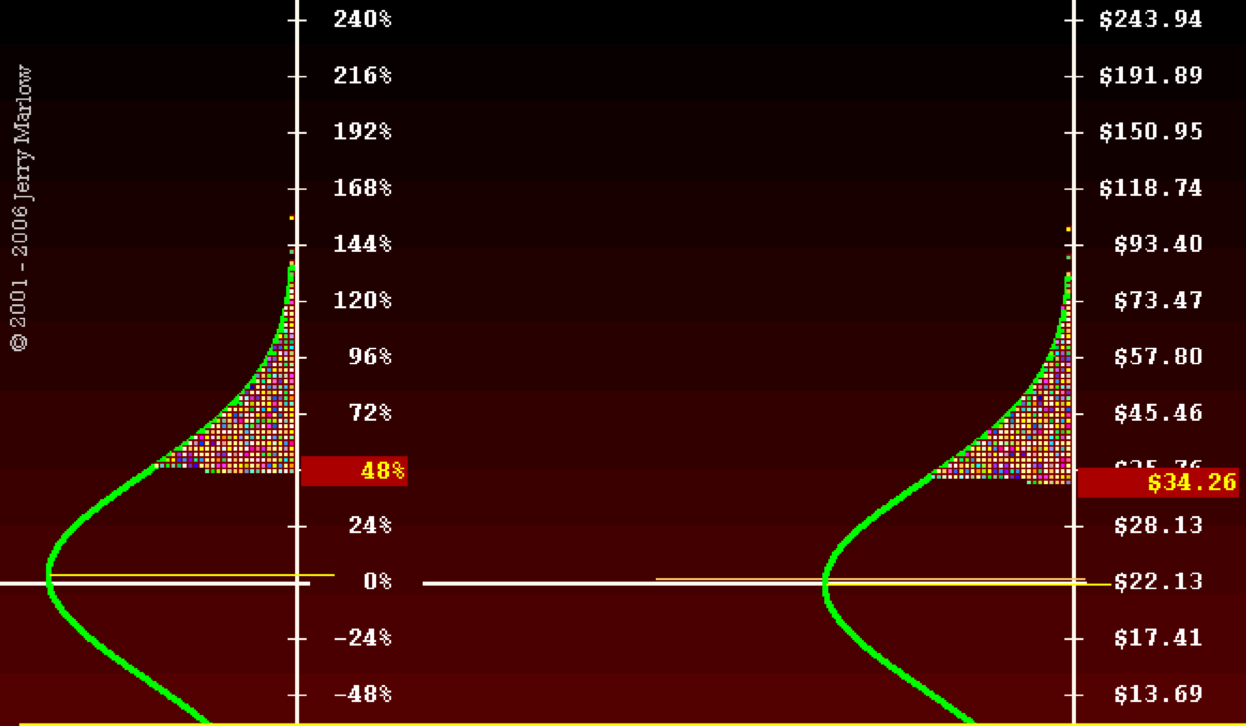


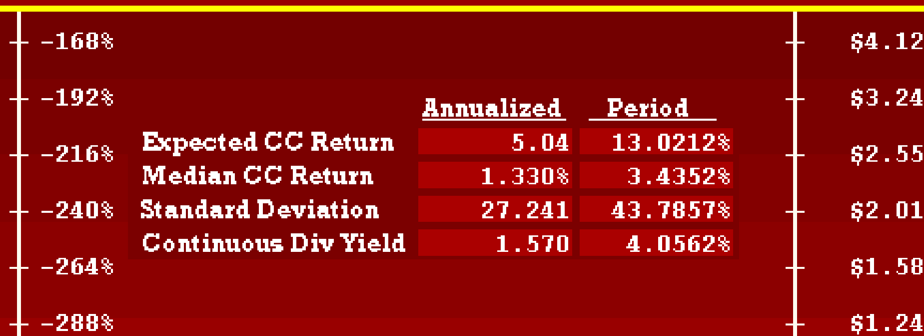
End-of-period Asset Price	$34.26
- Strike Price	22.50
= Payoff	$11.76

Payoff	$11.76
x Probability	0.00050000
= Probability-weighted Future Value	0.00587799

Probability-weighted FV /	0.00587799
(exp(Period Expected R))	1.13906928
= Probability-weighted Present Value	0.00516034
Cumulative Probability-weighted Present Value	2.93671668

Getting divorced? Don't let the court value your spouse's stock options at their so called "intrinsic value"!

by Jerry Marlow



	Annualized	Period
Expected CC Return	5.04	13.0212%
Median CC Return	1.330%	3.4352%
Standard Deviation	27.241	43.7857%
Continuous Div Yield	1.570	4.0562%

Current Asset Price	22.13
Days to Expire (365 D/Y)	943
Call Strike Price	22.50

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Jerry Marlow, MBA, values stock options in divorce proceedings and in other litigation; gives seminars to CPAs, to divorce financial planners and to others on how to value stock options in divorce; develops interactive tutorials on stock options and develops software for valuing stock options. He is author of ***Option Pricing: Black-Scholes Made Easy*** published by John Wiley & Sons. His books, software and services are available at www.jerrymarlow.com.

Beware "intrinsic value." Beware "under water." If you have to, challenge precedents. People who do not understand stock options or the nature of the value of stock options often value stock options at their so-called "intrinsic value." An option's so-called "intrinsic value" is the value the option would have if it expired on the day of the valuation.

For example, let's say it's June 19, 2006. Today is your marriage's separation date and the valuation as-of date for your spouse's stock options. Microsoft's stock is trading at $22.13. Your spouse has 100,000 Microsoft options that expire in seven years. The options have a strike price of $22.50. They are "under water." That is, currently the strike price is higher than the stock's trading price.

If you were going to buy Microsoft stock today, it would be cheaper to buy shares at the market price than at the options' strike or exercise price. Hence, if these options expired today, they would offer no payoff. Their value today would be $0. With an expire-today value of $0, the options' "intrinsic value" is $0. If the people who are valuing your spouse's stock options for him or her claim the value of these stock options is their "intrinsic value," then they will claim that your spouse's options have a value of $0. Tough luck!

But the options do not expire today. They expire in seven years. Is their value still $0?

If stock options with zero “intrinsic value” were valueless, then, with no risk, in less than fifteen years, anyone with $5,000 could become a billionaire

Once you get approval for knowing what you’re doing and having the resources to do it, through a brokerage account, you can sell stock options you don’t even own, never bought and never paid for. You can sell “under-water” stock options. That is, you can sell stock options that have zero “intrinsic value.” You can sell for real money instruments that, according to people who value stock options at their “intrinsic value,” are worthless. If you can sell for real money something that is worthless, that you never bought and that you never paid for, you can make a lot of money real fast. It’s almost like getting in on the dot-com bubble at the beginning.

You can sell options at the bid price that the market offers.

To the right are bid prices as of June 19, 2006 for "under-water" Microsoft call options: options with zero "intrinsic value." These are just a few of the thousands upon thousands of "under-water," "zero-intrinsic-value" call options that you can sell for real money.

In the designation
06 Jul 22.50 (MSQ GX):

06 is the expiration year 2006.

Jul is the expiration month July. Microsoft options expire on the first Saturday after the third Friday of the month.

$22.50 is the strike price.

(MSQ GX) is the identifier for this particular option.

If these options were worthless, then the only constraint on how fast you could rake in money would be your broker's margin requirements. The initial margin requirement for selling the under-water call options we're going to look at is roughly ten time's the option's bid price.

