S&P 500 companies is Ibbotson/Duff & Phelps Cost of Capital yearbooks,³¹ all of which are publicly available and widely used in such analyses and in peer reviewed academic studies.

A-20. The Industry Cost of Debt for the S&P 500 companies is measured using the cost of debt as reported in the Ibbotson/Duff & Phelps Cost of Capital yearbooks.³² The Debt Weight is measured by the Debt to Total Capital ratio as reported in the Ibbotson/Duff & Phelps Cost of

Cost of Capital Decision, STB 2016 Cost of Capital Decision, STB 2017 Cost of Capital Decision, and STB 2018 Cost of Capital Decision.

³⁰ “The Standard Industrial Classification Codes that appear in a company's disseminated EDGAR filings indicate the company's type of business. These codes are also used in the Division of Corporation Finance as a basis for assigning review responsibility for the company's filings.” U.S. Security and Exchange Commission website, accessed on November 16, 2019 at <https://www.sec.gov/info/edgar/siccodes.htm>.

³¹ Ibbotson Cost of Capital 2006 Yearbook, Ibbotson Cost of Capital 2007 Yearbook, Ibbotson Cost of Capital 2008 Yearbook, Ibbotson Cost of Capital 2009 Yearbook, Ibbotson Cost of Capital 2010 Yearbook, Ibbotson Cost of Capital 2011 Yearbook, Ibbotson Cost of Capital 2012 Yearbook, Ibbotson Cost of Capital 2013 Yearbook, Duff & Phelps 2014 Valuation Handbook – U.S. Industry Cost of Capital, Duff & Phelps 2015 Valuation Handbook – U.S. Industry Cost of Capital, Duff & Phelps 2016 Valuation Handbook – U.S. Industry Cost of Capital, Duff & Phelps 2017 Valuation Handbook – U.S. Industry Cost of Capital, and Duff & Phelps 2018 Valuation Handbook – U.S. Industry Cost of Capital, collectively (“Ibbotson/Duff & Phelps Cost of Capital”) yearbooks.. The industry data in the cost of capital yearbooks are reported at different levels of aggregation for an industry (one-, two-, three-, and four-digit SIC code levels) and within that industry (median, SIC composite, large composite, and small composite). All inputs from the cost of capital yearbooks we use in our analyses are based on two-digit SIC code industry level and SIC composite data aggregation level.

³² The Industry Cost of Debt was first published as a standalone reported item in 2011. For years 2006-2010, we calculate the Industry Cost of Debt in a year by adding to the 2011 figure the difference in the spread of a 10-year BBB corporate bond between 2011 and that year. For example, Ibbotson Cost of Capital 2011 Yearbook reports cost of debt of 4.63% for the two-digit SIC code 27. The average spread over the risk-free rate of a 10-year BBB corporate bond, as reported by Bloomberg, was 2.07% in 2011 and 3.27% in 2008. Thus, for 2008, we estimate the cost of debt for SIC code 27 at 5.83% (= 4.63% + 3.27% - 2.07%).

Capital yearbooks. Both the Industry Cost of Debt and Debt Weight are measured at the two-digit SIC code level.³³

A-21. The Industry Cost of Common Equity for the S&P 500 companies is calculated by equally weighing the common equity cost estimates based on the CAPM and MSDCF methods³⁴ as reported in the Ibbotson/Duff & Phelps Cost of Capital yearbooks. I calculate the Common Equity Weight as one minus Debt Weight.³⁵ Both Industry Cost of Common Equity and Common Equity Weight are calculated at the two-digit SIC code level.³⁶

A-22. As discussed earlier, the CAPM has three inputs: risk-free rate; market risk premium; and beta. The risk-free rate and the market risk premium are economy-wide estimates. The risk-free rate and the market risk premium for the S&P 500 companies are the annual figures reported in the STB Cost of Capital Decisions. Industry beta for the S&P 500 companies is the levered raw beta reported in the Ibbotson/Duff & Phelps Industry Cost of Capital books at the two-digit SIC code level.³⁷

³³ I use the reported “SIC Composite” definition.

³⁴ Note that prior to 2008, STB calculated Cost of Common Equity based on CAPM alone. Respectively, for the two years prior to 2008 in my sample, 2006 and 2007, I use only CAPM to estimate the Cost of Common Equity.

³⁵ This calculation of the Common Equity Weights assumes that the companies in our sample finance their operations with debt and common equity only. In reality, companies use other equity securities, such as preferred equity. Thus, we effectively assume that costs of common and preferred equity are the same. We expect the impact of this assumption on our cost of capital calculations to be *de minimis* due to the usually small proportion of preferred equity to total capital. For example, over the last 13 years, STB determined that the preferred equity accounted for less than 0.005% of the publicly traded railroads’ total capital in 5 of the 13 years and zero % in the other 8 years.

³⁶ I use the reported “SIC Composite” definition.

³⁷ I use the reported “SIC Composite” definition.

A-23. The MSDCF cost of equity for each company is the 3-Stage Discounted Cash Flow cost of equity reported in Ibbotson/Duff & Phelps Cost of Capital yearbooks at the two-digit SIC code level.³⁸ The methodology of the 3-Stage Discounted Cash Flow Model³⁹ forms the foundation of STB's MSDCF Model.⁴⁰ Thus the 3-Stage Discounted Cash Flow cost of equity and the MSDCF cost of equity are calculated based on the same methodology.

A-24. The Industry Cost of Capital for the S&P 500 companies is equal to the weighted averages of the Industry Cost of Debt and Industry Cost of Equity. The data to measure the industry cost of capital is not available for all years for all two-digit SIC codes because these codes were not available in the Ibbotson/Duff & Phelps Cost of Capital yearbooks.⁴¹ When the industry cost of capital was not available for a two-digit SIC code in a year, we estimate the cost of capital for that two-digit SIC code based on the average cost of capital across all two-digit SIC codes in that year.⁴²

³⁸ I use the reported "SIC Composite" definition.

³⁹ See, for example, Ibbotson Cost of Capital 2013 Yearbook, p. 13, "The three-stage model identifies three separate growth rates: a growth rate applicable to cash flows during the first five years of future performance, a growth rate applicable to cash flows over the sixth through tenth years, and a growth rate applicable to earnings for all future years following the first ten years... Cash flow is defined as income before extraordinary items plus depreciation less capital expenditures plus deferred taxes. Normal cash flows and income before extraordinary items are used because of the potential for anomalous years. 'Normal' cash flows and income before extraordinary items are estimated by multiplying the last five years average cash flow and earnings rates, both as a percent of sales, by the most recent year's sales... Earnings are used in place of cash flows in the third term, because over extended periods of time it is assumed that capital expenditures and depreciation will be equal... In those instances where companies in the composite do not have a Thomson Reuters earnings growth estimate, the industry average is substituted."

⁴⁰ See paragraph A-16 and the footnotes thereto.

⁴¹ The methodology underlying the analyses in the yearbooks require a minimum of 5 companies per industry.

⁴² More specifically, if the cost of capital is not available for a given two-digit SIC code in a year, we add to the average cost of capital calculated across all two-digit SIC codes ("sample average") in that year the mean deviation from the sample average across all other years in which there is a cost of capital figure available for the two-digit SIC code with missing cost of capital in the current year. The industry cost of capital was not available for any year for two-digit SIC code 99, Nonclassifiable Establishments. For industries with SIC code 99, we use the sample average cost of capital. The issue of missing industry cost of capital affects less than 3% of our sample.

Exhibit A1
S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
ENERGY FUTURE HOLDINGS CORP	0033A	1	0	0	0	0	0	0	0	0	0	0	0	0
AVAYA INC	5933B	1	0	0	0	0	0	0	0	0	0	0	0	0
BIOMET INC	5938B	1	0	0	0	0	0	0	0	0	0	0	0	0
UNIVISION COMMUNICATIONS INC	5952B	1	0	0	0	0	0	0	0	0	0	0	0	0
BAUSCH & LOMB HLDGS -REDH	6583B	1	0	0	0	0	0	0	0	0	0	0	0	0
AGILENT TECHNOLOGIES INC	A	1	1	1	1	1	1	1	1	1	1	1	1	1
ALCOA INC	AA.3	1	1	1	1	1	1	1	1	1	1	0	0	0
ALTABA INC	AABA	1	1	1	1	1	1	1	1	1	1	1	0	0
AMERICAN AIRLINES GROUP INC	AAL	0	0	0	0	0	0	0	0	0	1	1	1	1
ADVANCE AUTO PARTS INC	AAP	0	0	0	0	0	0	0	0	0	1	1	1	1
APPLE INC	AAPL	1	1	1	1	1	1	1	1	1	1	1	1	1
ABBVIE INC	ABBV	0	0	0	0	0	0	0	1	1	1	1	1	1
AMERISOURCEBERGEN CORP	ABC	1	1	1	1	1	1	1	1	1	1	1	1	1
APPLIED BIOSYSTEMS INC	ABL.3	1	1	0	0	0	0	0	0	0	0	0	0	0
ABIOMED INC	ABMD	0	0	0	0	0	0	0	0	0	0	0	0	1
ABBOTT LABORATORIES	ABT	1	1	1	1	1	1	1	1	1	1	1	1	1
AMERICAN CAPITAL LTD	ACAS*	0	1	1	0	0	0	0	0	0	0	0	0	0
ACCENTURE PLC	ACN	0	0	0	0	0	1	1	1	1	1	1	1	1
AFFILIATED COMPUTER SERVICES	ACS	1	1	1	1	0	0	0	0	0	0	0	0	0
ADOBE INC	ADBE	1	1	1	1	1	1	1	1	1	1	1	1	1
ADC TELECOMMUNICATIONS INC	ADCT	1	0	0	0	0	0	0	0	0	0	0	0	0
ANALOG DEVICES	ADI	1	1	1	1	1	1	1	1	1	1	1	1	1
ARCHER-DANIELS-MIDLAND CO	ADM	1	1	1	1	1	1	1	1	1	1	1	1	1
AUTOMATIC DATA PROCESSING	ADP	1	1	1	1	1	1	1	1	1	1	1	1	1
ALLIANCE DATA SYSTEMS CORP	ADS	0	0	0	0	0	0	0	1	1	1	1	1	1
AUTODESK INC	ADSK	1	1	1	1	1	1	1	1	1	1	1	1	1
ADT CORP	ADT.4	0	0	0	0	0	0	1	1	1	1	0	0	0
AMEREN CORP	AEE	1	1	1	1	1	1	1	1	1	1	1	1	1
AMERICAN ELECTRIC POWER CO	AEP	1	1	1	1	1	1	1	1	1	1	1	1	1
AES CORP (THE)	AES	1	1	1	1	1	1	1	1	1	1	1	1	1
AETNA INC	AET	1	1	1	1	1	1	1	1	1	1	1	1	0
AFLAC INC	AFL*	1	1	1	1	1	1	1	1	1	1	1	1	1

