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## She Caught the CATY, and Left Me a Mule to Ride: Improving on Dividend Yield as an Indicator of Stock Valuations and Expected Returns

Laurence B. Siegel[1]

The title of this essay refers to two things: (1) a great Blues Brothers song;[2] and (2) a new measure of market valuation set forth by Philip Straehl and Roger Ibbotson, the CATY or cyclically adjusted total yield.

Straehl and Ibbotson [2017] developed the CATY as a substitute for Robert Shiller's CAPE or cyclically adjusted price-earnings ratio, a measure that I've covered in two prior articles.[3] The CATY differs from the CAPE in that the former considers cash flow to the investor to be the relevant measure of corporate performance for the purpose of valuing the stock market. This is in contrast to the use of profits ("earnings") in the CAPE and in the traditional price-earnings or PE ratio.

But Straehl and Ibbotson's CATY, while innovative and relevant, is an incomplete measure of cash flow to the investor. It is incomplete because, of the three components of cash flow to the investor, it includes only two: dividends and share buybacks. It should also include "cash takeovers." By *cash takeovers* I mean funds received by shareholders in merger and acquisition activity where the shares acquired are paid for by the acquirer in cash.

Why include cash takeovers? Like buybacks, they are a source of cash income to an index fund holder or other diversified investor. If you hold shares in Company A, you don't care whether the cash you receive comes from Company A (in a buyback) or from Company B (in a takeover).

The purpose of this paper is to quantify the yield from cash takeovers and to thereby produce a better, more complete measure of cash flow to the investor and of the CATY.[4] I call the CATY adjusted to include cash takeovers "my CATY." I then explore

[2] "She Caught the Katy" was written by Taj Mahal and James Rachell, and covered by the Blues Brothers (John Belushi and Dan Aykroyd). The Katy is a railroad (the Missouri-Kansas-Texas or "KT") — thus the song lyrics, and my title, do make sense (sort of).

[3] Siegel [2014] and Siegel [2016].

[4] This is not the first work to consider cash takeovers as a component of cash flow to the equity investor. Robertson and Wright [2006] and Sabbatucci [2016] did so explicitly, and Grinold, Kroner, and Siegel [2011] mentioned the desirability of doing so in passing.

the consequences of these results for the expected return on equities and for the equity risk premium.[5]

## THINKING ABOUT VALUATION: WHY WE SHOULD CARE ABOUT DIVIDENDS AND CASH FLOWS

### WHY IS CASH FLOW TO THE INVESTOR IMPORTANT?

Cash flow to the investor, effectively an expanded definition of dividends, is more relevant to valuation than earnings because cash, unlike earnings, can actually be spent by the investor. Moreover, it's hard for a company to fake the ability to pay out cash. The company wasn't kidding; it really did have the money, and now you have it. In contrast, earnings are subject to estimation error and manipulation, and are often "restated" (reduced) when a company admits that its claim to have earned a certain amount of money was exaggerated or incorrect.

### WHY NOT LOOK *ONLY* AT DIVIDENDS?

Moreover, an expanded definition of dividends that includes buybacks and/or cash takeovers is relevant where dividends alone are not. Invoking one of Franco Modigliani and Merton Miller's classic indifference principles, Straehl and Ibbotson say that this is the case because:

> Investors should be indifferent about whether they receive distributions via dividends or buybacks as well as how they participate in a buyback — that is, by receiving cash from tendering their shares or by receiving an increased proportion in the company. (p. 33)

This logic applies to cash from takeovers as well as from buybacks. In addition, argue Straehl and Ibbotson, the expanded definition on which the CATY relies is relevant because the CATY gives better return forecasts than the CAPE or the dividend yield.[6]

### "A COW FOR HER MILK"

Some old-time analysts do look only at dividends. John Burr Williams, the Harvard professor who first set forth the dividend discount model in 1938, waxed poetic on the question (and bolstered the argument for placing less emphasis on earnings):

> Earnings are only a means to an end, and the means should not be mistaken for the end. Therefore we must say that a stock derives its value from its dividends, not its earnings. In short, a stock is worth only what you can get out of it.

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[5] This article can be regarded as part of the "supply of capital market returns" literature, which treats cash generated by corporations as the main factor influencing the returns equity investors can expect. This literature begins, as far as I know, with Diermeier, Ibbotson, and Siegel [1984]. Ibbotson and Chen [2003] furthered this line of analysis. A fuller review and list of references, also covering the related "future equals past" and "dividend discount model" threads, is in Straehl and Ibbotson [2017] and Siegel [2017].

[6] The authors write, "[O]ver the longer sample periods, starting in 1881 and 1901, CATY is at least as predictive as CAPE, exhibiting a slightly higher $R$ and a similarly significant coefficient. However, over the sample starting in 1970, when buybacks became prevalent, CATY is significantly more predictive than CAPE, with an $R$ of 6.44% compared with CAPE's 2.28%" (p. 47).

> Even so spoke the old farmer to his son:  A cow for her milk/ a hen for her eggs/ and a stock, by heck/ for her dividends/ An orchard for fruit/ bees for their honey/ and stocks, besides/ for their dividends.[7]

(I'm glad he kept his day job instead of pursuing poetry full-time.) And, in fact, in Williams' day, dividends were effectively the only source of cash flow to the investor. Buybacks were prohibited or frowned upon by the authorities, and takeovers of listed companies were rare.[8] But, in 1982, with taxes on dividends weighing heavily on investors, the Securities and Exchange Commission passed rule 10b-18, "which, despite a few mechanical restrictions, opened the gates for companies to begin to repurchase shares *en masse*" (Bryan [2016]). Share repurchases are treated more favorably from a tax perspective than dividends.