	A	B	C	D
1	**MSFT (Nasdaq)**	**$22.13**		
2	Jun 19 2006 @ 09:48 ET			
3				
4	**Under-Water,**			
5	**Zero Intrinsic-Value**	**Bid**	**Days to**	**Years to**
6	**Call Options**	**Price**	**Expiration**	**Expiration**
7	06 Jul 22.50 (MSQ GX)	$0.45	33	0.1
8	06 Jul 25.00 (MSQ GJ)	$0.05	33	0.1
9	06 Aug 22.50 (MSQ HX)	$0.70	61	0.2
10	06 Aug 25.00 (MSQ HJ)	$0.05	61	0.2
11	06 Oct 22.50 (MSQ JX)	$1.20	124	0.3
12	06 Oct 25.00 (MSQ JJ)	$0.35	124	0.3
13	06 Oct 27.50 (MSQ JY)	$0.10	124	0.3
14	07 Jan 22.50 (MSQ AX)	$1.65	215	0.6
15	07 Jan 24.50 (MSQ AR)	$0.80	215	0.6
16	07 Jan 25.00 (MSQ AJ)	$0.65	215	0.6
17	07 Jan 27.00 (MSQ AS)	$0.30	215	0.6
18	07 Jan 27.50 (MSQ AY)	$0.20	215	0.6
19	07 Jan 29.50 (MSQ AT)	$0.10	215	0.6
20	07 Jan 30.00 (MSQ AK)	$0.10	215	0.6
21	08 Jan 22.50 (WMF AX)	$3.10	579	1.6
22	08 Jan 25.00 (WMF AE)	$2.00	579	1.6
23	08 Jan 27.50 (WMF AY)	$1.20	579	1.6
24	08 Jan 30.00 (WMF AF)	$0.70	579	1.6
25	08 Jan 35.00 (WMF AG)	$0.20	579	1.6
26	08 Jan 40.00 (WMF AH)	$0.05	579	1.6
27	09 Jan 22.50 (VMF AX)	$4.00	942	2.6
28	09 Jan 25.00 (VMF AE)	$3.10	942	2.6
29	09 Jan 30.00 (VMF AF)	$1.70	942	2.6
30	09 Jan 35.00 (VMF AG)	$0.75	942	2.6

Let’s say you have $5,000 you can put up as margin. For $0.45 each, you sell 1,200 of the “under-water,” “zero-intrinsic-value” call options that have a strike price of $22.50 and that expire in approximately one month. If these options were worthless, then a month later, you’re $540 richer. In one month, you’ve earned better than an 11% return on your capital. Even if you were paying a 35% short-term capital-gains tax as you go (which would not be a very good tax-management strategy) and you were maintaining the initial margin until the options expire (which is not very efficient position management), you would be earning better than 7% a month after taxes. You would be earning an after-tax annual return of around 229%.

You keep it up. Every month you sell more under-water call options and earn a 7.15% after-tax return. Every year, your money more than doubles. After seven years, your $5,000 has grown to more than $1.6 million. After fifteen years, you’re a billionaire.

Maybe the people who want to value your spouse’s stock options at their “intrinsic value” don’t want to be billionaires. Or maybe...

A quick glance at how much you can sell “under-water,” “zero-intrinsic-value” options for and a little arithmetic leaves us with only two possible conclusions: Either at least some stock options with time remaining until expiration are worth more than their so-called “intrinsic value,” or the people who want to value your spouse’s stock options at their “intrinsic value” don’t want to become billionaires” even when doing so takes only $5,000 and is risk free.

I don’t know about you, but, from this little demonstration, since most of the people I know wouldn’t mind becoming billionaires, I would conclude that stock options that expire later than today most likely have value greater than their expire-today or “intrinsic” value. I would conclude that even “under-water” stock options may have value. A glance at the table of bid prices would tell me that, the longer an option’s time to expiration, the greater its value.

If valuing options at their "intrinsic value" is clearly bogus, why do some family courts still do it?

Up until 1973, no one had come up with a reliable way to value stock options. There were no option exchanges in the United States. There wasn't much of a market for stock options. On April 26, 1973, the Chicago Board Options Exchange (CBOE) began trading. On the first day of trading, only 911 contracts (91,100 options) on sixteen underlying stocks traded.

Later in 1973, Fischer Black and Myron Scholes published their paper on and formula for what became known as Black-Scholes Option-Pricing Theory. For the first time, a rational and reliable way to value and price stock options came into existence.

In 1975, the CBOE adopted the Black-Scholes model for pricing options. The Black-Scholes formula was built into traders' handheld calculators. Option trading took off. In 2005, the CBOE traded 468,249,301 contracts (468,249,301,000 options) with a notional value of more than $12 trillion.

While Black-Scholes Option Pricing Theory revolutionized the world of finance and created markets that trade in billions of options and trillions of dollars, with one exception, U.S. courts ordinarily do not base their judgments on revolutions. They base their judgments on precedents. Up until 1973 no precedent could exist for valuing options according to Black-Scholes Option Pricing Theory because Black-Scholes Option Pricing Theory didn't exist. What's more, anyone who finished school before 1973 couldn't have studied Black-Scholes Option Pricing Theory in school because it didn't exist.

Precedents for valuing stock options were established before Black-Scholes Option Pricing Theory was formulated and before options exchanges existed. Precedents were based on bogus notions like intrinsic value and incalculable notions like time value. These now-obsolete notions precluded the fair valuation of stock options. Nonetheless bogus valuation methodologies became precedents.

At one time, radical feminists might have argued that most of the spouses with stock options were men and that male-dominated courts therefore had a subconscious inclination to undervalue stock options; but surely, in an era in which many women have employee stock options and many judges are women, no vestige of such a bias— if it ever existed— persists.

To persuade a court to value your spouse's stock options at their fair economic value, you may have to persuade the judge that Black-Scholes Option Pricing Theory trumps precedent

If my spouse (if I had one) were divorcing me and she had employee stock options, I would do everything I could to make sure that the options were valued not at their so-called "intrinsic value" but at their fair economic value. I would do everything I could to make certain that the options were valued in a way that is consistent with the prices you can get by selling options in the market place.

To persuade a court to use modern financial theory instead of bogus precedents to value your spouse's stock options, you may have to educate the judge about the Black-Scholes methodology and the fair valuation of stock options in a way that he or she can understand.

Unless explained graphically, Black-Scholes formula is not easy to understand

The Black-Scholes formula for valuing call options appears to the right.

The Black-Scholes formula falls within a branch of mathematics known as stochastic calculus. It’s not easy stuff. Unless the judge handling your case has at least a recent masters degree in mathematics or finance, he or she is unlikely to be able to make much sense of the formula. “Intrinsic value” the judge can at least understand.

While understanding the formula requires mathematical sophistication, understanding the concepts behind Black-Scholes Option Pricing Theory does not. Using graphic simulations the concepts can be explained simply and accurately. With a graphical approach, you and your attorney may be able to persuade the judge to give greater validity to a valuation methodology that revolutionized finance and won a Nobel Prize in Economics than to obsolete precedents like “intrinsic value.”

$$c = Se^{-qT}N(d_1) - Ke^{-rT}N(d_2)$$

where

$$d_1 = \frac{\ln(S/K) + (r - q + \frac{\sigma^2}{2})T}{\sigma\sqrt{T}}$$

$$d_2 = \frac{\ln(S/K) + (r - q - \frac{\sigma^2}{2})T}{\sigma\sqrt{T}} = d_1 - \sigma\sqrt{T}$$

S=Stock price at time zero

r = Continuously compounded risk-free rate

q = Continuous dividend yield

T = Option's time to expiration

N(x) = The cumulative normal distribution function

K = The option's strike price

σ = Volatility of the relative price change of the underlying stock price

The psychological hurdle: What value is it fair to give to uncertain payoffs?

To embrace Black-Scholes Option Pricing Theory, you, your attorney and the judge first have to embrace probabilistic methodologies for valuing uncertain future cash flows. For example, let's say that, during your marriage, your spouse's employer gave him or her a lottery ticket. By coincidence the lottery drawing will take place one year after your separation date. Does this lottery ticket have any value? If so, what methodology would be fair to determine its value?

"What's the payoff?," you might ask. "What are the odds?"

Suppose your spouse has one chance in a million to win a million dollars. If that's the case, then the probability-weighted payoff is the probability of winning (1 in a million) times the payoff ($1,000,000).

Probability-weighted payoff = (1/1,000,000) x $1,000,000

= $1.00

As of your separation date, what's the value of the lottery ticket?

The payoff happens one year in the future. The present value of a future payoff is the future payoff discounted by an appropriate interest rate. Suppose that, in a savings account, you could earn 5% interest. If 5% were the appropriate discount rate, then the present value of the payoff would be $1 discounted at 5% for one year.

Present value = $1.00/1.05

= $0.952 or slightly more than 95 cents

Hence, we can say that that probability-weighted present value of this lottery ticket is slightly more than 95 cents.

50% of $0.952 is roughly 48 cents. If you were entitled to 50% of the marital assets, would you consider 48 cents to be a fair settlement for your interest in this ticket? If not, what alternative methodology of arriving at a present value would you consider to be more fair? Keep in mind that you don't know if your spouse is going to win or lose the lottery.