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Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
ALLERGAN PLC	AGN	1	1	1	1	1	1	1	1	1	1	1	1	1
ALLERGAN INC	AGN.2	1	1	1	1	1	1	1	1	1	0	0	0	0
AMERICAN INTERNATIONAL GROUP	AIG*	1	1	1	1	1	1	1	1	1	1	1	1	1
APARTMENT INVST & MGMT CO	AIV*	1	1	1	1	1	1	1	1	1	1	1	1	1
ASSURANT INC	AIZ*	0	1	1	1	1	1	1	1	1	1	1	1	1
ARTHUR J GALLAGHER & CO	AJG*	0	0	0	0	0	0	0	0	0	0	1	1	1
AKAMAI TECHNOLOGIES INC	AKAM	0	1	1	1	1	1	1	1	1	1	1	1	1
AK STEEL HOLDING CORP	AKS	0	0	1	1	1	0	0	0	0	0	0	0	0
ALBEMARLE CORP	ALB	0	0	0	0	0	0	0	0	0	0	1	1	1
ALIGN TECHNOLOGY INC	ALGN	0	0	0	0	0	0	0	0	0	0	0	1	1
ALASKA AIR GROUP INC	ALK	0	0	0	0	0	0	0	0	0	0	1	1	1
ALLSTATE CORP	ALL*	1	1	1	1	1	1	1	1	1	1	1	1	1
ALLEGION PLC	ALLE	0	0	0	0	0	0	0	1	1	1	1	1	1
ALTERA CORP	ALTR.1	1	1	1	1	1	1	1	1	1	0	0	0	0
ALEXION PHARMACEUTICALS INC	ALXN	0	0	0	0	0	0	1	1	1	1	1	1	1
APPLIED MATERIALS INC	AMAT	1	1	1	1	1	1	1	1	1	1	1	1	1
AMBAC FINANCIAL GROUP INC	AMBC*	1	1	0	0	0	0	0	0	0	0	0	0	0
ADVANCED MICRO DEVICES	AMD	1	1	1	1	1	1	1	0	0	0	0	1	1
AMETEK INC	AME	0	0	0	0	0	0	0	1	1	1	1	1	1
AFFILIATED MANAGERS GRP INC	AMG*	0	0	0	0	0	0	0	0	1	1	1	1	1
AMGEN INC	AMGN	1	1	1	1	1	1	1	1	1	1	1	1	1
AMERIPRISE FINANCIAL INC	AMP*	1	1	1	1	1	1	1	1	1	1	1	1	1
AMERICAN TOWER CORP	AMT*	0	1	1	1	1	1	1	1	1	1	1	1	1
AMAZON.COM INC	AMZN	1	1	1	1	1	1	1	1	1	1	1	1	1
AUTONATION INC	AN	1	1	1	1	1	1	1	1	1	1	1	0	0
ANDEAVOR	ANDV	0	1	1	1	1	1	1	1	1	1	1	1	0
ARISTA NETWORKS INC	ANET	0	0	0	0	0	0	0	0	0	0	0	0	1
ABERCROMBIE & FITCH -CL A	ANF	0	1	1	1	1	1	1	0	0	0	0	0	0
ALPHA NATURAL RESOURCES INC	ANRZQ	0	0	0	0	0	1	0	0	0	0	0	0	0
ANSYS INC	ANSS	0	0	0	0	0	0	0	0	0	0	0	1	1
ANTHEM INC	ANTM	1	1	1	1	1	1	1	1	1	1	1	1	1
AON PLC	AON*	1	1	1	1	1	1	1	1	1	1	1	1	1

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Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
SMITH (A.O.)	AOS	0	0	0	0	0	0	0	0	0	0	0	1	1
APACHE CORP	APA	1	1	1	1	1	1	1	1	1	1	1	1	1
ANADARKO PETROLEUM CORP	APC	1	1	1	1	1	1	1	1	1	1	1	1	1
AMERICAN POWER CONVERSION CP	APCC.	1	0	0	0	0	0	0	0	0	0	0	0	0
AIR PRODUCTS & CHEMICALS INC	APD	1	1	1	1	1	1	1	1	1	1	1	1	1
AMPHENOL CORP	APH	0	0	1	1	1	1	1	1	1	1	1	1	1
APOLLO EDUCATION GROUP INC	APOL	1	1	1	1	1	1	1	0	0	0	0	0	0
APTIV PLC	APTV	0	0	0	0	0	0	1	1	1	1	1	1	1
ALEXANDRIA R E EQUITIES INC	ARE*	0	0	0	0	0	0	0	0	0	0	0	1	1
AIRGAS INC	ARG	0	0	0	1	1	1	1	1	1	1	0	0	0
ARCONIC INC	ARNC	0	0	0	0	0	0	0	0	0	0	1	1	1
ASHLAND GLOBAL HOLDINGS INC	ASH	1	1	0	0	0	0	0	0	0	0	0	0	0
ARCHSTONE INC-REDH	ASN*	1	0	0	0	0	0	0	0	0	0	0	0	0
ALLTEL CORP	AT.2	1	0	0	0	0	0	0	0	0	0	0	0	0
ADTALEM GLOBAL EDUCATION INC	ATGE	0	0	0	1	1	1	0	0	0	0	0	0	0
ALLEGHENY TECHNOLOGIES INC	ATI	1	1	1	1	1	1	1	1	1	0	0	0	0
ALTICE USA INC	ATUS	0	0	0	0	1	1	1	1	1	1	0	0	0
ACTIVISION BLIZZARD INC	ATVI	0	0	0	0	0	0	0	0	0	1	1	1	1
AVALONBAY COMMUNITIES INC	AVB*	0	1	1	1	1	1	1	1	1	1	1	1	1
BROADCOM INC	AVGO	0	0	0	0	0	0	0	0	1	1	1	1	1
AVON PRODUCTS	AVP	1	1	1	1	1	1	1	1	1	0	0	0	0
AVERY DENNISON CORP	AVY	1	1	1	1	1	1	1	1	1	1	1	1	1
ALLIED WASTE INDUSTRIES INC	AW	1	1	0	0	0	0	0	0	0	0	0	0	0
AMERICAN WATER WORKS CO INC	AWK	0	0	0	0	0	0	0	0	0	0	1	1	1
AMERICAN EXPRESS CO	AXP*	1	1	1	1	1	1	1	1	1	1	1	1	1
ALLEGHENY ENERGY INC	AYE	1	1	1	1	1	0	0	0	0	0	0	0	0
ACUITY BRANDS INC	AYI	0	0	0	0	0	0	0	0	0	0	1	1	0
AUTOZONE INC	AZO	1	1	1	1	1	1	1	1	1	1	1	1	1
BOEING CO	BA	1	1	1	1	1	1	1	1	1	1	1	1	1
BANK OF AMERICA CORP	BAC*	1	1	1	1	1	1	1	1	1	1	1	1	1
MERRILL LYNCH & CO INC	BAC2*	1	1	1	0	0	0	0	0	0	0	0	0	0
BAXTER INTERNATIONAL INC	BAX	1	1	1	1	1	1	1	1	1	1	1	1	1

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Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
BED BATH & BEYOND INC	BBBY	1	1	1	1	1	1	1	1	1	1	1	0	0
BB&T CORP	BBT*	1	1	1	1	1	1	1	1	1	1	1	1	1
BBVA COMPASS BANCSHARES INC	BBVA1*	1	0	0	0	0	0	0	0	0	0	0	0	0
BEST BUY CO INC	BBY	1	1	1	1	1	1	1	1	1	1	1	1	1
BRUNSWICK CORP	BC	1	1	0	0	0	0	0	0	0	0	0	0	0
BARD (C.R.) INC	BCR	1	1	1	1	1	1	1	1	1	1	1	1	0
BLACK & DECKER CORP	BDK	1	1	1	1	0	0	0	0	0	0	0	0	0
BECTON DICKINSON & CO	BDX	1	1	1	1	1	1	1	1	1	1	1	1	1
BEAM INC	BEAM	1	1	1	1	1	1	1	1	0	0	0	0	0
FRANKLIN RESOURCES INC	BEN*	1	1	1	1	1	1	1	1	1	1	1	1	1
BROWN FORMAN CORP	BF.B	1	1	1	1	1	1	1	1	1	1	1	1	1
BRIGHTHOUSE FINANL INC	BHF*	0	0	0	0	0	0	0	0	0	0	0	1	1
BAKER HUGHES A GE CO	BHGE	0	0	0	0	0	0	0	0	0	0	0	1	1
BAKER HUGHES INC	BHI	1	1	1	1	1	1	1	1	1	1	1	0	0
BIG LOTS INC	BIG	1	1	1	1	1	1	1	0	0	0	0	0	0
BIOGEN INC	BIIB	1	1	1	1	1	1	1	1	1	1	1	1	1
BJ SERVICES CO	BJS.1	1	1	1	1	0	0	0	0	0	0	0	0	0
BANK OF NEW YORK MELLON CORP	BK*	1	1	1	1	1	1	1	1	1	1	1	1	1
BOOKING HOLDINGS INC	BKNG	0	0	0	1	1	1	1	1	1	1	1	1	1
BLACKROCK INC	BLK*	0	0	0	0	0	1	1	1	1	1	1	1	1
BALL CORP	BLL	1	1	1	1	1	1	1	1	1	1	1	1	1
BELLSOUTH CORP	BLS	1	0	0	0	0	0	0	0	0	0	0	0	0
BMC SOFTWARE INC	BMC	1	1	1	1	1	1	1	0	0	0	0	0	0
BEMIS CO INC	BMS	1	1	1	1	1	1	1	1	0	0	0	0	0
BRISTOL-MYERS SQUIBB CO	BMJ	1	1	1	1	1	1	1	1	1	1	1	1	1
BROADRIDGE FINANCIAL SOLUTNS	BR	0	0	0	0	0	0	0	0	0	0	0	0	1
BROADCOM CORP	BRCM	1	1	1	1	1	1	1	1	1	1	0	0	0
BERKSHIRE HATHAWAY	BRK.B*	0	0	0	0	1	1	1	1	1	1	1	1	1
BURLINGTON NORTHERN SANTA FE	BRK3	1	1	1	1	0	0	0	0	0	0	0	0	0
BARR PHARMACEUTICALS INC	BRL	1	1	0	0	0	0	0	0	0	0	0	0	0
BEAR STEARNS COMPANIES INC	BSC.1*	1	1	0	0	0	0	0	0	0	0	0	0	0
BOSTON SCIENTIFIC CORP	BSX	1	1	1	1	1	1	1	1	1	1	1	1	1