## AREN'T DIVIDENDS VOLUNTARY?

Everyone who has suffered through a business school course in investments knows that dividends are voluntary. Many companies, especially rapidly-growing young companies, do not pay dividends at all, preferring to retain earnings indefinitely so that book value — and, hopefully, the stock price along with it — simply grows and grows until the entire return is realized on the day the investor sells the stock.[9]

The ability to avoid paying dividends creates a serious problem with the Williams rule (a stock, by heck, for her dividends). It is part of the reason that analysts have focused so intensely on earnings rather than dividends in the years since Modigliani and Miller showed that the two measures of corporate performance should theoretically give the same value for a company.

## A THOUGHT EXPERIMENT

The traditional way of describing the voluntary nature of dividends is to conduct a thought experiment: what would the world be like if dividends were prohibited by law, or taxed at 100%? No company would pay dividends, but investors could create "homemade dividends" (to raise cash for spending) by selling shares. And, as we see with non-dividend-paying stocks, they do.

While a given investor can do this by selling some of her shares to another investor, however, the whole population of investors cannot raise cash by selling shares. (Sell to whom?) The only way that investors in such a world could raise cash is by selling shares back to the issuing company, if that company has cash, or to a different company. Thus, from the investor's point of view, buybacks and cash takeovers have the same function as dividends: they return cash to the investor.

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[7] Williams [1938].

[8] Takeovers of privately held companies were not rare; most of the great old-time companies with General, United, Consolidated, etc. in their names were roll-ups.

[9] In practice, if a company does this for long enough, the IRS will require it to declare a dividend so that tax can be collected from the company's shareholders at the ordinary income rate and in current time, as contrasted with the lower (and also delayed) capital gains tax rate. Most long-lived companies begin paying dividends eventually.

Of course, in the real world dividends are not illegal, nor are they taxed at 100%. So there are three ways that a company can distribute cash to investors: actual dividends, buybacks of its own stock, and cash purchases of another company's stock. (It doesn't matter whether the purchases are for portfolio investment purposes or as part of a plan to take over the other company.) Since none of these three ways of distributing cash is fundamentally different from the others,[10] we combine them all into a single measure, cash flow to the investor or *CFI*.

The rest of this article presents my investigation of the takeover yield (that is, cash from takeovers expressed as a yield in the way that dividends are), integrates the results with the total yield work of Straehl and Ibbotson, and presents estimates — reflective of this "new" source of yield — of the expected return on equities and of the equity risk premium.
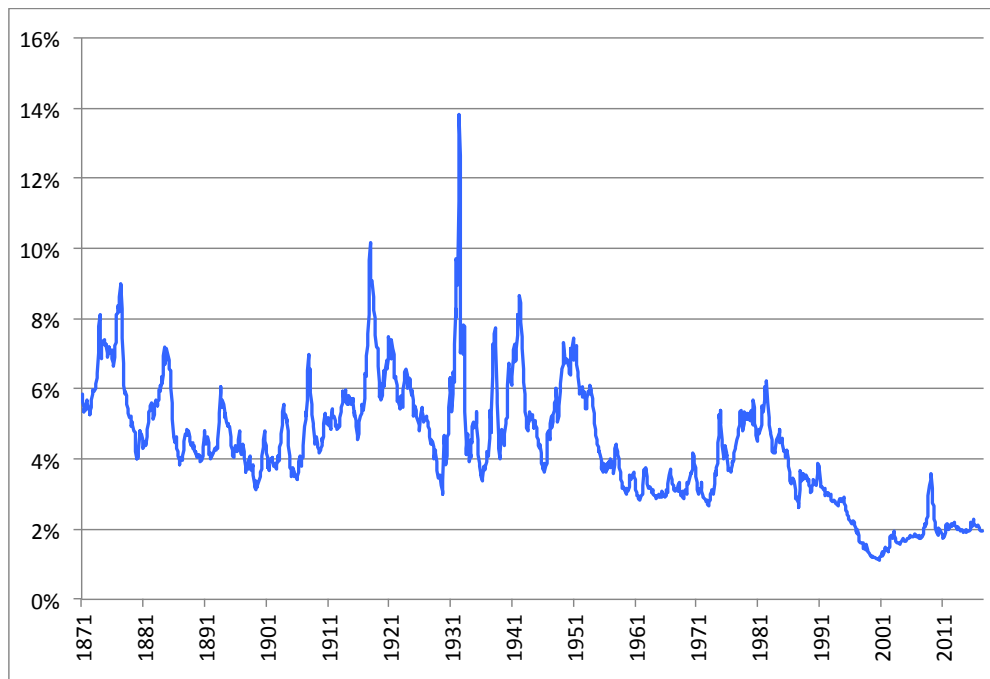
## PRESENTATION OF THE DATA
### DIVIDEND YIELDS

We begin at the beginning — not where Straehl and Ibbotson started, but before that, with the pure dividend yield. Exhibit 1 shows the dividend yield on the S&P 500 and predecessor indices from January 1871 to September 2017.[11]

EXHIBIT 1
DIVIDEND YIELD OF THE S&P 500 AND PREDECESSOR INDICES, 1871-2017



Source: Robert Shiller's web page, http://www.econ.yale.edu/~shiller/data.htm, with calculations by the author.

