ThinkingApplied.com
Mind Tools: Applications and Solutions

A Stock Price Paradox
(v2.0)

Lee Humphries

Paradox: a statement opposed to common sense but possibly true

Some Preliminaries

Crazy as it sounds, your profit may be greater if you reject a stock at its current price and buy it later at a higher price. This counterintuitive puzzle has six pieces: fair value, margin of safety, price fluctuation, time frame, money market yield, and tax rate. We begin by examining them.

Fair value: What it is, how it's calculated, how it increases over time. The fair value of a business is generally regarded as the present value of all the cash that can be taken out of it over its remaining *discernible* life. The fair share price is the present value of that extractable cash divided by the business' number of diluted shares.

We can't pinpoint fair value with absolute certainty, but we can estimate it within probable limits. The fair-value estimate is the product of an *economic base* times a *multiplier*.

- Analysts use various economic bases to arrive at an estimate of fair value. These include the current dollar amount of invested capital, annual earnings, free cash flow, and economic profit.

- The base's multiplier is the sum of a series of present value factors. The factors quantify the company's *expected* growth and risk characteristics in the years that comprise its *discernible* future. The P/E ratio, the market's rubber yardstick of expected growth and risk, is such a multiplier (although its common definition—*price divided by earnings*—hides the fact).

  If a company's average growth and risk characteristics are stable over time, its discernible future will look the same from year to year. Stable growth and risk are reflected in a stable multiplier.

- The economic base of a successful company grows ever larger. And an increasing base times a stable (or improving) multiplier produces an increasing fair value. This drives the stock price higher.

Margin of safety. Because fair value can't be determined with certainty, prudent investors require a margin of safety—a purchase price discounted from their estimate of fair value. The margin of safety is financial insurance against a bone-headed appraisal.

Price fluctuation. The stock market assists investors in their margin-of-safety pursuit—although in its own good time. Prices are in constant flux, and sooner or later the market will offer up a stock at a price discounted to its fair value.

Time frame. The length of the wait for a discounted price is important. The economic effects of "sooner" and "later" are very different.

Money market yield. Discounted prices follow unpublished itineraries. They arrive and depart unannounced, often in the same day. Their brief half-lives leave buyers little time to respond, so funds must be immediately at hand. The tradeoff for quick access to parked cash is a lower, money-market rate of return. This rate plays a major role in paradoxical pricing.

Tax rate. The entire return on parked cash can't be rolled over into a beckoning stock. Part of it is ladled off by the tax man. Accordingly, federal and state tax rates on money market dividends figure into the puzzle.

An Example of Paradoxical Pricing

Now let's see how the six pieces fit together to create a pricing paradox—a situation where buying a stock later at a higher price produces a greater profit than buying it today at a lower price. You will find a small herd of numbers running through our discussion. They have been wrangled and corralled into Table 1.

Table 1
A Comparison of Two Investment Strategies

		Year	0	1	2	3
Investment	Stock:	Fair value (15% growth)	34.00	39.10	44.97	51.71
Choices		Market price	34.00	39.10	35.97	51.71
	Money market (4.39% yield):pre-tax value		34.00	35.49	37.05	

Art's	Stock:		Buy			Sell
Strategy			34.00			51.71 Proceeds
					-	3.90 Tax @ 22%
					=	47.81 Remainder
					-	34.00 Investment
					=	13.81 Profit

Bob's	Money market:		Buy	Sell		
Strategy			34.00	37.05 Pre-tax value		
				-	1.08	Tax @ 35% annually
				=	35.97	Remainder
	Stock:				Buy	Sell
					35.97	51.71 Proceeds
					-	3.46 Tax @ 22%
					=	48.25 Remainder
					-	34.00 Investment
					=	14.25 Profit

Imagine a very simple financial market, open only once a year—always on the same date. Its participants have but two investment choices: a single stock whose fair value grows 15% annually and a money market account that yields 3.65% annually.

The market price of the stock fluctuates. At years *0, 1, and 3* it trades at its fair value. At year *2* it trades at a 20% discount to its fair value.

Two investors, Art and Bob, try their luck in the market. Investing the same amount of cash, both enter the market at year *0* and exit it at year *3*. But they pursue different strategies.

Art buys the stock at year *0* for its fair value of $34.00. He sells it at year *3* for its fair value of $51.71.

Bob requires a 20% margin of safety. So at year *0*, he rejects the fairly-priced stock. Instead, he invests his cash in the money market account, pays the annual tax due on its dividends, and bides his time.

Two years later the stock is selling for $35.97. This is 5.8% *higher* than its year *0* market price of $34.00, but 20% *lower* than its current fair value of $44.97. Spying his margin of safety, Bob withdraws the cash from the money market fund, pays the tax due on his profit, and uses the balance to purchase the stock at its discounted price.

Then—once more—he bides his time, waiting until the market re-prices the stock at its fair value. A fair-value price is reestablished at year *3*, whereupon he sells the stock and—like Art—collects $51.71.

Both investors are taxed at the same rate. (We assume a combined federal and state tax rate of 22% on capital gains. The tax equals *sale proceeds minus cost* times *tax rate*.)

After paying the tax, Art comes away with $47.81 per share, a net profit of $13.81 on his $34.00 investment. But Bob—despite a higher purchase price—comes away with more, $48.25, a net profit of $14.25 on *his* $34 investment.

Why is Bob's profit greater? For two reasons.

First, the total after-tax return on his money market account—5.8%—equaled the percent increase in the stock price over the same period. This parity enabled him to buy the stock at year *2*'s higher price using only the after-tax proceeds from his original money market investment. (A combined federal and state tax rate of 35% was applied to his money market dividends.)