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S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
PEABODY ENERGY CORP	BTU	1	1	1	1	1	1	1	1	0	0	0	0	0
ANHEUSER-BUSCH COS INC	BUD.2	1	1	0	0	0	0	0	0	0	0	0	0	0
BORGWARNER INC	BWA	0	0	0	0	0	1	1	1	1	1	1	1	1
BAXALTA INC	BXLT	0	0	0	0	0	0	0	0	0	1	0	0	0
BOSTON PROPERTIES INC	BXP*	1	1	1	1	1	1	1	1	1	1	1	1	1
CITIGROUP INC	C*	1	1	1	1	1	1	1	1	1	1	1	1	1
CA INC	CA	1	1	1	1	1	1	1	1	1	1	1	1	0
CONAGRA BRANDS INC	CAG	1	1	1	1	1	1	1	1	1	1	1	1	1
CARDINAL HEALTH INC	CAH	1	1	1	1	1	1	1	1	1	1	1	1	1
CAMERON INTERNATIONAL CORP	CAM	0	0	1	1	1	1	1	1	1	1	0	0	0
CATERPILLAR INC	CAT	1	1	1	1	1	1	1	1	1	1	1	1	1
CHUBB LTD	CB*	1	1	0	0	1	1	1	1	1	1	1	1	1
CHUBB CORP	CB.1*	1	1	1	1	1	1	1	1	1	1	0	0	0
COOPER INDUSTRIES PLC	CBE	1	1	1	0	0	1	0	0	0	0	0	0	0
COMMERCE BANCORP INC/NJ	CBH.1*	1	1	0	0	0	0	0	0	0	0	0	0	0
CBOE GLOBAL MARKETS INC	CBOE*	0	0	0	0	0	0	0	0	0	0	0	1	1
CBRE GROUP INC	CBRE*	1	1	1	1	1	1	1	1	1	1	1	1	1
CBS CORP	CBS	1	1	1	1	1	1	1	1	1	1	1	1	1
COCA-COLA EUROPEAN PARTNERS	CCEP	1	1	1	1	1	1	1	1	1	1	0	0	0
CROWN CASTLE INTL CORP	CCI*	0	0	0	0	0	0	1	1	1	1	1	1	1
CARNIVAL CORP/PLC (USA)	CCL	1	1	1	1	1	1	1	1	1	1	1	1	1
CIRCUIT CITY STORES INC	CCTYQ	1	1	0	0	0	0	0	0	0	0	0	0	0
CADENCE DESIGN SYSTEMS INC	CDNS	0	0	0	0	0	0	0	0	0	0	0	1	1
CELANESE CORP	CE	0	0	0	0	0	0	0	0	0	0	0	0	1
CONSTELLATION ENERGY GRP INC	CEG	1	1	1	1	1	1	0	0	0	0	0	0	0
CELGENE CORP	CELG	1	1	1	1	1	1	1	1	1	1	1	1	1
CEPHALON INC	CEPH	0	0	1	1	1	0	0	0	0	0	0	0	0
CERNER CORP	CERN	0	0	0	0	1	1	1	1	1	1	1	1	1
CF INDUSTRIES HOLDINGS INC	CF	0	0	1	1	1	1	1	1	1	1	1	1	1
COUNTRYWIDE FINANCIAL CORP	CFC.3*	1	1	0	0	0	0	0	0	0	0	0	0	0
CITIZENS FINANCIAL GROUP INC	CFG*	0	0	0	0	0	0	0	0	0	0	1	1	1
CAREFUSION CORP	CFN	0	0	0	1	1	1	1	1	1	0	0	0	0

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Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
CHURCH & DWIGHT INC	CHD	0	0	0	0	0	0	0	0	0	1	1	1	1
CHESAPEAKE ENERGY CORP	CHK	1	1	1	1	1	1	1	1	1	1	1	1	0
C H ROBINSON WORLDWIDE INC	CHRW	0	1	1	1	1	1	1	1	1	1	1	1	1
CHARTER COMMUNICATIONS INC	CHTR	0	0	0	0	0	0	0	0	0	0	1	1	1
CIGNA CORP	CI	1	1	1	1	1	1	1	1	1	1	1	1	1
CIENA CORP	CIEN	1	1	1	0	0	0	0	0	0	0	0	0	0
CINCINNATI FINANCIAL CORP	CINF*	1	1	1	1	1	1	1	1	1	1	1	1	1
CIT GROUP INC	CIT*	1	1	1	0	0	0	0	0	0	0	0	0	0
COLGATE-PALMOLIVE CO	CL	1	1	1	1	1	1	1	1	1	1	1	1	1
CLEVELAND-CLIFFS INC	CLF	0	0	0	1	1	1	1	1	0	0	0	0	0
CLOROX CO/DE	CLX	1	1	1	1	1	1	1	1	1	1	1	1	1
COMERICA INC	CMA*	1	1	1	1	1	1	1	1	1	1	1	1	1
COMCAST CORP	CMCSA	1	1	1	1	1	1	1	1	1	1	1	1	1
CME GROUP INC	CME*	1	1	1	1	1	1	1	1	1	1	1	1	1
CHIPOTLE MEXICAN GRILL INC	CMG	0	0	0	0	0	1	1	1	1	1	1	1	1
CUMMINS INC	CMI	1	1	1	1	1	1	1	1	1	1	1	1	1
CMS ENERGY CORP	CMS	1	1	1	1	1	1	1	1	1	1	1	1	1
COMVERSE TECHNOLOGY INC	CMVT	1	0	0	0	0	0	0	0	0	0	0	0	0
CAREMARK RX INC	CMX.1	1	0	0	0	0	0	0	0	0	0	0	0	0
CENTENE CORP	CNC	0	0	0	0	0	0	0	0	0	0	1	1	1
CENTERPOINT ENERGY INC	CNP	1	1	1	1	1	1	1	1	1	1	1	1	1
CNX RESOURCES CORPORATION	CNX	1	1	1	1	1	1	1	1	1	1	0	0	0
CAPITAL ONE FINANCIAL CORP	COF*	1	1	1	1	1	1	1	1	1	1	1	1	1
CABOT OIL & GAS CORP	COG	0	0	1	1	1	1	1	1	1	1	1	1	1
ROCKWELL COLLINS	COL	1	1	1	1	1	1	1	1	1	1	1	1	0
COOPER COS INC (THE)	COO	0	0	0	0	0	0	0	0	0	0	1	1	1
CONOCOPHILLIPS	COP	1	1	1	1	1	1	1	1	1	1	1	1	1
COSTCO WHOLESALE CORP	COST	1	1	1	1	1	1	1	1	1	1	1	1	1
COTY INC	COTY	0	0	0	0	0	0	0	0	0	0	1	1	1
COVIDIEN PLC	COV	0	1	1	0	0	1	1	1	1	0	0	0	0
CAMPBELL SOUP CO	CPB	1	1	1	1	1	1	1	1	1	1	1	1	1
COLUMBIA PIPELINE GROUP INC	CPGX	0	0	0	0	0	0	0	0	0	1	0	0	0

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Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
CAPRI HOLDINGS LTD	CPRI	0	0	0	0	0	0	0	1	1	1	1	1	1
COPART INC	CPRT	0	0	0	0	0	0	0	0	0	0	0	0	1
COMPUWARE CORP	CPWR.1	1	1	1	1	1	1	0	0	0	0	0	0	0
SALESFORCE.COM INC	CRM	0	0	1	1	1	1	1	1	1	1	1	1	1
CISCO SYSTEMS INC	CSCO	1	1	1	1	1	1	1	1	1	1	1	1	1
CSRA INC	CSRA	0	0	0	0	0	0	0	0	0	1	1	1	0
CSX CORP	CSX	1	1	1	1	1	1	1	1	1	1	1	1	1
CINTAS CORP	CTAS	1	1	1	1	1	1	1	1	1	1	1	1	1
CENTURYLINK INC	CTL	1	1	1	1	1	1	1	1	1	1	1	1	1
COGNIZANT TECH SOLUTIONS	CTSH	1	1	1	1	1	1	1	1	1	1	1	1	1
CENTEX CORP	CTX.2	1	1	1	0	0	0	0	0	0	0	0	0	0
CITRIX SYSTEMS INC	CTXS	1	1	1	1	1	1	1	1	1	1	1	1	1
CONVERGYS CORP	CVG	1	1	1	0	0	0	0	0	0	0	0	0	0
COVENTRY HEALTH CARE INC	CVH	1	1	1	1	1	1	1	0	0	0	0	0	0
CVS HEALTH CORP	CVS	1	1	1	1	1	1	1	1	1	1	1	1	1
CHEVRON CORP	CVX	1	1	1	1	1	1	1	1	1	1	1	1	1
CONCHO RESOURCES INC	CXO	0	0	0	0	0	0	0	0	0	0	1	1	1
CAESARS ENTERTAINMENT CORP	CZR	1	1	0	0	0	0	0	0	0	0	0	0	0
DOMINION ENERGY INC	D	1	1	1	1	1	1	1	1	1	1	1	1	1
DELTA AIR LINES INC	DAL	0	0	0	0	0	0	0	1	1	1	1	1	1
DUPONT DE NEMOURS INC	DD	1	1	1	1	1	1	1	1	1	1	1	1	1
DU PONT (E I) DE NEMOURS	DD.2	1	1	1	1	1	1	1	1	1	1	1	0	0
DILLARDS INC -CL A	DDS	1	1	0	0	0	0	0	0	0	0	0	0	0
DEERE & CO	DE	1	1	1	1	1	1	1	1	1	1	1	1	1
DELL TECHNOLOGIES INC	DELL	1	1	1	1	1	1	1	0	0	0	0	0	0
DEAN FOODS CO	DF	1	1	1	1	1	1	1	0	0	0	0	0	0
DISCOVER FINANCIAL SVCS	DFS*	0	1	1	1	1	1	1	1	1	1	1	1	1
DOLLAR GENERAL CORP	DG	1	0	0	0	0	0	1	1	1	1	1	1	1
QUEST DIAGNOSTICS INC	DGX	1	1	1	1	1	1	1	1	1	1	1	1	1
D R HORTON INC	DHI	1	1	1	1	1	1	1	1	1	1	1	1	1
DANAHER CORP	DHR	1	1	1	1	1	1	1	1	1	1	1	1	1
DISNEY (WALT) CO	DIS	1	1	1	1	1	1	1	1	1	1	1	1	1

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Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
DISCOVERY INC	DISCA	0	0	0	0	1	1	1	1	1	1	1	1	1
DISH NETWORK CORP	DISH	0	0	0	0	0	0	0	0	0	0	0	1	1
DOW JONES & CO INC	DJ	1	0	0	0	0	0	0	0	0	0	0	0	0
DIGITAL REALTY TRUST INC	DLR*	0	0	0	0	0	0	0	0	0	0	1	1	1
DOLLAR TREE INC	DLTR	0	0	0	0	0	1	1	1	1	1	1	1	1
DUN & BRADSTREET CORP	DNB	0	0	1	1	1	1	1	1	1	1	1	0	0
DENBURY RESOURCES INC	DNR	0	0	0	1	1	1	1	1	1	0	0	0	0
DIAMOND OFFSHORE DRILLING INC	DO	0	0	0	1	1	1	1	1	1	1	0	0	0
DOVER CORP	DOV	1	1	1	1	1	1	1	1	1	1	1	1	1
DR PEPPER SNAPPLE GROUP INC	DPS	0	0	1	1	1	1	1	1	1	1	1	1	0
DUKE REALTY CORP	DRE*	0	0	0	0	0	0	0	0	0	0	0	1	1
DARDEN RESTAURANTS INC	DRI	1	1	1	1	1	1	1	1	1	1	1	1	1
DTE ENERGY CO	DTE	1	1	1	1	1	1	1	1	1	1	1	1	1
DIRECTV	DTV.2	1	1	1	1	1	1	1	1	1	0	0	0	0
DUKE ENERGY CORP	DUK	1	1	1	1	1	1	1	1	1	1	1	1	1
PROGRESS ENERGY INC	DUK8	1	1	1	1	1	1	0	0	0	0	0	0	0
DAVITA INC	DVA	0	0	1	1	1	1	1	1	1	1	1	1	1
DEVON ENERGY CORP	DVN	1	1	1	1	1	1	1	1	1	1	1	1	1
DXC TECHNOLOGY CO	DXC	1	1	1	1	1	1	1	1	1	0	0	1	1
DYNEGY INC	DYN	1	1	1	0	0	0	0	0	0	0	0	0	0
ELECTRONIC ARTS INC	EA	1	1	1	1	1	1	1	1	1	1	1	1	1
EBAY INC	EBAY	1	1	1	1	1	1	1	1	1	1	1	1	1
ECOLAB INC	ECL	1	1	1	1	1	1	1	1	1	1	1	1	1
CONSOLIDATED EDISON INC	ED	1	1	1	1	1	1	1	1	1	1	1	1	1
ELECTRONIC DATA SYSTEMS CORP	EDS.	1	1	0	0	0	0	0	0	0	0	0	0	0
EQUIFAX INC	EFX	1	1	1	1	1	1	1	1	1	1	1	1	1
EDISON INTERNATIONAL	EIX	1	1	1	1	1	1	1	1	1	1	1	1	1
LAUDER (ESTEE) COS INC -CL A	EL	1	1	1	1	1	1	1	1	1	1	1	1	1
EMC CORP/MA	EMC	1	1	1	1	1	1	1	1	1	1	0	0	0
EASTMAN CHEMICAL CO	EMN	1	1	1	1	1	1	1	1	1	1	1	1	1
EMERSON ELECTRIC CO	EMR	1	1	1	1	1	1	1	1	1	1	1	1	1
ENDO INTERNATIONAL PLC	ENDP	0	0	0	0	0	0	0	0	0	1	1	0	0