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[10] Before taxes and ignoring any signaling effects from the fact that a dividend, once paid, is usually repeated.
[11] The S&P 500 was started in March 1957. The predecessor indices are the S&P 90 (January 1926-February 1957) and the Cowles Commission index (1871-1925). While the analysis in this article, and in Straehl and Ibbotson, is for the S&P 500, the results would not be very different for a broader definition of the U.S. market.

Dividend yields declined steadily and significantly over the second half of the period. The high yield in 1932 is an outlier due to low stock prices but, once the yield had returned to its historical range, it declined further as stock valuations expanded and dividends failed to keep pace. By the early 2000s, the dividend yield stabilized around 2%, about one-third its pre-1950 average. The common wisdom was that, as dividends became less important, investors expected and received larger capital gains, made possible by the increased amount of retained earnings.

And, in fact, capital gains were large over 1949-1966, 1981-1999, and 2009-2017, which are large chunks of the overall postwar period. The S&P index rose, in nominal terms, from roughly $17 in 1950 to $2,692 recently (December 19, 2017). With that kind of capital growth, who needs dividends?

Investors buying now at high prices, that's who. The current dividend yield of 2% is pitiable compared with historical rates of return; if high going-in prices mean that the expected capital gain is also modest, prospects for equity investors are muted at best.

Not so fast. This analysis ignores two important "new" sources of return: share buybacks and cash takeovers.

### DIVIDEND YIELDS PLUS BUYBACKS

Straehl and Ibbotson, noting the importance of buybacks, add these to dividends as shown in Exhibit 2. (We start the graph at 1950, not because earlier years are unimportant but because buybacks were zero in those years.) As dividend yields began to collapse in the 1980s, buybacks grew to replace them, with the result that the sum of dividend and buyback yields (the green line) was pretty stable during this period, only falling a little relative to its 1981-1982 bear market high.

EXHIBIT 2
DIVIDEND YIELD, BUYBACK YIELD, AND SUM OF DIVIDEND AND BUYBACK YIELDS ON S&P 500 AND PREDECESSOR INDICES, 1950-2016
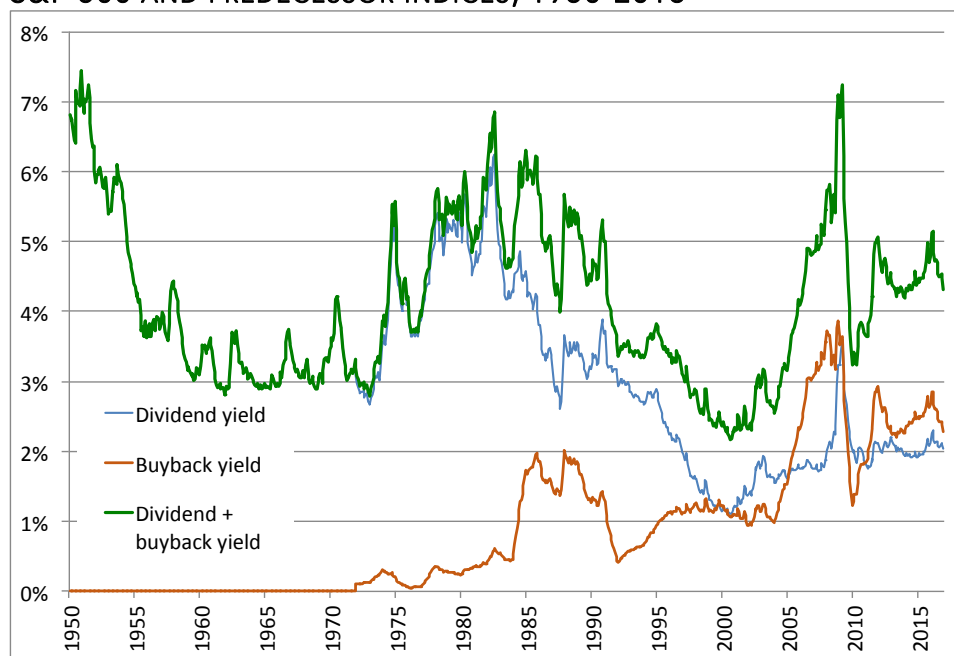


Source: Morningstar data, used by permission; graphed by the author.

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After 1990 the sum of the dividend and buyback yields fell as stock prices soared, but the combined yield rose once again in the 2000s. In the twenty-first century, *buybacks have exceeded dividends*, and the sum of the two yields has averaged about 4.4% in the current decade (2010-2016), above the historical (1950-2016) average of this variable. If the stock market is overvalued — and it might or might not be, I don't know — the evidence of it isn't in these figures.

If, instead of dividing the current month's dividends and buybacks by the current stock price, you average (in the numerator) the last 120 months' dividends and buybacks, all stated in real terms, you arrive at Straehl and Ibbotson's CATY, the cyclically adjusted total yield before accounting for takeovers. While the numbers are interesting, you can find them in the Straehl and Ibbotson article, so I won't repeat them since I am going to construct my own CATY, one based on cash takeovers as well as dividends and buybacks.