Would it make a difference in the fairness of the methodology if the probability of winning were higher and the outcomes more complicated?

Suppose that only ten lottery tickets are in existence. Your spouse’s employer gave him or her five tickets. In addition to a grand prize of $1,000,000, there is a second-place prize of $500,000 and a third-place prize of $300,000.

The payoffs total $1,800,000. Your spouse has half the tickets. The same methodology gives your spouse’s probability-weighted payoff.

5/10 x $1,800,000 = $900,000.

Yet, depending on how many of the prizes your spouse won, the outcome could be a number of different payoffs. The table at right shows the different possible payoffs, each one’s probability and its probability-weighted payoff.

By discounting at 5% the probability-weighted future value of the payoffs, we get the probability-weighted present value:

$900,000/1.05 = $857,143.

50% of $857,143 is $428,571. If you were entitled to 50% of the marital assets, would you consider $428,571 to be a fair valuation for your interest in these lottery tickets? If not, what alternative methodology of arriving at a present value would you consider to be more fair?

Payoff	Probability	Probability-weighted payoff
$1,800,000	0.083333	$150,000
$1,500,000	0.138889	$208,333
$1,300,000	0.138889	$180,556
1,000,000	0.138889	$138,889
$800,000	0.138889	$111,111
$500,000	0.138889	$69,444
$300,000	0.138889	$41,667
$0	0.083333	$0
Totals:	1.0	$900,000

Suppose that, to do the valuation, you relied upon intuition. Suppose your intuition told you that, with all the uncertainty your spouse was facing, the lottery tickets weren't worth $900,000 but only $700,000. As your 50% of the value of this marital property, you accept $350,000 discounted back to the present.

If you made that bargain and your spouse then bought the other five tickets for $900,000 discounted back to the present, then he or she would be guaranteed a payoff of $1,800,000 for something valued at $1,600,000. As his or her 50% of the value of the marital property, your spouse would end up with a future value of

$1,800,000 - $350,000 - $900,000 = $550,000.

He or she would have eliminated the risk and would be $200,000 better off than you.

Bargains that allow one spouse to gain a risk-free advantage over the other are not fair bargains.

Very likely, if a court were seeking to find the present value of some other uncertain future cash flows, such as those from a pension plan that terminated upon the employee or retiree spouse's demise, it would seek to find the probability-weighted present value of those cash flows. Likewise the fairest value to assign to employee stock options is the probability-weighted present value of their potential future payoffs.

An option's present value depends upon the probability of different payoffs

Stock prices are volatile. They jump around. The more it jumps around and the more time it has to jump around, the farther a stock price can get from where it is now. If we look at a particular stock's trading price and how much it jumps around, we can see how far over a particular period of time the price might get from where it is now.

If we build a simulator that incorporates the assumptions behind Black-Scholes Option Pricing Theory, we can simulate how stock prices might jump around over a given time horizon. Let's use such a simulator to look at the relationship between an option's potential payoffs and its value. As an example, we will use the "under-water, " "zero intrinsic-value" Microsoft option 08 Jan 22.50 (WMF AX).