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S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
EOG RESOURCES INC	EOG	1	1	1	1	1	1	1	1	1	1	1	1	1
EQUITY OFFICE PROPERTIES TR	EOP*	1	0	0	0	0	0	0	0	0	0	0	0	0
EL PASO CORP	EP	1	1	1	1	1	1	0	0	0	0	0	0	0
EMBARQ CORP	EQ.2	1	1	1	0	0	0	0	0	0	0	0	0	0
EQUINIX INC	EQIX*	0	0	0	0	0	0	0	0	0	1	1	1	1
EQUITY RESIDENTIAL	EQR*	1	1	1	1	1	1	1	1	1	1	1	1	1
EQT CORP	EQT	0	0	1	1	1	1	1	1	1	1	1	1	0
EVERSOURCE ENERGY	ES	0	0	0	1	1	1	1	1	1	1	1	1	1
EXPRESS SCRIPTS HOLDING CO	ESRX	1	1	1	1	1	1	1	1	1	1	1	1	0
ESSEX PROPERTY TRUST	ESS*	0	0	0	0	0	0	0	0	1	1	1	1	1
ENSCO ROWAN PLC	ESV	0	1	1	0	0	0	1	1	1	1	0	0	0
E TRADE FINANCIAL CORP	ETFC*	1	1	1	1	1	1	1	1	1	1	1	1	1
EATON CORP PLC	ETN	1	1	1	1	1	1	1	1	1	1	1	1	1
ENTERGY CORP	ETR	1	1	1	1	1	1	1	1	1	1	1	1	1
ENVISION HEALTHCARE CORP	EVHC	0	0	0	0	0	0	0	0	0	0	1	1	0
EVERGY INC	EVRG	0	0	0	0	0	0	0	0	0	0	0	0	1
EDWARDS LIFESCIENCES CORP	EW	0	0	0	0	0	1	1	1	1	1	1	1	1
EXELON CORP	EXC	1	1	1	1	1	1	1	1	1	1	1	1	1
EXPEDITORS INTL WASH INC	EXPD	0	1	1	1	1	1	1	1	1	1	1	1	1
EXPEDIA GROUP INC	EXPE	0	1	1	1	1	1	1	1	1	1	1	1	1
EXTRA SPACE STORAGE INC	EXR*	0	0	0	0	0	0	0	0	0	0	1	1	1
FORD MOTOR CO	F	1	1	1	1	1	1	1	1	1	1	1	1	1
DIAMONDBACK ENERGY INC	FANG	0	0	0	0	0	0	0	0	0	0	0	0	1
FASTENAL CO	FAST	0	0	1	1	1	1	1	1	1	1	1	1	1
FACEBOOK INC	FB	0	0	0	0	0	0	0	1	1	1	1	1	1
FORTUNE BRANDS HOME & SECUR	FBHS	0	0	0	0	0	0	0	0	0	0	1	1	1
FREEPORT-MCMORAN INC	FCX	1	1	1	1	1	1	1	1	1	1	1	1	1
FIRST DATA CORP	FDC	1	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY DOLLAR STORES	FDO	1	1	1	1	1	1	1	1	1	0	0	0	0
FEDEX CORP	FDX	1	1	1	1	1	1	1	1	1	1	1	1	1
FIRSTENERGY CORP	FE	1	1	1	1	1	1	1	1	1	1	1	1	1
F5 NETWORKS INC	FFIV	0	0	0	0	1	1	1	1	1	1	1	1	1

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S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
FIRST HORIZON NATIONAL CORP	FHN*	1	1	1	1	1	1	1	0	0	0	0	0	0
FEDERATED INVESTORS INC	FII*	1	1	1	1	1	1	1	0	0	0	0	0	0
FIDELITY NATIONAL INFO SVCS	FIS	1	1	1	1	1	1	1	1	1	1	1	1	1
FISERV INC	FISV	1	1	1	1	1	1	1	1	1	1	1	1	1
FIFTH THIRD BANCORP	FITB*	1	1	1	1	1	1	1	1	1	1	1	1	1
FOOT LOCKER INC	FL	0	0	0	0	0	0	0	0	0	0	1	1	1
FLIR SYSTEMS INC	FLIR	0	0	0	1	1	1	1	1	1	1	1	1	1
FLUOR CORP	FLR	1	1	1	1	1	1	1	1	1	1	1	1	1
FLOWERVE CORP	FLS	0	0	1	1	1	1	1	1	1	1	1	1	1
FLEETCOR TECHNOLOGIES INC	FLT	0	0	0	0	0	0	0	0	0	0	0	0	1
FMC CORP	FMC	0	0	0	1	1	1	1	1	1	1	1	1	1
FEDERAL HOME LOAN MORTG CORP	FMCC*	1	1	0	0	0	0	0	0	0	0	0	0	0
FEDERAL NATIONAL MORTGA ASSN	FNMA*	1	1	0	0	0	0	0	0	0	0	0	0	0
FOSSIL GROUP INC	FOSL	0	0	0	0	0	0	1	1	1	1	0	0	0
FEDERAL REALTY INVESTMENT TR	FRT*	0	0	0	0	0	0	0	0	0	0	1	1	1
FOREST LABORATORIES -CL A	FRX	1	1	1	1	1	1	1	1	0	0	0	0	0
FIRST SOLAR INC	FSLR	0	0	0	1	1	1	1	1	1	1	1	0	0
TECHNIPFMC PLC	FTI	0	0	0	0	0	0	0	0	0	0	0	1	1
FMC TECHNOLOGIES INC	FTL1	0	0	0	1	1	1	1	1	1	1	1	0	0
FORTINET INC	FTNT	0	0	0	0	0	0	0	0	0	0	0	0	1
FRONTIER COMMUNICATIONS CORP	FTR	1	1	1	1	1	1	1	1	1	1	1	0	0
FORTIVE CORP	FTV	0	0	0	0	0	0	0	0	0	0	1	1	1
NICOR INC	GAS.2	1	1	1	1	1	0	0	0	0	0	0	0	0
GENERAL DYNAMICS CORP	GD	1	1	1	1	1	1	1	1	1	1	1	1	1
GENERAL ELECTRIC CO	GE	1	1	1	1	1	1	1	1	1	1	1	1	1
GENZYME CORP	GENZ	1	1	1	1	1	0	0	0	0	0	0	0	0
GGP INC	GGP*	0	1	0	0	0	0	0	1	1	1	1	1	0
GRAHAM HOLDINGS CO	GHC	0	1	1	1	1	1	1	1	0	0	0	0	0
GILEAD SCIENCES INC	GILD	1	1	1	1	1	1	1	1	1	1	1	1	1
GENERAL MILLS INC	GIS	1	1	1	1	1	1	1	1	1	1	1	1	1
CORNING INC	GLW	1	1	1	1	1	1	1	1	1	1	1	1	1
GENERAL MOTORS CO	GM	1	1	1	0	0	0	0	1	1	1	1	1	1

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Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
GAMESTOP CORP	GME	0	1	1	1	1	1	1	1	1	1	0	0	0
GENWORTH FINANCIAL INC	GNW*	1	1	1	1	1	1	1	1	1	0	0	0	0
ALPHABET INC	GOOGL	1	1	1	1	1	1	1	1	1	1	1	1	1
GENUINE PARTS CO	GPC	1	1	1	1	1	1	1	1	1	1	1	1	1
GLOBAL PAYMENTS INC	GPN	0	0	0	0	0	0	0	0	0	0	1	1	1
GAP INC	GPS	1	1	1	1	1	1	1	1	1	1	1	1	1
GOODRICH CORP	GR	1	1	1	1	1	1	0	0	0	0	0	0	0
GARMIN LTD	GRMN	0	0	0	0	0	0	1	1	1	1	1	1	1
GOLDMAN SACHS GROUP INC	GS*	1	1	1	1	1	1	1	1	1	1	1	1	1
GOODYEAR TIRE & RUBBER CO	GT	1	1	1	1	1	1	1	1	1	1	1	1	1
GRAINGER (W W) INC	GWW	1	1	1	1	1	1	1	1	1	1	1	1	1
HALLIBURTON CO	HAL	1	1	1	1	1	1	1	1	1	1	1	1	1
HARMAN INTERNATIONAL INDS	HAR	1	1	1	1	1	1	1	1	1	1	1	0	0
HASBRO INC	HAS	1	1	1	1	1	1	1	1	1	1	1	1	1
HUNTINGTON BANCSHARES	HBAN*	1	1	1	1	1	1	1	1	1	1	1	1	1
HANESBRANDS INC	HBI	0	0	0	0	0	0	0	0	0	1	1	1	1
HCA HEALTHCARE INC	HCA	0	0	0	0	0	0	0	0	0	1	1	1	1
HUDSON CITY BANCORP INC	HCBK*	0	1	1	1	1	1	1	1	1	0	0	0	0
HCP INC	HCP*	0	0	1	1	1	1	1	1	1	1	1	1	1
MANOR CARE INC	HCR.1	1	0	0	0	0	0	0	0	0	0	0	0	0
HOME DEPOT INC	HD	1	1	1	1	1	1	1	1	1	1	1	1	1
HESS CORP	HES	1	1	1	1	1	1	1	1	1	1	1	1	1
HOLLYFRONTIER CORP	HFC	0	0	0	0	0	0	0	0	0	0	0	0	1
HARTFORD FINANCIAL SERVICES	HIG*	1	1	1	1	1	1	1	1	1	1	1	1	1
HUNTINGTON INGALLS IND INC	HII	0	0	0	0	0	0	0	0	0	0	0	0	1
HILTON WORLDWIDE HOLDINGS	HLT	1	0	0	0	0	0	0	0	0	0	0	1	1
HEALTH MANAGEMENT ASSOC	HMA	1	0	0	0	0	0	0	0	0	0	0	0	0
HARLEY-DAVIDSON INC	HOG	1	1	1	1	1	1	1	1	1	1	1	1	1
HOLOGIC INC	HOLX	0	0	0	0	0	0	0	0	0	0	1	1	1
HONEYWELL INTERNATIONAL INC	HON	1	1	1	1	1	1	1	1	1	1	1	1	1
STARWOOD HOTELS&RESORTS WRLD	HOT	1	1	1	1	1	1	1	1	1	1	0	0	0
HELMERICH & PAYNE	HP	0	0	0	0	1	1	1	1	1	1	1	1	1