CASH TAKEOVERS

To account for cash takeovers, an associate (Mihir Gandhi) and I studied merger and acquisition (M&A) transactions where a company in the S&P 500 was the target, or acquired company, over 1979-2016.[12] We separated cash M&A transactions into two categories: (1) purchases of shares of companies in the S&P 500 by companies in the S&P 500; and (2) purchases of shares of companies in the S&P 500 by companies *not* in the S&P 500, including foreign and private buyers.

The reason for this distinction is that, from the viewpoint of an S&P 500 index fund holder, the two types of transactions have different wealth effects. In the first type, the benefit of cash paid to the investor is offset (fully or partially) by a decrease in the acquirer's cash position; whether fully or partially depends on whether or not the transaction is value-creating. In the second type, the cash paid to the investor is "new money" from that investor's point of view—that is, it is not offset by a decline in the cash position of the acquirer — because the investor does not hold shares of the acquirer.

Exhibit 3 shows the year-by-year dollar volume of acquisitions of stocks in the S&P 500 for cash, broken out by the two categories of acquirer (in the S&P 500 or not in it).

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[12] Merger and acquisition (M&A) data are from Securities Data Corporation's SDC Platinum (we took only the cash portion of cash-and-securities deals) and the list of S&P 500 constituents comes from CRSP at the University of Chicago. We used six-digit CUSIP numbers and ticker symbols to identify acquisition targets from SDC that are part of the S&P 500 list in CRSP. (CUSIP/ticker matches are not perfect.) To calculate the yield, we divide M&A totals over a given year by the market cap of the S&P at the beginning of that year. Where an acquisition was accomplished with a mix of cash and stock, we counted only the cash part toward the takeover yield.

## Exhibit 3
## Volume of cash takeovers and cash takeover yields, S&P 500, 1979-2016

| Year | Number of deals | | | Dollar volume of cash takeovers ($ millions) | | | Cash takeover yield (%) | | | Market cap of S&P 500 ($ millions)* |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Acquirer in S&P | Acquirer not in S&P | Total | Acquirer in S&P | Acquirer not in S&P | Total | Acquirer in S&P | Acquirer not in S&P | |
| 1979 | 3 | 1 | 2 | 889 | 363 | 526 | 0.143% | 0.058% | 0.085% | 621,040 |
| 1980 | 2 | 1 | 1 | 1,234 | 479 | 755 | 0.178% | 0.069% | 0.109% | 693,250 |
| 1981 | 7 | 4 | 3 | 13,364 | 11,370 | 1,994 | 1.447% | 1.231% | 0.216% | 923,662 |
| 1982 | 0 | 0 | 0 | - | - | - | 0.000% | 0.000% | 0.000% | 851,202 |
| 1983 | 0 | 0 | 0 | - | - | - | 0.000% | 0.000% | 0.000% | 989,480 |
| 1984 | 5 | 2 | 3 | 4,482 | 3,323 | 1,159 | 0.377% | 0.279% | 0.097% | 1,189,541 |
| 1985 | 45 | 7 | 38 | 34,662 | 12,730 | 21,931 | 2.918% | 1.072% | 1.846% | 1,187,784 |
| 1986 | 51 | 14 | 37 | 50,338 | 23,854 | 26,484 | 3.422% | 1.622% | 1.801% | 1,470,926 |
| 1987 | 49 | 7 | 42 | 49,120 | 10,449 | 38,671 | 2.872% | 0.611% | 2.261% | 1,710,021 |
| 1988 | 57 | 10 | 47 | 57,103 | 19,721 | 37,383 | 3.214% | 1.110% | 2.104% | 1,776,569 |
| 1989 | 109 | 15 | 94 | 70,599 | 12,991 | 57,609 | 3.799% | 0.699% | 3.100% | 1,858,312 |
| 1990 | 83 | 7 | 76 | 26,904 | 4,797 | 22,107 | 1.133% | 0.202% | 0.931% | 2,374,446 |
| 1991 | 34 | 8 | 26 | 7,583 | 1,934 | 5,648 | 0.355% | 0.091% | 0.264% | 2,136,468 |
| 1992 | 29 | 3 | 26 | 2,738 | 1,418 | 1,320 | 0.098% | 0.051% | 0.047% | 2,787,199 |
| 1993 | 26 | 2 | 24 | 3,265 | 2,019 | 1,246 | 0.109% | 0.068% | 0.042% | 2,983,593 |
| 1994 | 19 | 5 | 14 | 28,632 | 16,313 | 12,319 | 0.879% | 0.501% | 0.378% | 3,258,282 |
| 1995 | 32 | 5 | 27 | 20,495 | 12,609 | 7,886 | 0.619% | 0.381% | 0.238% | 3,308,933 |
| 1996 | 24 | 4 | 20 | 31,102 | 20,247 | 10,855 | 0.682% | 0.444% | 0.238% | 4,559,871 |
| 1997 | 18 | 7 | 11 | 23,704 | 10,390 | 13,314 | 0.429% | 0.188% | 0.241% | 5,521,312 |
| 1998 | 20 | 5 | 15 | 29,488 | 18,109 | 11,380 | 0.394% | 0.242% | 0.152% | 7,479,890 |
| 1999 | 23 | 8 | 15 | 64,399 | 18,315 | 46,084 | 0.662% | 0.188% | 0.474% | 9,727,754 |
| 2000 | 28 | 8 | 20 | 104,871 | 45,820 | 59,051 | 0.870% | 0.380% | 0.490% | 12,047,625 |
| 2001 | 6 | 2 | 4 | 19,958 | 4,859 | 15,099 | 0.177% | 0.043% | 0.134% | 11,258,254 |
| 2002 | 6 | 3 | 3 | 13,350 | 9,937 | 3,413 | 0.128% | 0.095% | 0.033% | 10,423,255 |
| 2003 | 7 | 4 | 3 | 6,852 | 3,281 | 3,571 | 0.083% | 0.040% | 0.043% | 8,283,963 |
| 2004 | 4 | 1 | 3 | 56,088 | 4,549 | 51,539 | 0.553% | 0.045% | 0.508% | 10,151,601 |
| 2005 | 10 | 6 | 4 | 45,448 | 15,270 | 30,178 | 0.409% | 0.137% | 0.271% | 11,116,473 |
| 2006 | 23 | 14 | 9 | 167,747 | 86,405 | 81,343 | 1.434% | 0.739% | 0.695% | 11,699,205 |
| 2007 | 32 | 5 | 27 | 293,492 | 31,935 | 261,557 | 2.249% | 0.245% | 2.004% | 13,051,379 |
| 2008 | 49 | 6 | 43 | 202,015 | 23,363 | 178,653 | 1.549% | 0.179% | 1.370% | 13,041,930 |
| 2009 | 17 | 4 | 13 | 91,193 | 74,441 | 16,752 | 1.083% | 0.884% | 0.199% | 8,420,846 |
| 2010 | 12 | 5 | 7 | 47,872 | 18,897 | 28,975 | 0.454% | 0.179% | 0.275% | 10,545,504 |
| 2011 | 12 | 1 | 11 | 58,634 | 5,000 | 53,634 | 0.492% | 0.042% | 0.450% | 11,920,737 |
| 2012 | 8 | 3 | 5 | 63,931 | 40,147 | 23,784 | 0.539% | 0.338% | 0.200% | 11,865,436 |
| 2013 | 8 | 2 | 6 | 81,996 | 6,417 | 75,579 | 0.609% | 0.048% | 0.561% | 13,468,250 |
| 2014 | 6 | 1 | 5 | 36,128 | 13,301 | 22,827 | 0.214% | 0.079% | 0.135% | 16,904,786 |
| 2015 | 20 | 12 | 8 | 183,513 | 158,061 | 25,452 | 0.972% | 0.837% | 0.135% | 18,887,313 |
| 2016 | 22 | 8 | 14 | 244,038 | 84,960 | 159,078 | 1.331% | 0.463% | 0.867% | 18,339,327 |
| **Average (1979-2016)** | | | | | | | **0.970%** | **0.365%** | **0.605%** | |
| Average (1985-2016) | | | | | | | **1.085%** | **0.383%** | **0.703%** | |
| Average (2007-2016) | | | | | | | **0.949%** | **0.329%** | **0.620%** | |