Current stock price: $22.13

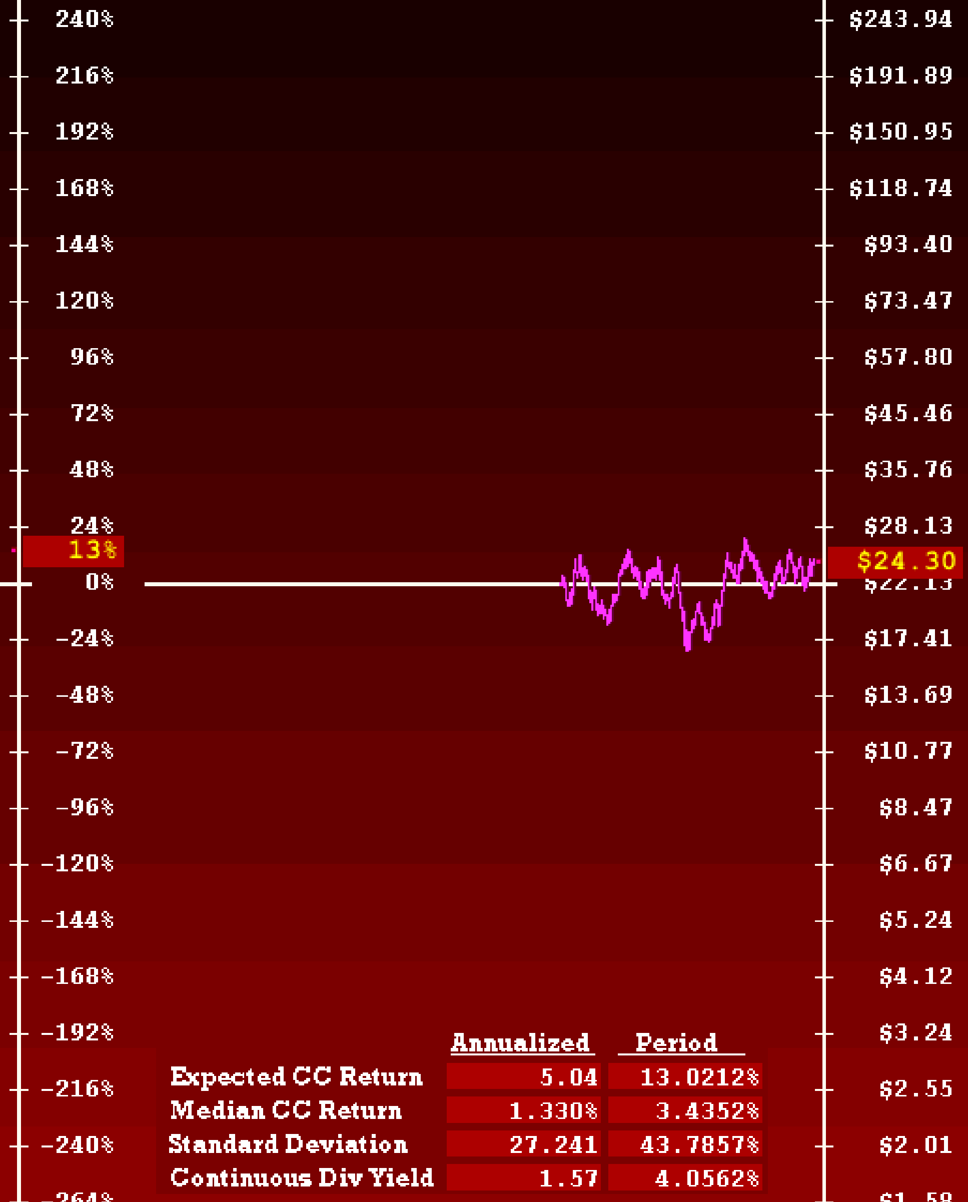
Strike or exercise price $22.50

Expires January 17, 2009 which is 943 from the valuation as-of date

Bid price: $4.00

Bid-Ask Average: $4.35

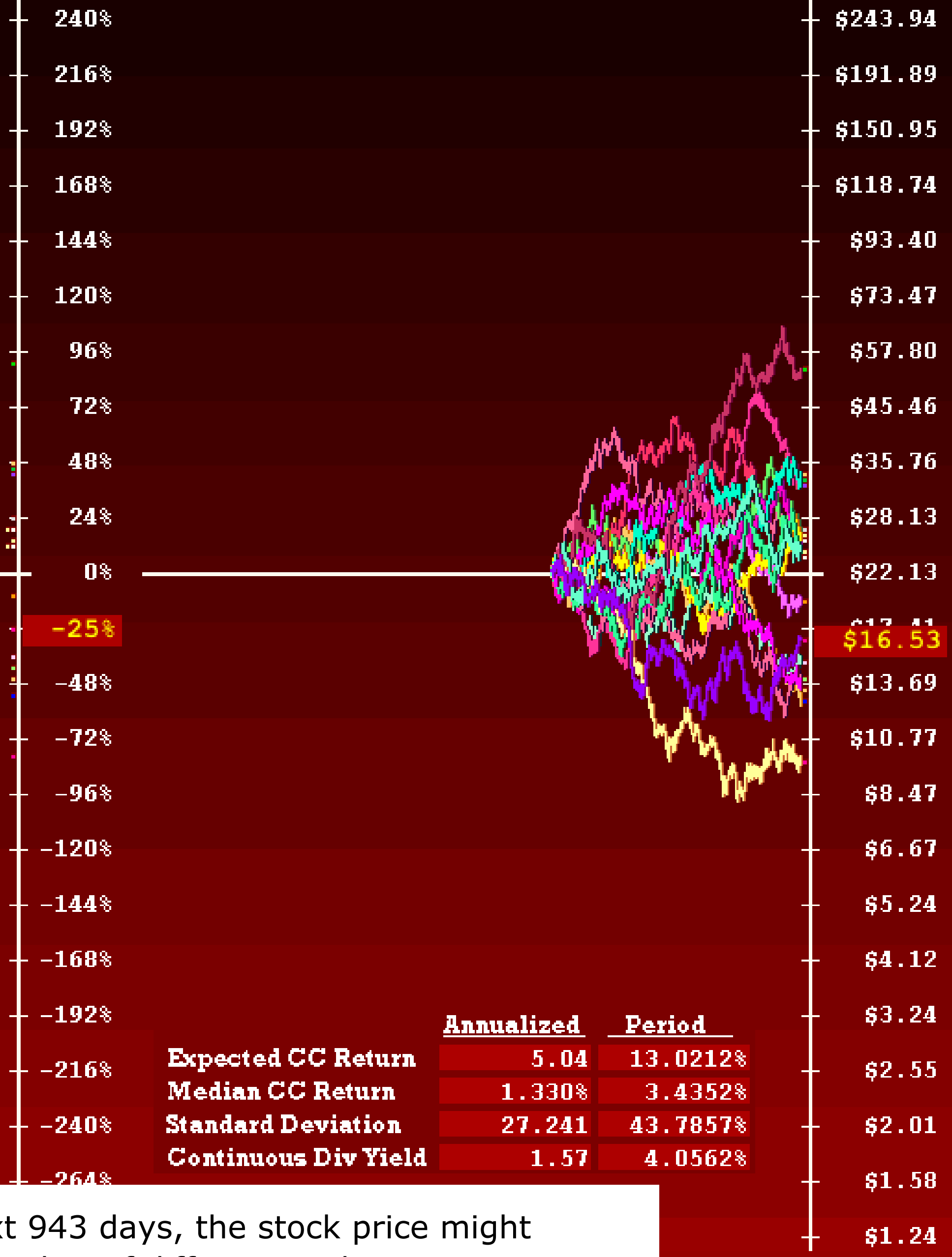
Ask price: $4.70



	Annualized	Period
Expected CC Return	5.04	13.0212%
Median CC Return	1.330%	3.4352%
Standard Deviation	27.241	43.7857%
Continuous Div Yield	1.57	4.0562%

Current Asset Price	22.13
Investment Horizon	943

Over the next 943 days, we might expect the price of Microsoft stock to jump around something like this. We can tabulate the outcome of a simulated price path with one little square and the period return that the price path produces with another little square.



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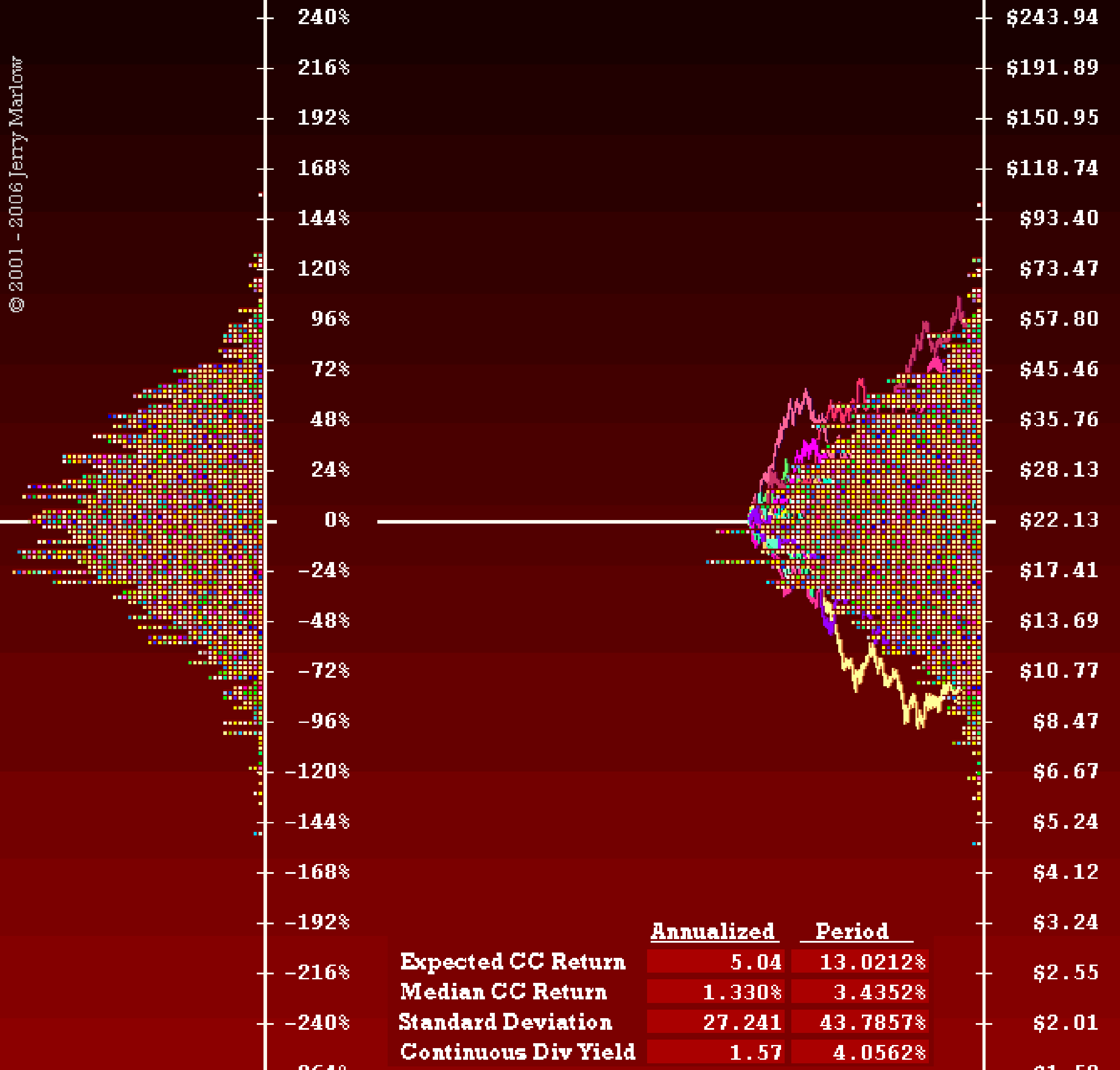
Current Asset Price	22.13
Investment Horizon	943

Over the next 943 days, the stock price might follow any number of different paths. We can tabulate the outcome of each price path with a little square.