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Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
HERCULES INC	HPC	1	1	0	0	0	0	0	0	0	0	0	0	0
HEWLETT PACKARD ENTERPRISE	HPE	0	0	0	0	0	0	0	0	0	1	1	1	1
HP INC	HPQ	1	1	1	1	1	1	1	1	1	1	1	1	1
BLOCK H & R INC	HRB	1	1	1	1	1	1	1	1	1	1	1	1	1
HORMEL FOODS CORP	HRL	0	0	0	1	1	1	1	1	1	1	1	1	1
HARRIS CORP	HRS	0	0	1	1	1	1	1	1	1	1	1	1	1
HILLSHIRE BRANDS CO	HSH	1	1	1	1	1	1	0	0	0	0	0	0	0
HENRY SCHEIN INC	HSIC	0	0	0	0	0	0	0	0	0	1	1	1	1
HOSPIRA INC	HSP	1	1	1	1	1	1	1	1	1	0	0	0	0
HOST HOTELS & RESORTS INC	HST*	0	1	1	1	1	1	1	1	1	1	1	1	1
HERSHEY CO	HSY	1	1	1	1	1	1	1	1	1	1	1	1	1
HUMANA INC	HUM	1	1	1	1	1	1	1	1	1	1	1	1	1
IAC/INTERACTIVECORP	IAC	1	1	0	0	0	0	0	0	0	0	0	0	0
INTL BUSINESS MACHINES CORP	IBM	1	1	1	1	1	1	1	1	1	1	1	1	1
INTERCONTINENTAL EXCHANGE	ICE*	0	1	1	1	1	1	1	1	1	1	1	1	1
IDEXX LABS INC	IDXX	0	0	0	0	0	0	0	0	0	0	0	1	1
INTL FLAVORS & FRAGRANCES	IFF	1	1	1	1	1	1	1	1	1	1	1	1	1
INTL GAME TECHNOLOGY	IGT.1	1	1	1	1	1	1	1	1	0	0	0	0	0
IHEARTMEDIA INC	IHTM	1	1	0	0	0	0	0	0	0	0	0	0	0
ILLUMINA INC	ILMN	0	0	0	0	0	0	0	0	0	1	1	1	1
IMS HEALTH HOLDINGS INC	IMS	1	1	1	1	0	0	0	0	0	0	0	0	0
INCYTE CORP	INCY	0	0	0	0	0	0	0	0	0	0	0	1	1
IHS MARKIT LTD	INFO	0	0	0	0	0	0	0	0	0	0	0	1	1
INTEL CORP	INTC	1	1	1	1	1	1	1	1	1	1	1	1	1
INTUIT INC	INTU	1	1	1	1	1	1	1	1	1	1	1	1	1
INTL PAPER CO	IP	1	1	1	1	1	1	1	1	1	1	1	1	1
INTERPUBLIC GROUP OF COS	IPG	1	1	1	1	1	1	1	1	1	1	1	1	1
IPG PHOTONICS CORP	IPGP	0	0	0	0	0	0	0	0	0	0	0	0	1
IQVIA HOLDINGS INC	IQV	0	0	0	0	0	0	0	0	0	0	0	1	1
INGERSOLL-RAND PLC	IR	1	1	1	0	1	1	1	1	1	1	1	1	1
IRON MOUNTAIN INC	IRM*	0	0	0	1	1	1	1	1	1	1	1	1	1
INTUITIVE SURGICAL INC	ISRG	0	0	1	1	1	1	1	1	1	1	1	1	1

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Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
GARTNER INC	IT	0	0	0	0	0	0	0	0	0	0	0	1	1
ITT INC	ITT	1	1	1	1	1	0	0	0	0	0	0	0	0
ILLINOIS TOOL WORKS	ITW	1	1	1	1	1	1	1	1	1	1	1	1	1
INVESCO LTD	IVZ*	0	0	1	1	1	1	1	1	1	1	1	1	1
SUN MICROSYSTEMS INC	JAVA	1	1	1	1	0	0	0	0	0	0	0	0	0
HUNT (JB) TRANSPRT SVCS INC	JBHT	0	0	0	0	0	0	0	0	0	1	1	1	1
JABIL INC	JBL	1	1	1	1	1	1	1	1	0	0	0	0	0
JOHNSON CONTROLS INTL PLC	JCI	1	1	1	1	1	1	1	1	1	1	1	1	1
PENNEY (J C) CO	JCP	1	1	1	1	1	1	1	0	0	0	0	0	0
JACOBS ENGINEERING GROUP INC	JEC	0	1	1	1	1	1	1	1	1	1	1	1	1
JEFFERIES FINANCIAL GRP INC	JEF*	0	1	1	1	1	1	1	1	1	1	1	1	1
HENRY (JACK) & ASSOCIATES	JKHY	0	0	0	0	0	0	0	0	0	0	0	0	1
JOHNSON & JOHNSON	JNJ	1	1	1	1	1	1	1	1	1	1	1	1	1
JUNIPER NETWORKS INC	JNPR	1	1	1	1	1	1	1	1	1	1	1	1	1
JANUS CAPITAL GROUP INC	JNS*	1	1	1	1	1	0	0	0	0	0	0	0	0
JONES GROUP INC	JNY	1	1	1	0	0	0	0	0	0	0	0	0	0
JOY GLOBAL INC	JOY	0	0	0	0	0	1	1	1	1	0	0	0	0
JPMORGAN CHASE & CO	JPM*	1	1	1	1	1	1	1	1	1	1	1	1	1
NORDSTROM INC	JWN	1	1	1	1	1	1	1	1	1	1	1	1	1
KELLOGG CO	K	1	1	1	1	1	1	1	1	1	1	1	1	1
KATE SPADE & CO	KATE	1	1	0	0	0	0	0	0	0	0	0	0	0
KB HOME	KBH	1	1	1	0	0	0	0	0	0	0	0	0	0
KEURIG DR PEPPER INC	KDP	0	0	0	0	0	0	0	0	1	1	0	0	0
KEYCORP	KEY*	1	1	1	1	1	1	1	1	1	1	1	1	1
KEYSIGHT TECHNOLOGIES INC	KEYS	0	0	0	0	0	0	0	0	0	0	0	0	1
KING PHARMACEUTICALS INC	KG	1	1	1	1	0	0	0	0	0	0	0	0	0
KRAFT HEINZ CO	KHC	1	1	1	1	1	1	1	0	0	1	1	1	1
KIMCO REALTY CORP	KIM*	1	1	1	1	1	1	1	1	1	1	1	1	1
KLA-TENCOR CORP	KLAC	1	1	1	1	1	1	1	1	1	1	1	1	1
KIMBERLY-CLARK CORP	KMB	1	1	1	1	1	1	1	1	1	1	1	1	1
KINDER MORGAN INC	KMI	1	0	0	0	0	0	1	1	1	1	1	1	1
CARMAX INC	KMX	0	0	0	0	1	1	1	1	1	1	1	1	1

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Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
COCA-COLA CO	KO	1	1	1	1	1	1	1	1	1	1	1	1	1
EASTMAN KODAK CO	KODK	1	1	1	1	0	0	0	0	0	0	0	0	0
KROGER CO	KR	1	1	1	1	1	1	1	1	1	1	1	1	1
KRAFT FOODS GROUP INC	KRFT	0	0	0	0	0	0	1	1	1	0	0	0	0
KEYSPAN CORP	KSE	1	0	0	0	0	0	0	0	0	0	0	0	0
KOHL'S CORP	KSS	1	1	1	1	1	1	1	1	1	1	1	1	1
KANSAS CITY SOUTHERN	KSU	0	0	0	0	0	0	0	1	1	1	1	1	1
LOEWS CORP	L*	1	1	1	1	1	1	1	1	1	1	1	1	1
L BRANDS INC	LB	1	1	1	1	1	1	1	1	1	1	1	1	1
LEIDOS HOLDINGS INC	LDOS	0	0	0	1	1	1	1	0	0	0	0	0	0
LEGGETT & PLATT INC	LEG	1	1	1	1	1	1	1	1	1	1	1	1	1
LEHMAN BROTHERS HOLDINGS INC	LEHMQ*	1	1	0	0	0	0	0	0	0	0	0	0	0
LENNAR CORP	LEN	1	1	1	1	1	1	1	1	1	1	1	1	1
LABORATORY CP OF AMER HLDGS	LH	1	1	1	1	1	1	1	1	1	1	1	1	1
LIFE TECHNOLOGIES CORP	LIFE.3	0	0	1	1	1	1	1	1	0	0	0	0	0
LINDE PLC	LIN	1	1	1	1	1	1	1	1	1	1	1	1	1
LKQ CORP	LKQ	0	0	0	0	0	0	0	0	0	0	1	1	1
L3 TECHNOLOGIES INC	LLL	1	1	1	1	1	1	1	1	1	1	1	1	1
LINEAR TECHNOLOGY CORP	LLTC	1	1	1	1	1	1	1	1	1	1	1	0	0
LILLY (ELI) & CO	LLY	1	1	1	1	1	1	1	1	1	1	1	1	1
LEGG MASON INC	LM*	1	1	1	1	1	1	1	1	1	1	0	0	0
LOCKHEED MARTIN CORP	LMT	1	1	1	1	1	1	1	1	1	1	1	1	1
LINCOLN NATIONAL CORP	LNC*	1	1	1	1	1	1	1	1	1	1	1	1	1
ALLIANT ENERGY CORP	LNT	0	0	0	0	0	0	0	0	0	0	1	1	1
LORILLARD INC	LO	0	0	1	1	1	1	1	1	1	0	0	0	0
LOWE'S COS INC	LOW	1	1	1	1	1	1	1	1	1	1	1	1	1
LAM RESEARCH CORP	LRCX	0	0	0	0	0	0	1	1	1	1	1	1	1
LSI CORP	LSI.1	1	1	1	1	1	1	1	1	0	0	0	0	0
SOUTHWEST AIRLINES	LUV	1	1	1	1	1	1	1	1	1	1	1	1	1
LEVEL 3 COMMUNICATIONS INC	LVLT	0	0	0	0	0	0	0	0	1	1	1	0	0
LAMB WESTON HOLDINGS INC	LW	0	0	0	0	0	0	0	0	0	0	0	0	1
LEXMARK INTL INC -CL A	LXK	1	1	1	1	1	1	0	0	0	0	0	0	0