*As of beginning of year. All other data are over the year.

Source: SDC Platinum and CRSP; calculations by the author.

Remarkably, this analysis uncovers a whole new source of return to S&P 500 index fund holders, amounting to almost 1% per year historically and presumably a comparable amount going forward! Because takeovers were just getting off the ground in 1979-1984, one might count only 1985 to the present, when average takeover yields were slightly higher; and, if you adhere to the logic in CAPE and CATY and only consider the last ten years, the averages are slightly lower. At any rate, the total takeover yield, averaged across these various time periods, is close to 1%.

## TWO KINDS OF ACQUIRERS

Before you get too excited: while these additional cash flows to the investor really did occur, you cannot just add 1% to estimates of the future return from an equity index fund or portfolio. The extra money has to come from somewhere, and in the case of acquirer companies that are in the S&P 500, it comes from companies that are already in the investor's portfolio. This is also true of buybacks; the company buying back its own shares no longer has the cash used to buy those shares (and is also, by definition, in the investor's portfolio). These second-order effects make it difficult to use any of these yield measures for forecasting equity returns, but I will attempt a resolution of these issues in the Expected Returns section of this essay.

## THE CFI YIELD OVER TIME

Setting aside the split between the two types of acquirers, here's a graph — in Exhibit 4 — of the takeover yield over time, along with the other two components of cash flow to the investor, and the total of all three (the CFI yield):