Second, although the two investors received equal proceeds from their year *3* stock sales, Bob's stock basis was higher. This gave him a lower capital gains tax bill and a higher *overall* profit.

The Hurdle Rate

For Bob's money market account to produce a two-year *after-tax* return of 5.8%, an annual *pretax* return of 4.39% was required. That 4.39% was his money market *hurdle rate*. For any given period, the money market hurdle rate is the annualized *pre-tax* yield at which the annualized *after-tax* yield will equal the stock's annualized rate of price change. Bob would have been out of luck if the average money market yield during his two-year wait had been under 4.39%.

The money market yield required to produce paradoxical pricing depends on: (1) the money market tax rate, (2) the stock's fair-value growth rate, (3) the length of the wait for a margin-of-safety discount, and (4) the size of the margin-of-safety discount.

The hurdle rate moves higher as the tax rate increases, the fair value growth rate increases, the wait for a discount increases, and as the margin of safety *decreases*.

The values used in our example are summarized in Table 2, column a. Let's alter them one-at-a-time and observe the effect on the hurdle rate. Increasing the tax rate on money market dividends from 35% to 36% raises the hurdle rate to 4.46% (column b). Increasing the fair-value growth rate from 15% to 16% raises the hurdle rate to 5.78% (column c). Increasing the wait from two years to three years raises the hurdle rate to 10.42% (column d). And decreasing the margin of safety from 20% to 19% raises the hurdle rate to 5.40% (column e). All of these alterations drive the hurdle rate higher, but the most dramatic change occurs when the discounted purchase is delayed by a year—the hurdle rate is catapulted from 4.39% to 10.42%!

Table 2
The Money Market Hurdle Rate Under Changed Conditions

	a	b	c	d	e
Tax rate on dividends (federal + state)	35%	**36%**	35%	35%	35%
Fair-value growth rate	15%	15%	**16%**	15%	15%
Time until discount becomes available	2 years	2 years	2 years	**3 years**	2 years
Margin-of-safety discount	20%	20%	20%	20%	**19%**
Money market hurdle rate	4.39%	4.46%	5.78%	10.42%	5.40%

Calculating the Hurdle Rate

At what annualized *pre-tax* yield will a money market account's annualized *after-tax* yield equal a stock's rate of price increase from year *0* to year *y*? We track down the answer like this:

- Step 1. Calculate the stock's estimated total return factor from present time *0* to later time *y*:

  estimated total return factor = [(estimated price y) / (current price 0)] –1.

- Step 2. Take the yth root of the result in Step 1.

- Step 3. Subtract *1* from the result in Step 2.

- Step 4. Divide the result of Step 3 by *1 – the sum of the federal and state tax rates*.

- Step 5. Multiply the result in Step 4 by *100%*.

If the annualized money market yield available to you within the time frame *0* to *y* equals or exceeds the rate in Step 5, paradoxical pricing can occur. If the annualized money market yield is lower, paradoxical pricing cannot occur.

Procrastinating for Profit

Table 3 presents the hurdle rates for annualized fair-value growth of 7% to 20%. The hurdle rate was calculated using a combined federal and state tax rate of 35% on money market dividends. A stock's market price at year *0* is assumed to be fair value. Its market prices at years *1, 2, 3*, and *4* reflect a 20% margin-of-safety discount to current fair value. In instances where a later year's discounted price is equal to or less than year *0*'s market price, no hurdle rate exists.

Table 3
Annualized Money Market Hurdle Rates
for Waits of 1 to 4 Years

Year	0	1	2	3	4
Market price =	fair value	fair value - 20%	fair value - 20%	fair value - 20%	fair value - 20%
Fair-value growth rate					
7%	-	-	-	-	1.84%
8%	-	-	-	.40%	3.29%
9%	-	-	-	1.83%	4.75%
10%	-	-	-	3.25%	6.20%
11%	-	-	-	4.68%	7.66%
12%	-	-	.27%	6.11%	9.11%
13%	-	-	1.65%	7.54%	10.57%
14%	-	-	3.02%	8.97%	12.02%
15%	-	-	4.40%	10.39%	13.48%
16%	-	-	5.77%	11.82%	14.93%
17%	-	-	7.15%	13.25%	16.39%
18%	-	-	8.53%	14.68%	17.84%
19%	-	-	9.90%	16.11%	19.30%
20%	-	-	11.28%	17.54%	20.75%
			Hurdle rate for paradoxical pricing		

As Table 3 shows, the greater the money market return, the longer you can perch, buzzard-like, surveying the Wall Street landscape for a fleeting bargain. Suppose you are seeking fair-value growth in the 12% to 15% range during a period when money market yields are around 4.5%. Under these conditions you can afford to wait more than two years for the market to offer up a margin-of-safety price.

The higher a stock's growth rate, the wider its price swings tend to be. This volatility offers you decent odds that a 20% margin-of-safety discount will show up sometime during a two-year wait. Should the discount arrive early enough to send the stock below its initial cost—i.e., below its market price when your vigil began—there will be no hurdle rate to achieve and your money market profit will be added gravy.

Absolute Cost vs. Relative Cost

Confusion over paradoxical pricing arises when we measure cost in absolute, but not relative, terms. In absolute terms, a stock's costliness is its price in dollars—more dollars, higher cost. But in relative terms, its costliness is the ratio of its price to its fair value—smaller ratio, lower cost. Those who see this distinction can spot relative cost dropping, even as price is rising.

Lee Humphries, an interdisciplinary analyst, is President of ThinkingApplied.com.