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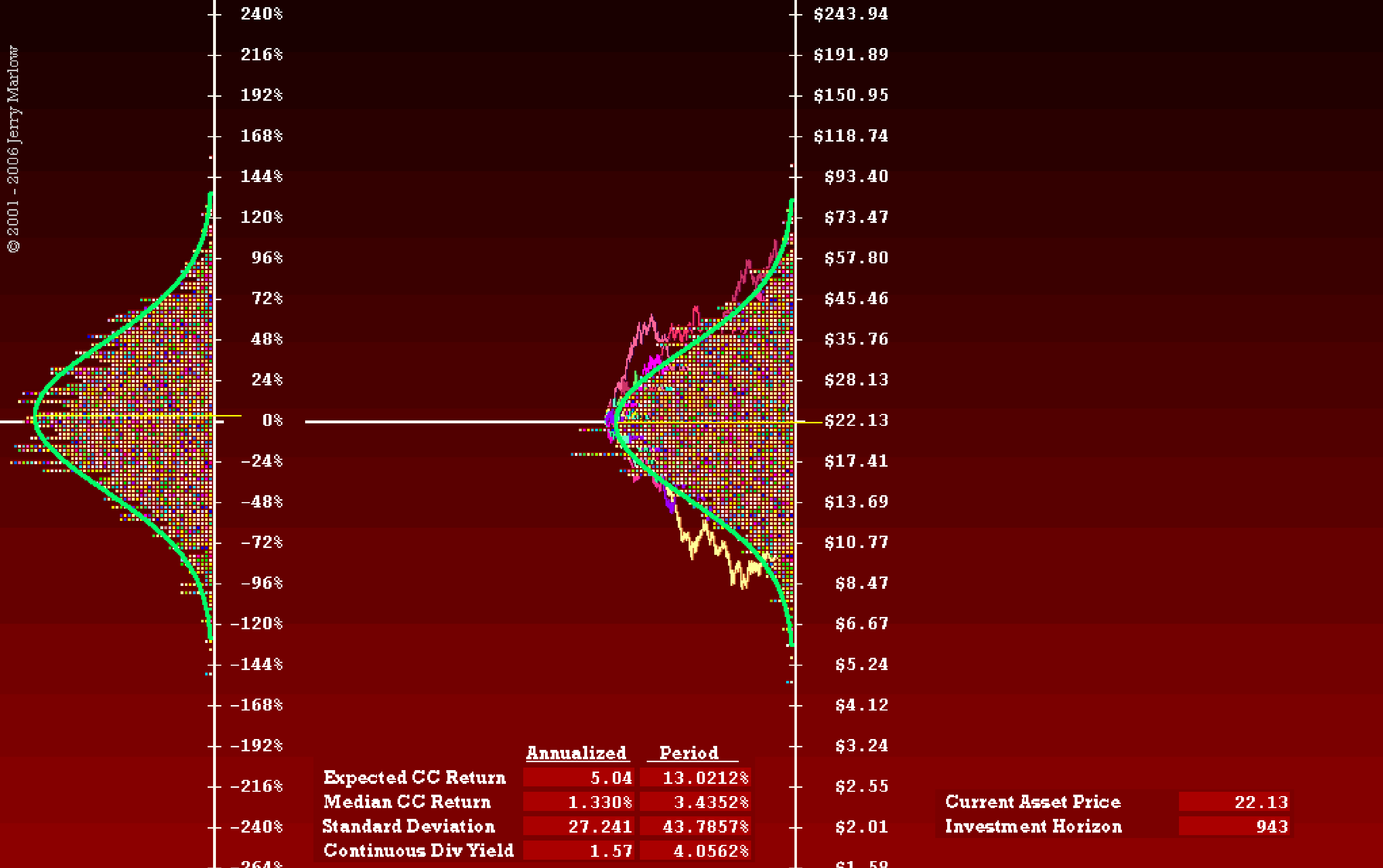
Continuous Div Yield	1.57	4.0562%

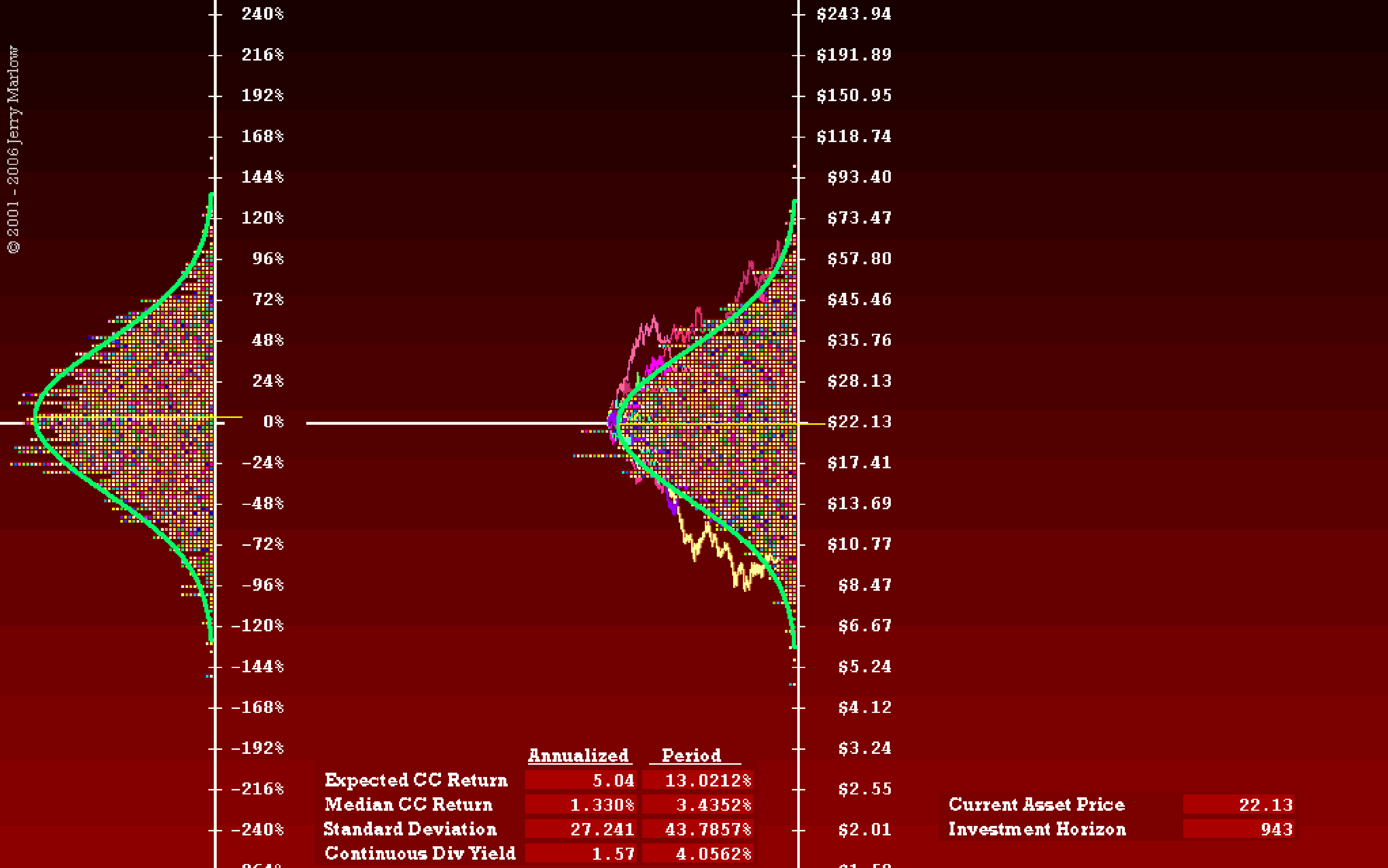
Current Asset Price	22.13
Investment Horizon	943

As we tabulate more and more stock-price and return outcomes, the little squares form histograms. The histograms form patterns.

Under Black-Scholes Option Pricing Theory, the outcomes of the price paths form



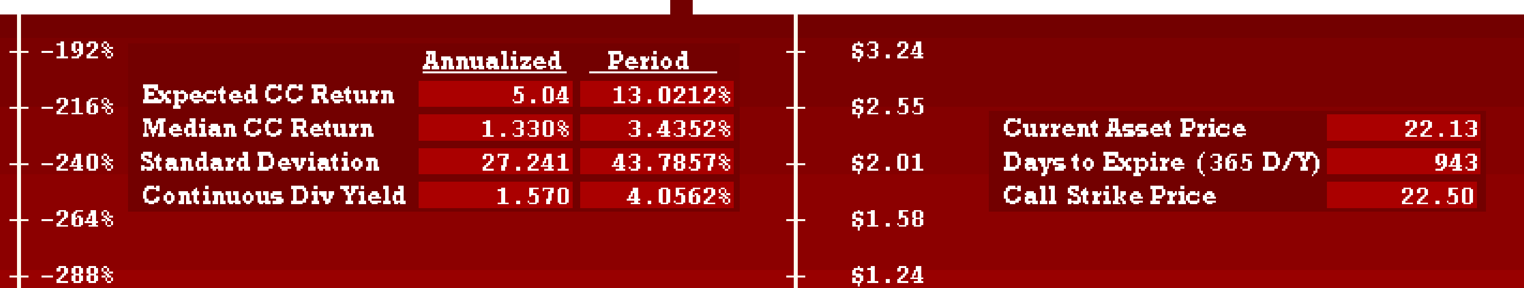
bell-shaped curves. The bell-shaped curves are probability distributions. Every financial forecast is a probability distribution. Under the assumptions of Black-Scholes Option Pricing Theory, the forecast for a stock is a bell-shaped curve drawn on a scale of continuously compounded rates of return or on a lognormal price scale.