### EXHIBIT 4
### DIVIDEND YIELD, BUYBACK YIELD, TAKEOVER YIELD, AND TOTAL (CFI YIELD)
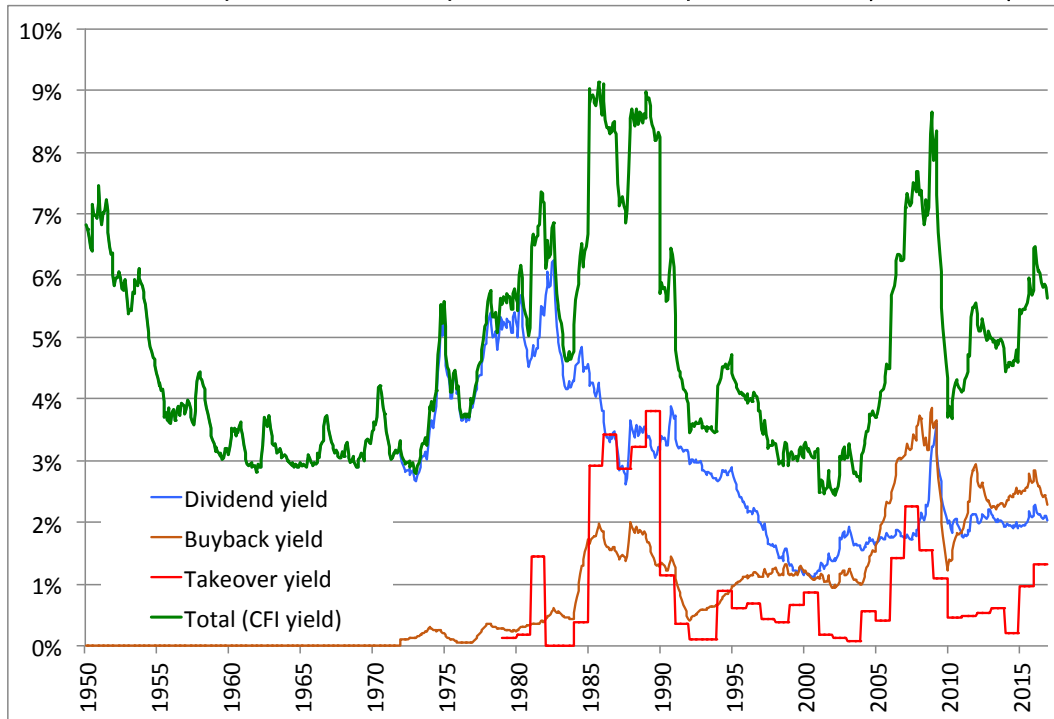


Source: Exhibits 2 and 3

The current CFI yield is 5.6%, *above* its historical (1950-2016) average of 4.7%. On its face, this datum suggests a fairly valued or even undervalued stock market, although there are other factors.

## SHE CAUGHT THE CATY

While the current CFI yield is high, it has varied considerably over the recent past. For that reason, as Robert Shiller has demonstrated, it is advisable when observing a valuation measure to take an average of the real (inflation-adjusted) value of the measure over time. In his work on CAPE, Shiller has concluded that 10 years is the "right" amount of time. While 10 years seems a bit arbitrary, I don't have a better suggestion. Therefore I convert the CFI yields in Exhibit 4 to a CATY, that is, to a cyclically adjusted measure of total yield that includes cash takeovers as well as the other components.

Exhibit 5 shows the evolution of "my CATY" over time. The current value, relevant for forecasting, is 4.23%, compared to a historical average of 3.96%.[13] (Note that the current value is itself an average, of 10-year real CFI yields.) Once again, if the stock market is overvalued relative to 50 years of history, it doesn't show up in this analysis. Moreover, there is no trend whatsoever — not down, not up. "My CATY" appears to fluctuate widely and directionlessly around 4%. The best news is that there is not much news.

EXHIBIT 5
"MY CATY," BASED ON CASH FLOW TO THE INVESTOR (CFI),
MARCH 1967-FEBRUARY 2017



Source: Author's analysis, based on data used to construct green line in Exhibit 4. Inflation adjustment using the CPI for All Urban Consumers from https://fred.stlouisfed.org/series/CPIAUCSL.

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[13] "Current" is February 28, 2017; historical is for the 50 years ended on that date.

## MY CATY VS. STRAEHL-IBBOTSON CATY VS. CAPE

To highlight the difference between "my CATY" and the other valuation analyses mentioned in this essay, Exhibit 6 compares the results in Exhibit 5 to the Straehl-Ibbotson CATY (which excludes cash takeovers) and Shiller's CAPE (which is based on earnings). So the variables can be compared, I've converted Shiller's CAPE to a yield, that is, to the earnings/price ratio, by taking the reciprocal of the CAPE itself.