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Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
LYONDELLBASELL INDUSTRIES NV	LYB	0	0	0	0	0	0	1	1	1	1	1	1	1
MACY'S INC	M	1	1	1	1	1	1	1	1	1	1	1	1	1
MASTERCARD INC	MA	0	0	1	1	1	1	1	1	1	1	1	1	1
MID-AMERICA APT CMNTYS INC	MAA*	0	0	0	0	0	0	0	0	0	0	1	1	1
MACERICH CO	MAC*	0	0	0	0	0	0	0	1	1	1	1	1	1
MARRIOTT INTL INC	MAR	1	1	1	1	1	1	1	1	1	1	1	1	1
MASCO CORP	MAS	1	1	1	1	1	1	1	1	1	1	1	1	1
MATTEL INC	MAT	1	1	1	1	1	1	1	1	1	1	1	1	1
MBIA INC	MBI*	1	1	1	0	0	0	0	0	0	0	0	0	0
MCDONALD'S CORP	MCD	1	1	1	1	1	1	1	1	1	1	1	1	1
MICROCHIP TECHNOLOGY INC	MCHP	0	1	1	1	1	1	1	1	1	1	1	1	1
MCKESSON CORP	MCK	1	1	1	1	1	1	1	1	1	1	1	1	1
MOODY'S CORP	MCO*	1	1	1	1	1	1	1	1	1	1	1	1	1
MONDELEZ INTERNATIONAL INC	MDLZ	0	1	1	1	1	1	1	1	1	1	1	1	1
MEREDITH CORP	MDP	1	1	1	1	1	0	0	0	0	0	0	0	0
MEDTRONIC PLC	MDT	1	1	1	1	1	1	1	1	1	1	1	1	1
MEDIMMUNE INC	MEDI	1	0	0	0	0	0	0	0	0	0	0	0	0
MASSEY ENERGY CO	MEE	0	0	1	1	1	0	0	0	0	0	0	0	0
MELLON FINANCIAL CORP	MEL.3*	1	0	0	0	0	0	0	0	0	0	0	0	0
METLIFE INC	MET*	1	1	1	1	1	1	1	1	1	1	1	1	1
MCAFEE INC	MFE	0	0	1	1	1	0	0	0	0	0	0	0	0
MGM RESORTS INTERNATIONAL	MGM	0	0	0	0	0	0	0	0	0	0	0	1	1
MOHAWK INDUSTRIES INC	MHK	0	0	0	0	0	0	0	1	1	1	1	1	1
MEDCO HEALTH SOLUTIONS INC	MHS	1	1	1	1	1	1	0	0	0	0	0	0	0
MARSHALL & ILSLEY CORP	ML1*	1	1	1	1	1	0	0	0	0	0	0	0	0
MILLIPORE CORP	MIL.2	1	1	1	1	0	0	0	0	0	0	0	0	0
MEAD JOHNSON NUTRITION CO	MJN	0	0	0	1	1	1	1	1	1	1	1	0	0
MCCORMICK & CO INC	MKC	1	1	1	1	1	1	1	1	1	1	1	1	1
MARTIN MARIETTA MATERIALS	MLM	0	0	0	0	0	0	0	0	1	1	1	1	1
MARSH & MCLENNAN COS	MMC*	1	1	1	1	1	1	1	1	1	1	1	1	1
MOTOROLA MOBILITY HLDGS INC	MMI.3	0	0	0	0	0	1	0	0	0	0	0	0	0
3M CO	MMM	1	1	1	1	1	1	1	1	1	1	1	1	1

Exhibit A1
S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
MALLINCKRODT PLC	MNK	0	0	0	0	0	0	0	0	1	1	1	0	0
MONSTER BEVERAGE CORP	MNST	0	0	0	0	0	0	1	1	1	1	1	1	1
ALTRIA GROUP INC	MO	1	1	1	1	1	1	1	1	1	1	1	1	1
MOLEX INC	MOLX	1	1	1	1	1	1	1	0	0	0	0	0	0
MONSANTO CO	MON	1	1	1	1	1	1	1	1	1	1	1	1	0
MOSAIC CO	MOS	0	0	0	0	0	1	1	1	1	1	1	1	1
MARATHON PETROLEUM CORP	MPC	0	0	0	0	0	1	1	1	1	1	1	1	1
MERCK & CO	MRK	1	1	1	1	1	1	1	1	1	1	1	1	1
MARATHON OIL CORP	MRO	1	1	1	1	1	1	1	1	1	1	1	1	1
MORGAN STANLEY	MS*	1	1	1	1	1	1	1	1	1	1	1	1	1
MSCI INC	MSCI*	0	0	0	0	0	0	0	0	0	0	0	0	1
MICROSOFT CORP	MSFT	1	1	1	1	1	1	1	1	1	1	1	1	1
MOTOROLA SOLUTIONS INC	MSI	1	1	1	1	1	1	1	1	1	1	1	1	1
M & T BANK CORP	MTB*	1	1	1	1	1	1	1	1	1	1	1	1	1
METTLER-TOLEDO INTL INC	MTD	0	0	0	0	0	0	0	0	0	0	1	1	1
MGIC INVESTMENT CORP/WI	MTG*	1	1	0	0	0	0	0	0	0	0	0	0	0
MANITOWOC CO	MTW	0	1	1	0	0	0	0	0	0	0	0	0	0
MICRON TECHNOLOGY INC	MU	1	1	1	1	1	1	1	1	1	1	1	1	1
MURPHY OIL CORP	MUR	1	1	1	1	1	1	1	1	1	1	1	0	0
MEADWESTVACO CORP	MWV	1	1	1	1	1	1	1	1	1	0	0	0	0
MONSTER WORLDWIDE INC	MWW	1	1	1	1	1	0	0	0	0	0	0	0	0
MAXIM INTEGRATED PRODUCTS	MXIM	1	0	0	0	0	0	0	0	0	0	0	0	1
MYLAN NV	MYL	1	1	1	1	1	1	1	1	1	1	1	1	1
NAVIENT CORP	NAVI*	1	1	1	1	1	1	1	1	1	1	1	1	0
NOBLE ENERGY INC	NBL	0	1	1	1	1	1	1	1	1	1	1	1	1
NABORS INDUSTRIES LTD	NBR	1	1	1	1	1	1	1	1	1	0	0	0	0
NATIONAL CITY CORP	NCC*	1	1	1	0	0	0	0	0	0	0	0	0	0
NORWEGIAN CRUISE LINE HLDGS	NCLH	0	0	0	0	0	0	0	0	0	0	0	1	1
NCR CORP	NCR	1	0	0	0	0	0	0	0	0	0	0	0	0
NASDAQ INC	NDAQ*	0	0	1	1	1	1	1	1	1	1	1	1	1
NOBLE CORP PLC	NE	1	1	1	0	0	1	1	1	1	0	0	0	0
NEXTERA ENERGY INC	NEE	1	1	1	1	1	1	1	1	1	1	1	1	1

Exhibit A1
S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
NEWMONT GOLDCORP CORP	NEM	1	1	1	1	1	1	1	1	1	1	1	1	1
NETFLIX INC	NFLX	0	0	0	0	1	1	1	1	1	1	1	1	1
NEWFIELD EXPLORATION CO	NFX	0	0	0	0	1	1	1	1	1	1	1	1	1
NISOURCE INC	NI	1	1	1	1	1	1	1	1	1	1	1	1	1
NIKE INC -CL B	NKE	1	1	1	1	1	1	1	1	1	1	1	1	1
NEKTAR THERAPEUTICS	NKTR	0	0	0	0	0	0	0	0	0	0	0	0	1
NIELSEN HOLDINGS PLC	NLSN	0	0	0	0	0	0	0	1	1	1	1	1	1
NORTHROP GRUMMAN CORP	NOC	1	1	1	1	1	1	1	1	1	1	1	1	1
NATIONAL OILWELL VARCO INC	NOV	1	1	1	1	1	1	1	1	1	1	1	1	1
NOVELL INC	NOVL	1	1	1	1	1	0	0	0	0	0	0	0	0
NRG ENERGY INC	NRG	0	0	0	0	1	1	1	1	1	1	1	1	1
NORFOLK SOUTHERN CORP	NSC	1	1	1	1	1	1	1	1	1	1	1	1	1
NATIONAL SEMICONDUCTOR CORP	NSM.2	1	1	1	1	1	0	0	0	0	0	0	0	0
NETAPP INC	NTAP	1	1	1	1	1	1	1	1	1	1	1	1	1
NORTHERN TRUST CORP	NTRS*	1	1	1	1	1	1	1	1	1	1	1	1	1
NUCOR CORP	NUE	1	1	1	1	1	1	1	1	1	1	1	1	1
NVIDIA CORP	NVDA	1	1	1	1	1	1	1	1	1	1	1	1	1
NOVELLUS SYSTEMS INC	NVLS.1	1	1	1	1	1	1	0	0	0	0	0	0	0
NEWELL BRANDS INC	NWL	1	1	1	1	1	1	1	1	1	1	1	1	1
NEWS CORP	NWSA	0	0	0	0	0	0	0	1	1	1	1	1	1
NEW YORK TIMES CO -CL A	NYT	1	1	1	1	0	0	0	0	0	0	0	0	0
NYSE EURONEXT	NYX*	0	1	1	1	1	1	1	0	0	0	0	0	0
REALTY INCOME CORP	O*	0	0	0	0	0	0	0	0	0	1	1	1	1
OFFICE DEPOT INC	ODP	1	1	1	1	0	0	0	0	0	0	0	0	0
OWENS-ILLINOIS INC	OI	0	0	0	1	1	1	1	1	1	1	0	0	0
ONEOK INC	OKE	0	0	0	0	1	1	1	1	1	1	1	1	1
OMNICOM GROUP	OMC	1	1	1	1	1	1	1	1	1	1	1	1	1
OFFICEMAX INC	OMX	1	1	0	0	0	0	0	0	0	0	0	0	0
ORACLE CORP	ORCL	1	1	1	1	1	1	1	1	1	1	1	1	1
O'REILLY AUTOMOTIVE INC	ORLY	0	0	0	1	1	1	1	1	1	1	1	1	1
OCCIDENTAL PETROLEUM CORP	OXY	1	1	1	1	1	1	1	1	1	1	1	1	1
PAYCHEX INC	PAYX	1	1	1	1	1	1	1	1	1	1	1	1	1

Exhibit A1
S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
PEOPLE'S UNITED FINL INC	PBCT*	0	0	1	1	1	1	1	1	1	1	1	1	1
PEPSI BOTTLING GROUP INC	PBG	1	1	1	1	0	0	0	0	0	0	0	0	0
PITNEY BOWES INC	PBI	1	1	1	1	1	1	1	1	1	1	1	0	0
PACCAR INC	PCAR	1	1	1	1	1	1	1	1	1	1	1	1	1
PG&E CORP	PCG	1	1	1	1	1	1	1	1	1	1	1	1	1
PLUM CREEK TIMBER CO INC	PCL*	1	1	1	1	1	1	1	1	1	1	0	0	0
PRECISION CASTPARTS CORP	PCP	0	1	1	1	1	1	1	1	1	1	0	0	0
METROPCS COMMUNICATIONS INC	PCS	0	0	0	1	1	1	1	0	0	0	0	0	0
PHELPS DODGE CORP	PD.1	1	0	0	0	0	0	0	0	0	0	0	0	0
PATTERSON COS INC	PDCO	1	1	1	1	1	1	1	1	1	1	1	1	0
PUBLIC SERVICE ENTRP GRP INC	PEG	1	1	1	1	1	1	1	1	1	1	1	1	1
PEPSICO INC	PEP	1	1	1	1	1	1	1	1	1	1	1	1	1
PETSMART INC	PETM	0	0	0	0	0	0	1	1	1	0	0	0	0
PFIZER INC	PFE	1	1	1	1	1	1	1	1	1	1	1	1	1
PRINCIPAL FINANCIAL GRP INC	PFG*	1	1	1	1	1	1	1	1	1	1	1	1	1
PROCTER & GAMBLE CO	PG	1	1	1	1	1	1	1	1	1	1	1	1	1
PEOPLES ENERGY CORP	PGL.1	1	0	0	0	0	0	0	0	0	0	0	0	0
PROGRESSIVE CORP-OHIO	PGR*	1	1	1	1	1	1	1	1	1	1	1	1	1
PARKER-HANNIFIN CORP	PH	1	1	1	1	1	1	1	1	1	1	1	1	1
PULTEGROUP INC	PHM	1	1	1	1	1	1	1	1	1	1	1	1	1
PACKAGING CORP OF AMERICA	PKG	0	0	0	0	0	0	0	0	0	0	0	1	1
PERKINELMER INC	PKI	1	1	1	1	1	1	1	1	1	1	1	1	1
PROLOGIS INC	PLD*	1	1	1	1	1	1	1	1	1	1	1	1	1
PALL CORP	PLL.1	1	1	1	1	1	1	1	1	1	0	0	0	0
PHILIP MORRIS INTERNATIONAL	PM	0	0	1	1	1	1	1	1	1	1	1	1	1
PMC-SIERRA INC	PMCS	1	0	0	0	0	0	0	0	0	0	0	0	0
PNC FINANCIAL SVCS GROUP INC	PNC*	1	1	1	1	1	1	1	1	1	1	1	1	1
PENTAIR PLC	PNR	0	0	0	0	0	0	1	1	1	1	1	1	1
PINNACLE WEST CAPITAL CORP	PNW	1	1	1	1	1	1	1	1	1	1	1	1	1
PEPCO HOLDINGS INC	POM	0	1	1	1	1	1	1	1	1	1	0	0	0
PPG INDUSTRIES INC	PPG	1	1	1	1	1	1	1	1	1	1	1	1	1
PPL CORP	PPL	1	1	1	1	1	1	1	1	1	1	1	1	1