If you have a keen eye, you may note that the price bell-shaped curve sits slightly lower than the return bell-shaped curve. Microsoft shares pay a small dividend. A stock's return includes both price changes and dividends, so, for stocks that pay dividends, the return bell-shaped curve sits higher than the price bell-shaped curve.

Once we have a forecast for a given time horizon, we can evaluate all the option payoffs that the forecast includes. With this forecast, the highest stock price we might expect at the end of 943 days would be $100.98. With a strike price of $22.50, that stock price would produce a payoff of $78.48.

Just as we calculated the probability-weighted future value of each potential lottery payoff, we want to calculate the probability-weighted future value of each potential option payoff. Here we're dividing our bell-shaped curve into 2,000 possible outcomes. Hence each outcome has a probability of 1 in 2,000 or .0005. The potential payoff times the probability of the payoff gives a probability-weighted future value of $.0392 or just under four cents.



End-of-period Asset Price	$100.98
- Strike Price	22.50
= Payoff	$78.48

Payoff	$78.48
x Probability	0.00050000
= Probability-weighted Future Value	0.03923768

Probability-weighted FV /	0.03923768
(exp(Period Expected R))	1.13906928
= Probability-weighted Present Value	0.03444714

	Annualized	Period
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Days to Expire (365 D/Y)	943
Call Strike Price	22.50

To go from a probability-weighted future value for this one payoff to its probability-weighted present value, we discount the future value by the risk-free rate for 943 days. Discounting the future value gives us a probability-weighted present value of just under three and a half cents for this one potential payoff.

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- Strike Price	22.50
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Payoff	$78.48
x Probability	0.00050000
= Probability-weighted Future Value	0.03923768

Probability-weighted FV /	0.03923768
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= Probability-weighted Present Value	0.03444714

Cumulative Probability-weighted Present Value	0.03444714

	Annualized	Period
Expected CC Return	5.04	13.0212%
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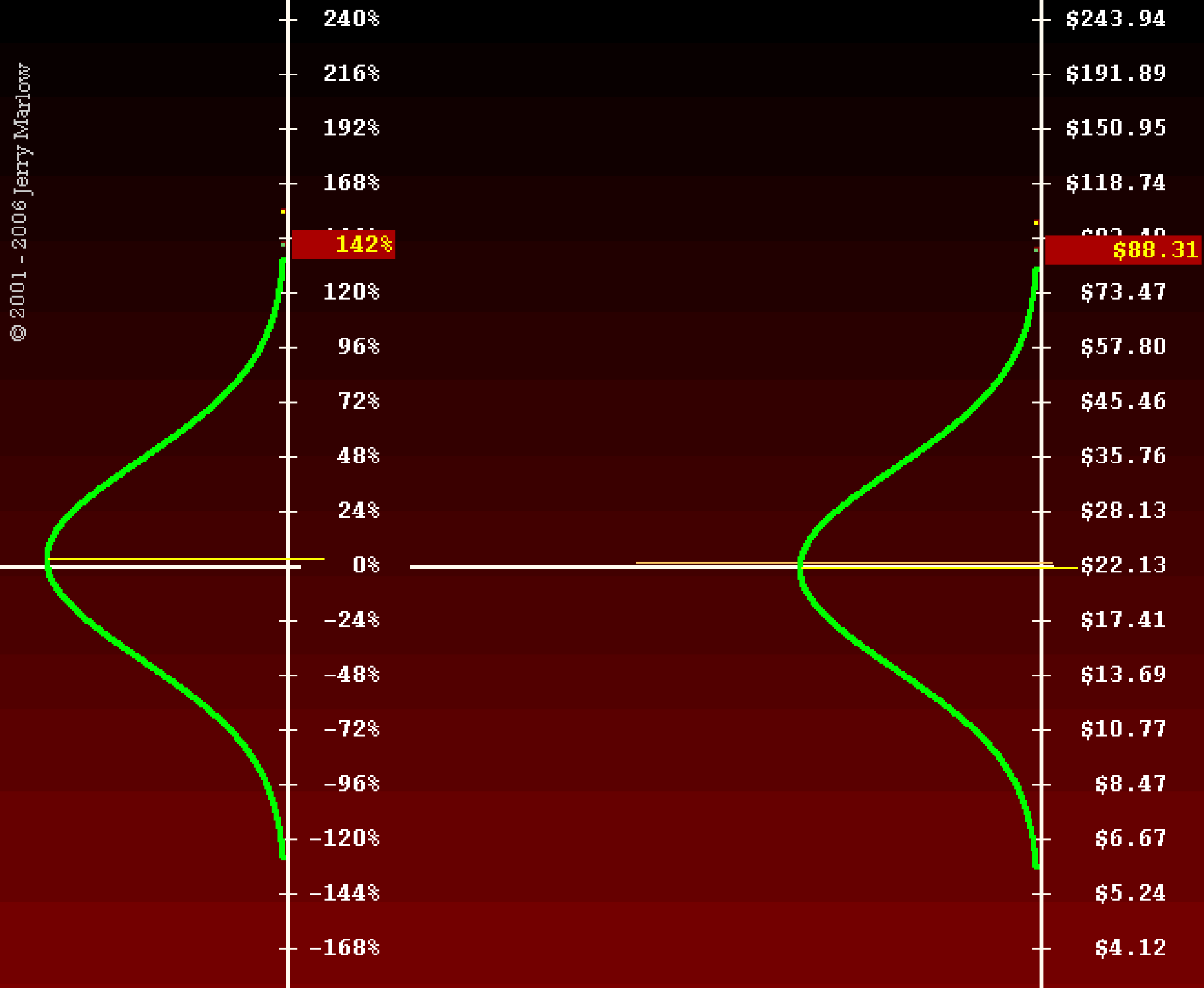
Current Asset Price	22.13
Days to Expire (365 D/Y)	943
Call Strike Price	22.50

As we calculate the probability-weighted present value of each potential outcome, we save the running total in the field at the bottom.



End-of-period Asset Price	$88.31
- Strike Price	22.50
= Payoff	$65.81

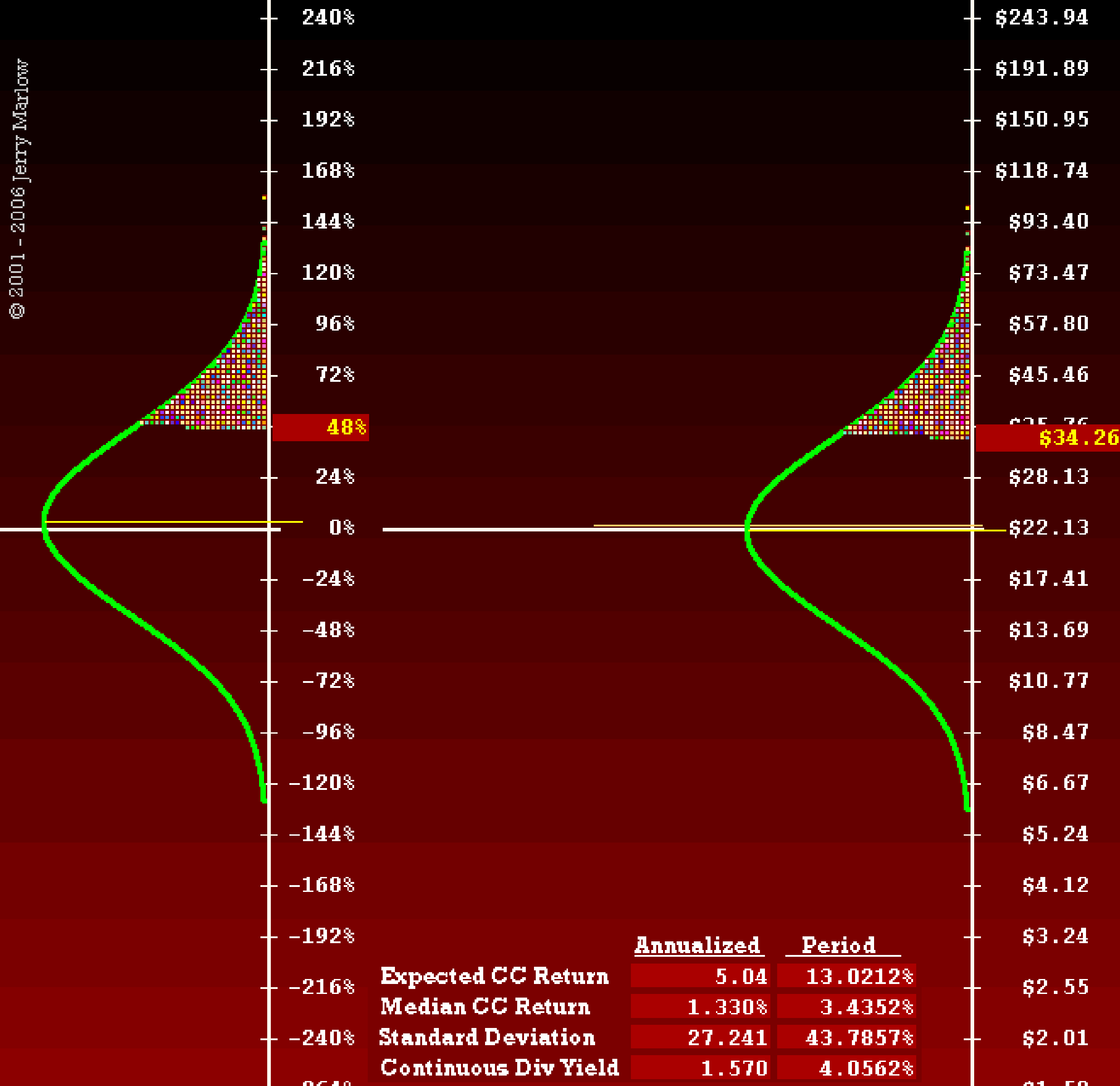
Payoff	$65.81
x Probability	0.00050000
= Probability-weighted Future Value	0.03290701