## EXHIBIT 6
## CAPE AND TWO CATYS, 1967-2017
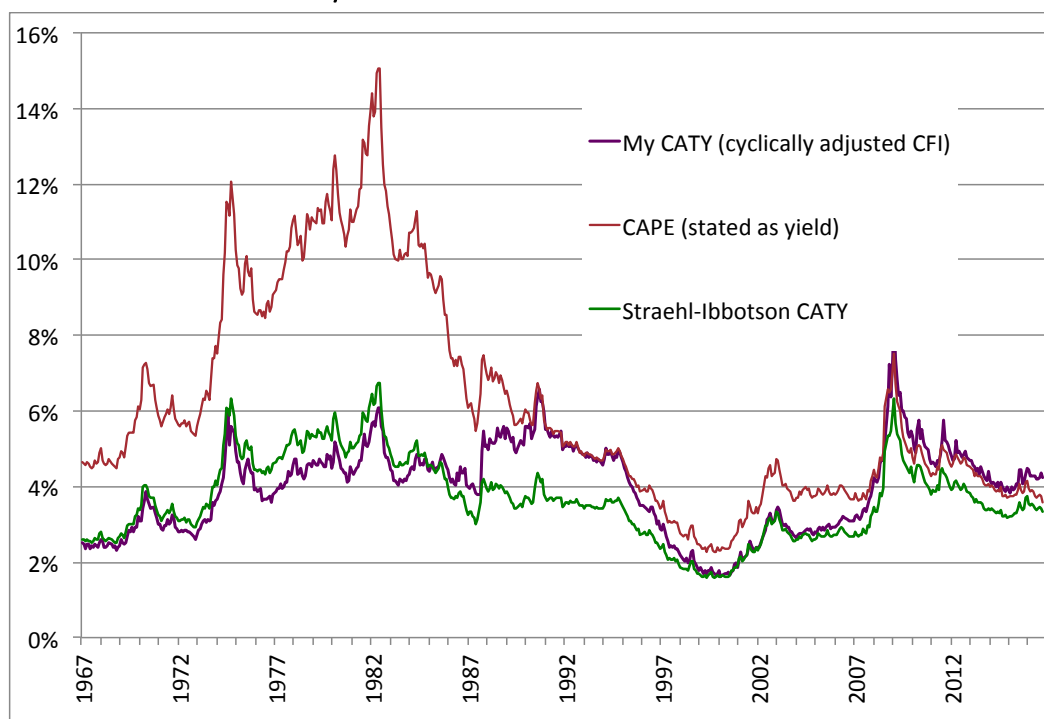


Source: Exhibit 5 (My CATY); Robert Shiller's data base, http://www.econ.yale.edu/~shiller/data/ie_data.xls (CAPE); Straehl and Ibbotson [2017].

The three valuation measures shown in Exhibit 6 give similar results at present. Historically, however, they have not. Straehl and Ibbotson demonstrate that their CATY is better than CAPE at forecasting equity returns, so it makes sense that my CATY will also be better than CAPE. As to which CATY is a better forecaster, that's a topic for future investigation.[14]

## WHAT RETURN CAN EQUITY INVESTORS EXPECT?

My purpose in this essay has mostly been to document the takeover yield and the CFI yield over time and to note the high level of the latter when compared to dividends alone or even to Straehl and Ibbotson's total yield (which does not include cash takeovers). However, if I don't take the last step and use this information to forecast the return on equities, somebody else will, and they might not get all the components

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[14] Sabbatucci [2016] addressed this question and finds that cash flow measures which include the takeover yield are better forecasters of subsequent equity returns.

right. (Nor will I — accurate forecasting is not difficult but impossible, but I think I know what the right components are.)

## AN EXPECTED RETURN MODEL

I use the Grinold, Kroner, and Siegel [2011] (henceforth "GKS") model of expected equity returns. It is:

$$R = \frac{D}{P} - \Delta S \; + \; i \; + \; g \; + \; \Delta PE.$$

(1)

$$\underbrace{\qquad}_{\text{Income}} \quad \underbrace{\qquad}_{\text{Earnings growth}} \underbrace{\qquad}_{\text{Repricing}}$$

where $R$ is the expected nominal return on an equity index, $D$ is dividends, $P$ is the price or index level, $\Delta S$ is net new issues (new issues minus share buybacks) expressed as a yield, $i$ is expected inflation, $g$ is the expected real growth rate of earnings (usually proxied by real GDP growth), and $\Delta PE$, the repricing term, is the expected annual change, up or down, in the PE ratio of the market.

Since the $\Delta S$ term is, itself, the difference of two numbers and is subtracted from the total, it is confusing so let's break it into its component parts:

$$R = \frac{D}{P} - N + B + i + g + \Delta PE$$

(2)

where N is new issues, expressed as a yield, and B is buybacks, expressed as a yield.

The aggregate return to corporations in the economy (or a subset of the economy such as the S&P 500) differs from the return per share. Note that the real growth term, $g$, refers to aggregate economic growth, not growth per share; thus $g$ in equation (2) can be written as:

$$g \; = \; gps \; + \; N - B$$

(3)

where $gps$ refers to real growth per share. Thus, to convert aggregate return in the economy to return per share, we *subtract* increases in the number of shares due to new issues *(N)* and *add* the number of shares due to buybacks and takeovers *(B)*.[15]

The structure of the model prevents me from using "my CATY" directly as an input. Instead, the dividend part of "my CATY" goes into the *D/P* term while the buyback and takeover parts go into the *B* term.

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[15] In a personal communication, Philip Straehl pointed out that there is a feedback loop in which the inclusion of cash takeovers in *B* will also have implications for aggregate growth ($g$), because $g \; = \; gps \; + \; N - B$. That is, aggregate growth is lower than it would otherwise be due to capital being diverted to the purchase of companies.

## A CAVEAT

The GKS formula, while correct in the sense that it's an accounting identity, is only as good as its inputs, some of which are tightly estimated and some loosely. (In fact, it's only as good as its loosest input.) The presence of very approximate inputs causes us to hesitate in asking readers to take our equity expected return and equity premium estimates too literally. The same caveat, of course, applies to other people's estimates.

## ESTIMATING THE INPUTS

The repricing term, $\Delta PE$, is tricky to estimate because, even if we have a fair value for the market, to which the price is expected to regress, we don't know the speed at which it will regress. Moreover, every time I've used a nonzero estimate for $\Delta PE$, I've been wrong. It seems like the current PE is the best forecast of the future PE except possibly at extreme valuations, so that is the assumption I'll use here: $\Delta PE = 0$.