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S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
PERRIGO CO PLC	PRGO	0	0	0	0	0	1	1	1	1	1	1	1	1
PRUDENTIAL FINANCIAL INC	PRU*	1	1	1	1	1	1	1	1	1	1	1	1	1
PUBLIC STORAGE	PSA*	1	1	1	1	1	1	1	1	1	1	1	1	1
PHILLIPS 66	PSX	0	0	0	0	0	0	1	1	1	1	1	1	1
PTC INC	PTC	1	0	0	0	0	0	0	0	0	0	0	0	0
PACTIV CORP	PTV	1	1	1	1	0	0	0	0	0	0	0	0	0
PVH CORP	PVH	0	0	0	0	0	0	0	1	1	1	1	1	1
QUANTA SERVICES INC	PWR	0	0	0	1	1	1	1	1	1	1	1	1	1
PIONEER NATURAL RESOURCES CO	PXD	0	0	1	1	1	1	1	1	1	1	1	1	1
PAYPAL HOLDINGS INC	PYPL	0	0	0	0	0	0	0	0	0	1	1	1	1
QWEST COMMUNICATION INTL INC	Q.2	1	1	1	1	1	0	0	0	0	0	0	0	0
QUALCOMM INC	QCOM	1	1	1	1	1	1	1	1	1	1	1	1	1
QEP RESOURCES INC	QEP	0	0	0	0	1	1	1	1	1	0	0	0	0
QLOGIC CORP	QLGC	1	1	1	1	1	0	0	0	0	0	0	0	0
QORVO INC	QRVO	0	0	0	0	0	0	0	0	0	1	1	1	1
RYDER SYSTEM INC	R	1	1	1	1	1	1	1	1	1	1	1	0	0
REYNOLDS AMERICAN INC	RAI	1	1	1	1	1	1	1	1	1	1	1	0	0
ROYAL CARIBBEAN CRUISES LTD	RCL	0	0	0	0	0	0	0	0	1	1	1	1	1
ROWAN COMPANIES PLC	RDC	1	1	1	1	1	1	1	1	0	0	0	0	0
EVEREST RE GROUP LTD	RE*	0	0	0	0	0	0	0	0	0	0	0	1	1
REGENCY CENTERS CORP	REG*	0	0	0	0	0	0	0	0	0	0	0	1	1
REGENERON PHARMACEUTICALS	REGN	0	0	0	0	0	0	0	1	1	1	1	1	1
REGIONS FINANCIAL CORP	RF*	1	1	1	1	1	1	1	1	1	1	1	1	1
ROBERT HALF INTL INC	RHI	1	1	1	1	1	1	1	1	1	1	1	1	1
RED HAT INC	RHT	0	0	0	1	1	1	1	1	1	1	1	1	1
TRANSOCEAN LTD	RIG	1	1	0	0	0	0	0	1	1	1	1	0	0
RAYMOND JAMES FINANCIAL CORP	RJF*	0	0	0	0	0	0	0	0	0	0	0	1	1
RALPH LAUREN CORP	RL	0	1	1	1	1	1	1	1	1	1	1	1	1
REALOGY HOLDINGS CORP	RLGY*	1	0	0	0	0	0	0	0	0	0	0	0	0
RESMED INC	RMD	0	0	0	0	0	0	0	0	0	0	0	1	1
ROHM AND HAAS CO	ROH	1	1	1	0	0	0	0	0	0	0	0	0	0
ROCKWELL AUTOMATION	ROK	1	1	1	1	1	1	1	1	1	1	1	1	1

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Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
ROLLINS INC	ROL	0	0	0	0	0	0	0	0	0	0	0	0	1
ROPER TECHNOLOGIES INC	ROP	0	0	0	1	1	1	1	1	1	1	1	1	1
ROSS STORES INC	ROST	0	0	0	1	1	1	1	1	1	1	1	1	1
RANGE RESOURCES CORP	RRC	0	1	1	1	1	1	1	1	1	1	1	1	0
DONNELLEY (R R) & SONS CO	RRD	1	1	1	1	1	1	0	0	0	0	0	0	0
REPUBLIC SERVICES INC	RSG	0	0	1	1	1	1	1	1	1	1	1	1	1
RS LEGACY CORP	RSHCQ	1	1	1	1	1	0	0	0	0	0	0	0	0
RAYTHEON CO	RTN	1	1	1	1	1	1	1	1	1	1	1	1	1
SPRINT CORP	S	1	1	1	1	1	1	1	0	0	0	0	0	0
SAFECO CORP	SAF*	1	1	0	0	0	0	0	0	0	0	0	0	0
SANMINA CORP	SANM	1	0	0	0	0	0	0	0	0	0	0	0	0
SBA COMMUNICATIONS CORP	SBAC*	0	0	0	0	0	0	0	0	0	0	0	1	1
SYMBOL TECHNOLOGIES	SBL.2	1	0	0	0	0	0	0	0	0	0	0	0	0
STARBUCKS CORP	SBUX	1	1	1	1	1	1	1	1	1	1	1	1	1
SCANA CORP	SCG	0	0	0	1	1	1	1	1	1	1	1	1	1
SCHWAB (CHARLES) CORP	SCHW*	1	1	1	1	1	1	1	1	1	1	1	1	1
SPECTRA ENERGY CORP	SE.7	0	1	1	1	1	1	1	1	1	1	1	0	0
SEALED AIR CORP	SEE	1	1	1	1	1	1	1	1	1	1	1	1	1
SCHERING-PLOUGH	SGP	1	1	1	0	0	0	0	0	0	0	0	0	0
SEARS HOLDINGS CORP	SHLDQ	1	1	1	1	1	1	0	0	0	0	0	0	0
SHERWIN-WILLIAMS CO	SHW	1	1	1	1	1	1	1	1	1	1	1	1	1
SIGMA-ALDRICH CORP	SIAL	1	1	1	1	1	1	1	1	1	0	0	0	0
SIGNET JEWELERS LTD	SIG	0	0	0	0	0	0	0	0	0	1	1	1	0
SMITH INTERNATIONAL INC	SII	1	1	1	1	0	0	0	0	0	0	0	0	0
SITE CENTERS CORP	SITC*	0	1	1	0	0	0	0	0	0	0	0	0	0
SVB FINANCIAL GROUP	SIVB*	0	0	0	0	0	0	0	0	0	0	0	0	1
SMUCKER (JM) CO	SJM	0	0	1	1	1	1	1	1	1	1	1	1	1
SCHLUMBERGER LTD	SLB	1	1	1	1	1	1	1	1	1	1	1	1	1
SL GREEN REALTY CORP	SLG*	0	0	0	0	0	0	0	0	0	1	1	1	1
SOLECTRON CORP	SLR	1	0	0	0	0	0	0	0	0	0	0	0	0
SNAP-ON INC	SNA	1	1	1	1	1	1	1	1	1	1	1	1	1
SANDISK CORP	SNDK	1	1	1	1	1	1	1	1	1	1	0	0	0

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Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
SCRIPPS NETWORKS INTERACTIVE	SNI	0	0	1	1	1	1	1	1	1	1	1	1	0
SYNOPSIS INC	SNPS	0	0	0	0	0	0	0	0	0	0	0	1	1
SYNOVUS FINANCIAL CORP	SNV*	1	1	0	0	0	0	0	0	0	0	0	0	0
SOUTHERN CO	SO	1	1	1	1	1	1	1	1	1	1	1	1	1
SOUTHERN CO GAS	SO7	0	0	0	0	0	1	1	1	1	1	0	0	0
SIMON PROPERTY GROUP INC	SPG*	1	1	1	1	1	1	1	1	1	1	1	1	1
S&P GLOBAL INC	SPGI*	1	1	1	1	1	1	1	1	1	1	1	1	1
STAPLES INC	SPLS	1	1	1	1	1	1	1	1	1	1	1	0	0
STERICYCLE INC	SRCL	0	0	1	1	1	1	1	1	1	1	1	1	0
SEMPRA ENERGY	SRE	1	1	1	1	1	1	1	1	1	1	1	1	1
EW SCRIPPS -CL A	SSP	1	1	0	0	0	0	0	0	0	0	0	0	0
SANTANDER HOLDINGS USA INC	STD2*	1	1	1	0	0	0	0	0	0	0	0	0	0
SUNTRUST BANKS INC	STI*	1	1	1	1	1	1	1	1	1	1	1	1	1
ST JUDE MEDICAL INC	STJ	1	1	1	1	1	1	1	1	1	1	1	0	0
QUESTAR CORP	STR	1	1	1	1	0	0	0	0	0	0	0	0	0
STATE STREET CORP	STT*	1	1	1	1	1	1	1	1	1	1	1	1	1
SEAGATE TECHNOLOGY PLC	STX	0	0	0	0	0	0	1	1	1	1	1	1	1
CONSTELLATION BRANDS	STZ	1	1	1	1	1	1	1	1	1	1	1	1	1
SUNOCO INC	SUN.1	1	1	1	1	1	1	0	0	0	0	0	0	0
SUNEDISON INC	SUNEQ	0	1	1	1	1	0	0	0	0	0	0	0	0
SUPERVALU INC	SVU	1	1	1	1	1	1	0	0	0	0	0	0	0
STANLEY BLACK & DECKER INC	SWK	1	1	1	1	1	1	1	1	1	1	1	1	1
SKYWORKS SOLUTIONS INC	SWKS	0	0	0	0	0	0	0	0	0	1	1	1	1
SOUTHWESTERN ENERGY CO	SWN	0	0	1	1	1	1	1	1	1	1	1	0	0
SAFEWAY INC	SWY	1	1	1	1	1	1	1	1	1	0	0	0	0
SYNCHRONY FINANCIAL	SYF*	0	0	0	0	0	0	0	0	0	1	1	1	1
STRYKER CORP	SYK	1	1	1	1	1	1	1	1	1	1	1	1	1
SYMANTEC CORP	SYMC	1	1	1	1	1	1	1	1	1	1	1	1	1
SYSICO CORP	SYI	1	1	1	1	1	1	1	1	1	1	1	1	1
AT&T INC	T	1	1	1	1	1	1	1	1	1	1	1	1	1
MOLSON COORS BREWING CO	TAP	1	1	1	1	1	1	1	1	1	1	1	1	1
TERADATA CORP	TDC	0	1	1	1	1	1	1	1	1	1	1	0	0