Probability-weighted FV /	0.03290701
(exp(Period Expected R))	1.13906928
= Probability-weighted Present Value	0.02888939
Cumulative Probability-weighted Present Value	0.06333653

	Annualized	Period
Expected CC Return	5.04	13.0212%
Median CC Return	1.330%	3.4352%
Standard Deviation	27.241	43.7857%
Continuous Div Yield	1.570	4.0562%

Current Asset Price	22.13
Days to Expire (365 D/Y)	943
Call Strike Price	22.50

With this forecast for this time horizon, the second highest end-of-period stock price we might expect would be $88.31. It would produce a payoff of $65.81 which would add $.0288939 to the cumulative probability-weighted present value of the option.



End-of-period Asset Price	$34.26
- Strike Price	22.50
= Payoff	$11.76

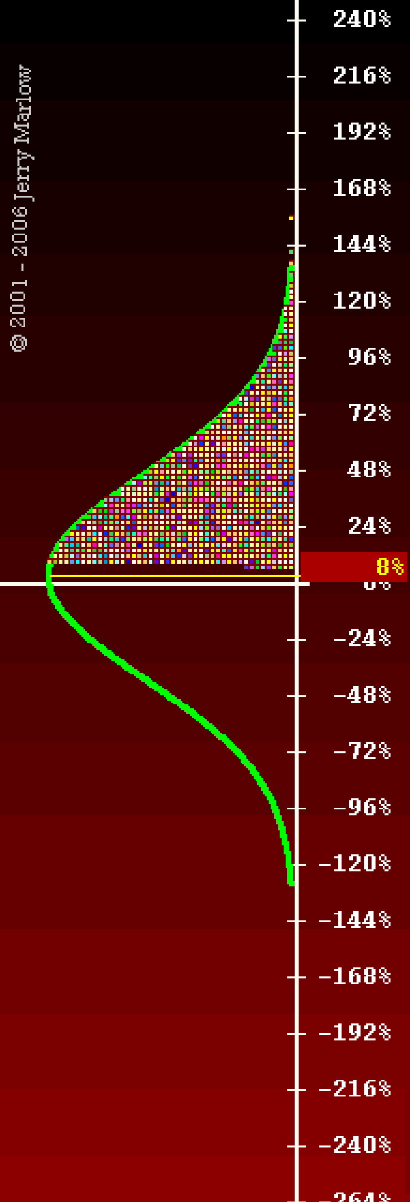
Payoff	$11.76
x Probability	0.00050000
= Probability-weighted Future Value	0.00587799

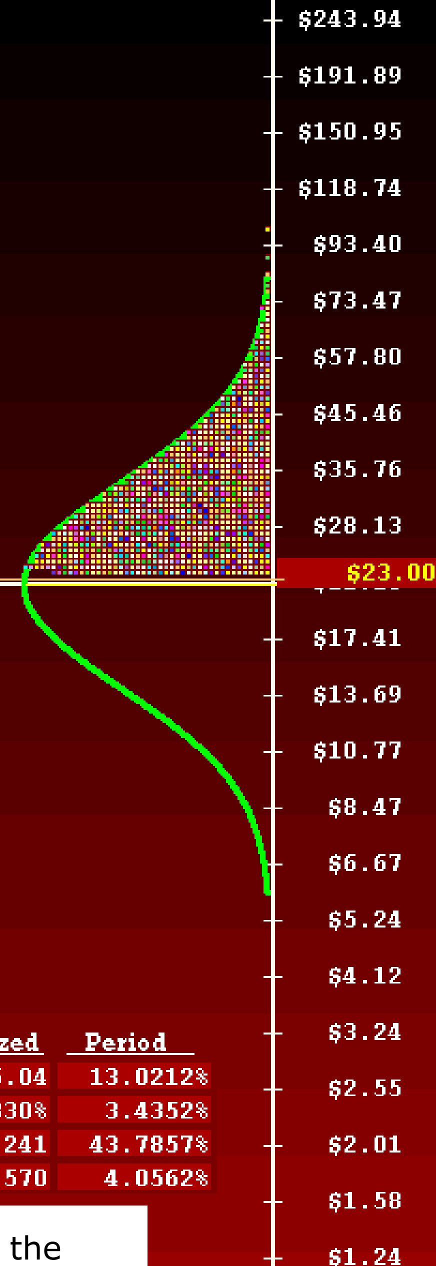
Probability-weighted FV /	0.00587799
(exp(Period Expected R))	1.13906928
= Probability-weighted Present Value	0.00516034
Cumulative Probability-weighted Present Value	2.93671668

	Annualized	Period
Expected CC Return	5.04	13.0212%
Median CC Return	1.330%	3.4352%
Standard Deviation	27.241	43.7857%
Continuous Div Yield	1.570	4.0562%

Current Asset Price	22.13
Days to Expire (365 D/Y)	943
Call Strike Price	22.50

As end-of-period stock prices get closer and closer to the strike price, payoffs are lower and lower. They add less and less to the cumulative probability-weighted present value of the option. This potential payoff adds slightly more than half a cent to the option's value.