Let's use 2% for expected inflation. Because of the construction of the GKS model, D/P in this setting needs to be the dividend-only yield, which is 1.82%.[16]

What should $g$ be? That's the toughest question in estimating any dividend discount model. Fortunately, we have some guidance from Straehl and Ibbotson, who find that the growth rate of real total payout (dividends plus buybacks) is roughly equal to that of real GDP. Since I expect real GDP in the United States to grow at 2.5%, I use that number as $g$.[17]

## ACCOUNTING FOR TAKEOVER YIELD

In equation 1, the $\Delta S$ (change in the number of shares) term, consisting of new issues minus buybacks, adjusts the result for dilution, which reflects the need of companies to issue new shares to maintain an adequate supply of capital. Dilution, GKS write, "is the difference between the growth rate of dividends and the growth rate of dividends per share." The negative sign in the equation ($-\Delta S$) indicates that the $\Delta S$ term is subtracted from the equity return estimate: the higher the value for new issues, the lower the equity return; the higher the value for buybacks (which are the opposite of new issues), the higher the equity return.

Since GKS' equity return estimate thus already takes account of buybacks, we only need to add takeovers. One can add them to dividends or to buybacks; because they are one-time rather than repeated transactions, I add them to buybacks ($B$ in equation 2). In the original GKS article, new issues expressed as a yield ($N$) are 2%, based on an estimate by Bernstein and Arnott [2003].[18] I have no new information on this number,

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[16] Accessed at http://www.multpl.com/s-p-500-dividend-yield/ on March 3, 2018.

[17] Since the companies in the S&P 500 do not make all their profits in the United States, a further adjustment for international exposure can be justified.

[18] This is probably the loosest or most speculative of the inputs to the GKS equation; dilution has varied tremendously across time and across countries. See Bernstein and Arnott [2003], Table 1 and Figure 6.

so I just use the GKS number.[19] The sum of the buyback and takeover yields, $B$, is +3.24%.[20]

Thus, the expected equity return on the S&P 500, $R$, is given by:

$R =$      $D/P$ (dividend yield, 1.82%)
           $- N$ (new issues, -2%)
           $+ B$ (buyback and takeover yields, 3.24%)
           $+ i$ (inflation, 2%)
           $+ g$ (real growth, 2.5%)

           = 7.56%.

Rounding, this 7.6% return is the expected geometric mean, nominal, total return.

## A SLIGHTLY MORE CONSERVATIVE ESTIMATE

For a more conservative (lower) estimate — in equity return forecasting, lower is probably good — let's go back to my earlier observation that only takeovers by companies not in the S&P represent new money from the point of view of an S&P 500 index fund holder. All other cash flows from the company to the investor come out of the investor's own pocket (because she holds the companies paying out the cash).

Thus, in calculating a more cautious estimate of the expected equity return, I adjust $B$ by removing the S&P-acquirer part of the takeover return. I thus arrive at a value for $B$ of 2.88%.[21] As a result: the expected nominal geometric return on S&P 500 equities is 1.82% − 2% + 2.88% + 2% + 2.5% = 7.2%.

## AVERAGING THE RESULTS

Finally, reflecting Bayesian statistical principles, when you have two estimates and you have no reason to believe one is more right than the other, it's best to take the average: 7.4%. The corresponding *real* geometric return is 5.4% Arithmetic mean returns (nominal and real) are about 2 percentage points higher.

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[19] Straehl and Ibbotson [2018] argue for less dilution, pointing out that Bernstein and Arnott studied a historical period of rapid economic growth when companies had to go to the capital markets for new funding more than they do now. They write, "Separately, the 2% dilution rule no longer applies even by [Bernstein and Arnott's] own measure of 'dilution,' which calculates net issuance at the market level. Although net issuance was 2.24% from 1926 to mid-2002 ([Bernstein and Arnott's] original sample), if updated data from the same CRSP dataset are used, we find that net issuance has been –0.72% (not +2.00%) thereafter [due to] share buybacks."
     Note, however, I am using the 2% dilution number as the *gross* amount of dilution; Bernstein and Arnott presented 2% as their estimate of *net* dilution. Thus, gross dilution was even larger, and I could have used that number if the authors had bothered to reveal it. My estimate of *net* dilution, -1.2%, is not only negative — as Straehl and Ibbotson would have it — but is even more negative than their -0.72% estimate (Straehl and Ibbotson [2018]), with the difference reflecting my inclusion of the takeover yield. (My variable naming convention has the sign for net dilution reversed: $B − N = 0.72\%$.)

[20] The buyback yield, 2.27%, is the last data point (December 2016) of the buyback yield line in Exhibit 2; the takeover yield, 0.97%, is from Exhibit 3, line "1979-2016", column "total".

[21] Instead of a 0.97% takeover yield I use 0.605% (Exhibit 3, line "1979-2016", column "acquirer not in S&P").

Subtracting the latest (March 2, 2018) 10-year TIPS yield of 0.74% from the real geometric return, I get a geometric mean equity risk premium of 4.7%.

Is this high or low? Relative to the pessimistic forecasts that have been circulating in this century, it's surprisingly high. It's close to the equity risk premium that was achieved over the long run (1926-2017) and that is widely used, in the "future equals past" method pioneered by Roger Ibbotson with various collaborators, to justify high equity allocations.

Paraphrasing Mark Twain, the death of future equity returns has been greatly exaggerated.

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