Exhibit A1
S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
TRANSDIGM GROUP INC	TDG	0	0	0	0	0	0	0	0	0	0	1	1	1
TECO ENERGY INC	TE	1	1	1	1	1	1	1	1	1	1	0	0	0
TEKTRONIX INC	TEK.1	1	0	0	0	0	0	0	0	0	0	0	0	0
TE CONNECTIVITY LTD	TEL	0	1	1	0	0	1	1	1	1	1	1	1	1
TERADYNE INC	TER	1	1	1	1	1	1	1	0	0	0	0	0	0
TEREX CORP	TEX	1	1	0	0	0	0	0	0	0	0	0	0	0
TWENTY-FIRST CENTURY FOX INC	TFCFA	1	1	1	1	1	1	1	1	1	1	1	1	1
TEGNA INC	TGNA	1	1	1	1	1	1	1	1	1	1	1	0	0
TARGET CORP	TGT	1	1	1	1	1	1	1	1	1	1	1	1	1
TENET HEALTHCARE CORP	THC	1	1	1	1	1	1	1	1	1	1	0	0	0
TITANIUM METALS CORP	TIE	0	1	1	1	1	1	0	0	0	0	0	0	0
TIFFANY & CO	TIF	1	1	1	1	1	1	1	1	1	1	1	1	1
TEMPLE-INLAND INC	TIN	1	0	0	0	0	0	0	0	0	0	0	0	0
TJX COS INC (THE)	TJX	1	1	1	1	1	1	1	1	1	1	1	1	1
TELLABS INC	TLAB	1	1	1	1	1	0	0	0	0	0	0	0	0
TORCHMARK CORP	TMK*	1	1	1	1	1	1	1	1	1	1	1	1	1
THERMO FISHER SCIENTIFIC INC	TMO	1	1	1	1	1	1	1	1	1	1	1	1	1
TAPESTRY INC	TPR	1	1	1	1	1	1	1	1	1	1	1	1	1
TRIBUNE MEDIA CO	TRCO	1	0	0	0	0	0	0	0	0	0	0	0	0
TRIPADVISOR INC	TRIP	0	0	0	0	0	1	1	1	1	1	1	1	1
PRICE (T. ROWE) GROUP	TROW*	1	1	1	1	1	1	1	1	1	1	1	1	1
TRAVELERS COS INC	TRV*	1	1	1	1	1	1	1	1	1	1	1	1	1
TRACTOR SUPPLY CO	TSCO	0	0	0	0	0	0	0	0	1	1	1	1	1
SABRE HOLDINGS CORP -CL A	TSG.2	1	0	0	0	0	0	0	0	0	0	0	0	0
TYSON FOODS INC -CL A	TSN	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL SYSTEM SERVICES INC	TSS	0	0	1	1	1	1	1	1	1	1	1	1	1
TRANE INC	TT.2	1	1	0	0	0	0	0	0	0	0	0	0	0
TAKE-TWO INTERACTIVE SFTWR	TTWO	0	0	0	0	0	0	0	0	0	0	0	0	1
TIME WARNER CABLE INC	TWC	0	0	0	1	1	1	1	1	1	1	0	0	0
TWITTER INC	TWTR	0	0	0	0	0	0	0	0	0	0	0	0	1
TIME WARNER INC	TWX	1	1	1	1	1	1	1	1	1	1	1	1	0
TEXAS INSTRUMENTS INC	TXN	1	1	1	1	1	1	1	1	1	1	1	1	1

Exhibit A1
S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
TEXTRON INC	TXT	1	1	1	1	1	1	1	1	1	1	1	1	1
TYCO INTERNATIONAL PLC	TYC	1	1	1	0	1	1	1	1	1	1	0	0	0
UNDER ARMOUR INC	UAA	0	0	0	0	0	0	0	0	1	1	1	1	1
UNITED CONTINENTAL HLDGS INC	UAL	0	0	0	0	0	0	0	0	0	1	1	1	1
UDR INC	UDR*	0	0	0	0	0	0	0	0	0	0	1	1	1
UNIVERSAL HEALTH SVCS INC	UHS	0	0	0	0	0	0	0	0	1	1	1	1	1
UNISYS CORP	UIS	1	1	0	0	0	0	0	0	0	0	0	0	0
ULTA BEAUTY INC	ULTA	0	0	0	0	0	0	0	0	0	0	1	1	1
UNITEDHEALTH GROUP INC	UNH	1	1	1	1	1	1	1	1	1	1	1	1	1
UNUM GROUP	UNM*	1	1	1	1	1	1	1	1	1	1	1	1	1
UNION PACIFIC CORP	UNP	1	1	1	1	1	1	1	1	1	1	1	1	1
UNITED PARCEL SERVICE INC	UPS	1	1	1	1	1	1	1	1	1	1	1	1	1
URBAN OUTFITTERS INC	URBN	0	0	0	0	1	1	1	1	1	1	1	0	0
UNITED RENTALS INC	URI	0	0	0	0	0	0	0	0	1	1	1	1	1
U S BANCORP	USB*	1	1	1	1	1	1	1	1	1	1	1	1	1
UST INC	UST.1	1	1	1	0	0	0	0	0	0	0	0	0	0
UNITED TECHNOLOGIES CORP	UTX	1	1	1	1	1	1	1	1	1	1	1	1	1
VISA INC	V	0	0	0	1	1	1	1	1	1	1	1	1	1
VARIAN MEDICAL SYSTEMS INC	VAR	0	1	1	1	1	1	1	1	1	1	1	1	1
VF CORP	VFC	1	1	1	1	1	1	1	1	1	1	1	1	1
VIACOM INC	VIAB	1	1	1	1	1	1	1	1	1	1	1	1	1
VIAVI SOLUTIONS INC	VIAV	1	1	1	1	1	1	1	0	0	0	0	0	0
VALERO ENERGY CORP	VLO	1	1	1	1	1	1	1	1	1	1	1	1	1
VULCAN MATERIALS CO	VMC	1	1	1	1	1	1	1	1	1	1	1	1	1
VORNADO REALTY TRUST	VNO*	1	1	1	1	1	1	1	1	1	1	1	1	1
VERISK ANALYTICS INC	VRSK	0	0	0	0	0	0	0	0	0	1	1	1	1
VERISIGN INC	VRSN	1	1	1	1	1	1	1	1	1	1	1	1	1
VERTEX PHARMACEUTICALS INC	VRTX	0	0	0	0	0	0	0	1	1	1	1	1	1
VENTAS INC	VTR*	0	0	0	1	1	1	1	1	1	1	1	1	1
VERIZON COMMUNICATIONS INC	VZ	1	1	1	1	1	1	1	1	1	1	1	1	1
WASHINGTON MUTUAL INC	WAMUQ*	1	1	0	0	0	0	0	0	0	0	0	0	0
WATERS CORP	WAT	1	1	1	1	1	1	1	1	1	1	1	1	1

Exhibit A1
S&P 500 Companies by Year

Company Name	Company Ticker	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
WACHOVIA CORP	WB.3*	1	1	1	0	0	0	0	0	0	0	0	0	0
WALGREENS BOOTS ALLIANCE INC	WBA	1	1	1	1	1	1	1	1	1	1	1	1	1
WELLCARE HEALTH PLANS INC	WCG	0	0	0	0	0	0	0	0	0	0	0	0	1
WESTERN DIGITAL CORP	WDC	0	0	0	1	1	1	1	1	1	1	1	1	1
WEC ENERGY GROUP INC	WEC	0	0	1	1	1	1	1	1	1	1	1	1	1
INTEGRYS HOLDING INC	WEC3	0	1	1	1	1	1	1	1	1	0	0	0	0
WELLTOWER INC	WELL*	0	0	0	1	1	1	1	1	1	1	1	1	1
WENDY'S INTERNATIONAL INC	WEN.2	1	1	0	0	0	0	0	0	0	0	0	0	0
WELLS FARGO & CO	WFC*	1	1	1	1	1	1	1	1	1	1	1	1	1
WHOLE FOODS MARKET INC	WFM	1	1	1	1	1	1	1	1	1	1	1	0	0
WEATHERFORD INTL PLC	WFTIF	1	1	1	0	0	0	0	0	0	0	0	0	0
WHIRLPOOL CORP	WHR	1	1	1	1	1	1	1	1	1	1	1	1	1
WINDSTREAM HOLDINGS INC	WINMQ	1	1	1	1	1	1	1	1	1	0	0	0	0
WILLIS TOWERS WATSON PLC	WLTW*	0	0	0	0	0	0	0	0	0	0	1	1	1
WASTE MANAGEMENT INC	WM	1	1	1	1	1	1	1	1	1	1	1	1	1
WILLIAMS COS INC	WMB	1	1	1	1	1	1	1	1	1	1	1	1	1
WALMART INC	WMT	1	1	1	1	1	1	1	1	1	1	1	1	1
WPX ENERGY INC	WPX	0	0	0	0	0	0	1	1	0	0	0	0	0
WESTROCK CO	WRK	0	0	0	0	0	0	0	0	0	1	1	1	1
WESTERN UNION CO	WU	1	1	1	1	1	1	1	1	1	1	1	1	1
WRIGLEY (WM) JR CO	WWY	1	1	0	0	0	0	0	0	0	0	0	0	0
WEYERHAEUSER CO	WY*	1	1	1	1	1	1	1	1	1	1	1	1	1
WYETH	WYE	1	1	1	0	0	0	0	0	0	0	0	0	0
WYNDHAM DESTINATIONS INC	WYND	1	1	1	1	1	1	1	1	1	1	1	1	0
WYNN RESORTS LTD	WYNN	0	0	1	1	1	1	1	1	1	1	1	1	1
UNITED STATES STEEL CORP	X	1	1	1	1	1	1	1	1	0	0	0	0	0
CIMAREX ENERGY CO	XEC	0	0	0	0	0	0	0	0	1	1	1	1	1
XCEL ENERGY INC	XEL	1	1	1	1	1	1	1	1	1	1	1	1	1
XL GROUP LTD	XL*	1	1	1	1	1	1	1	1	1	1	1	1	0
XILINX INC	XLNX	1	1	1	1	1	1	1	1	1	1	1	1	1
EXXON MOBIL CORP	XOM	1	1	1	1	1	1	1	1	1	1	1	1	1
DENTSPLY SIRONA INC	XRAY	0	0	1	1	1	1	1	1	1	1	1	1	1

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Number of S&P 500 Companies		500	500	500	500	500	500	500	500	500	500	500	500	500
Railroad, Financial Institutions and Real Estate		92	100	89	86	88	87	88	87	89	90	96	104	103
Sample Number of S&P 500 Companies		408	400	411	414	412	413	412	413	411	410	404	396	397
XEROX CORP	XRX	1	1	1	1	1	1	1	1	1	1	1	1	1
XTO ENERGY INC	XTO	1	1	1	1	0	0	0	0	0	0	0	0	0
XYLEM INC	XYL	0	0	0	0	0	1	1	1	1	1	1	1	1
YUM BRANDS INC	YUM	1	1	1	1	1	1	1	1	1	1	1	1	1
ZIMMER BIOMET HOLDINGS INC	ZBH	1	1	1	1	1	1	1	1	1	1	1	1	1
ZIONS BANCORPORATION NA	ZION*	1	1	1	1	1	1	1	1	1	1	1	1	1
ZOETIS INC	ZTS	0	0	0	0	0	0	0	1	1	1	1	1	1

Sources: Compustat.

Notes: Ticker DD in the list correspond to Dow Chemical Company before 2017 and DowDuPont after 2017 following its merger with DuPont on August 31, 2017.