End-of-period Asset Price	$23.00
- Strike Price	22.50
= Payoff	$0.50

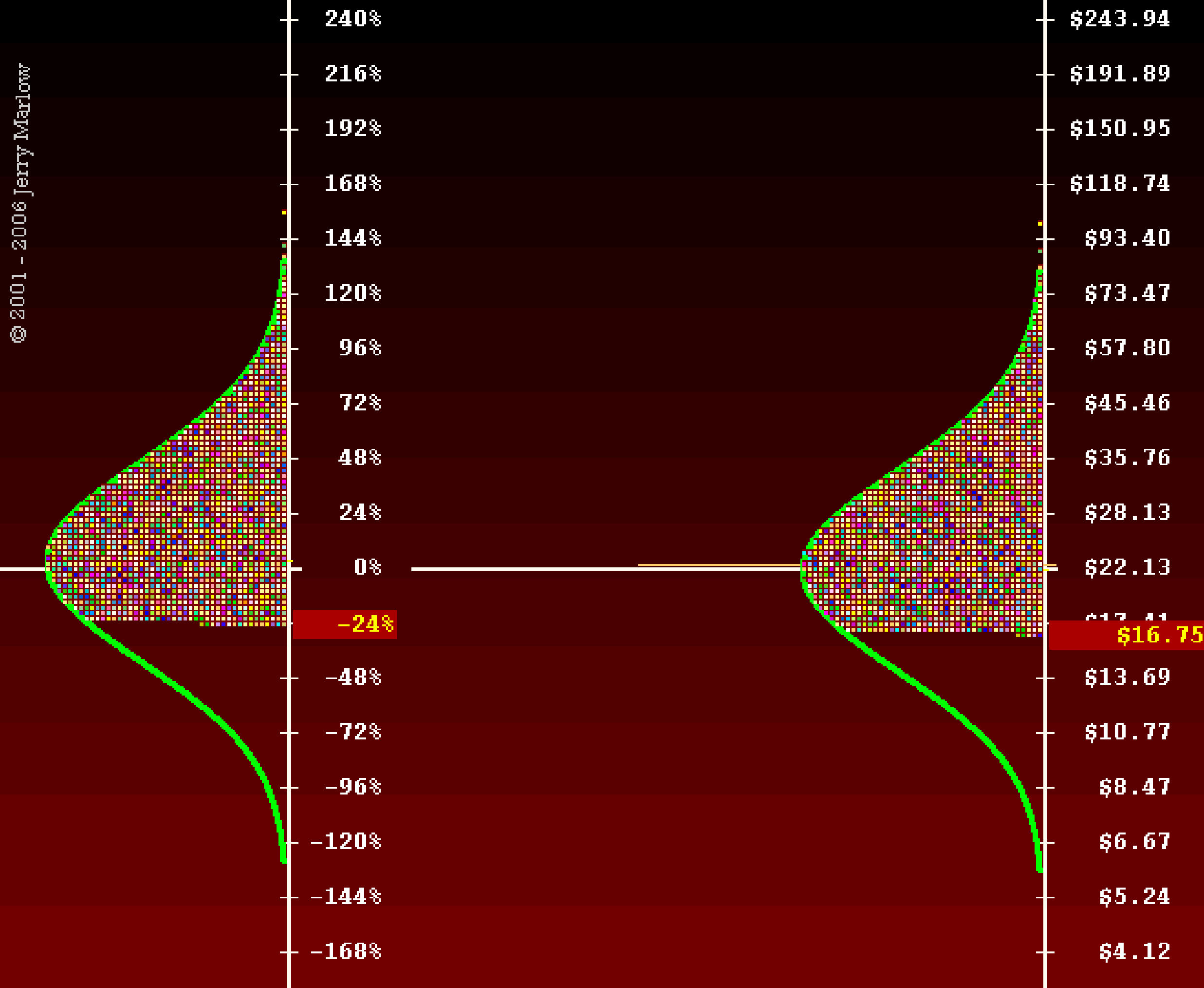
Payoff	$0.50
x Probability	0.00050000
= Probability-weighted Future Value	0.00024917

Probability-weighted FV /	0.00024917
(exp(Period Expected R))	1.13906928
= Probability-weighted Present Value	0.00021875
Cumulative Probability-weighted Present Value	4.34353489

	Annualized	Period
Expected CC Return	5.04	13.0212%
Median CC Return	1.330%	3.4352%
Standard Deviation	27.241	43.7857%
Continuous Div Yield	1.570	4.0562%

Current Asset Price	22.13
Days to Expire (365 D/Y)	943
Call Strike Price	22.50

A potential payoff of $0.50 adds very little to the option’s value.



End-of-period Asset Price	$16.75
- Strike Price	22.50
= Payoff	$0

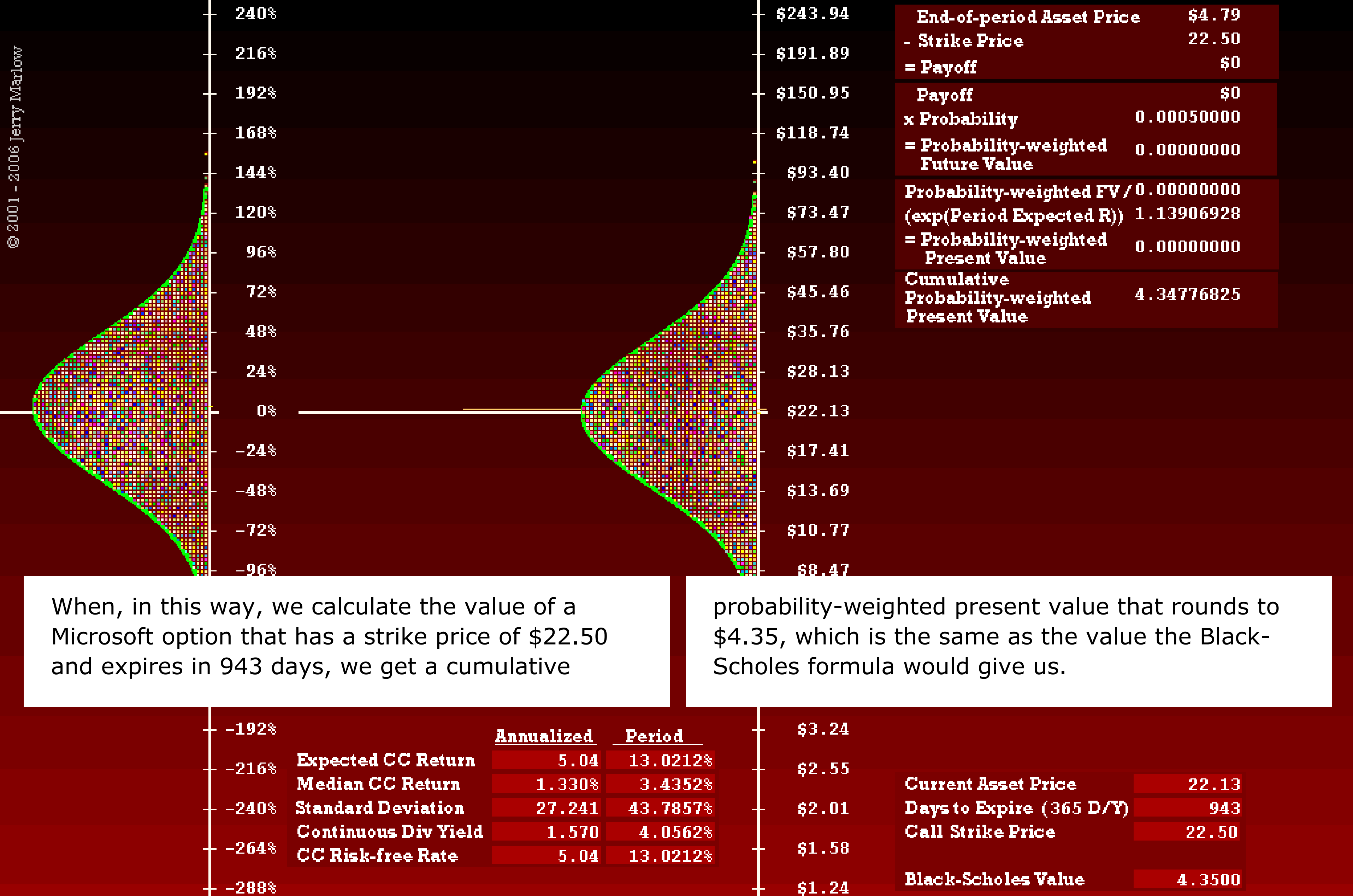
Payoff	$0
x Probability	0.00050000
= Probability-weighted Future Value	0.00000000

Probability-weighted FV /	0.00000000
(exp(Period Expected R))	1.13906928
= Probability-weighted Present Value	0.00000000
Cumulative Probability-weighted Present Value	4.34776825

	Annualized	Period
Expected CC Return	5.04	13.0212%
Median CC Return	1.330%	3.4352%
Standard Deviation	27.241	43.7857%
Continuous Div Yield	1.570	4.0562%

Current Asset Price	22.13
Days to Expire (365 D/Y)	943
Call Strike Price	22.50

Once end-of-period prices are below the strike price, the payoff is zero. The outcomes add nothing to the cumulative probability-weighted present value of the option.



When, in this way, we calculate the value of a Microsoft option that has a strike price of $22.50 and expires in 943 days, we get a cumulative probability-weighted present value that rounds to $4.35, which is the same as the value the Black-Scholes formula would give us.

In concept, the Black-Scholes formula makes the same calculations. It simply makes those calculations in many fewer steps, more quickly, more elegantly and more accurately. Instead of dividing the bell-shaped curve into 2,000 possible outcomes, it divides the bell-shaped curve into an infinite number of possible outcomes.

For this option, the marketplace bid price is $4.00. The marketplace ask price is $4.70. The value $4.35 is half way between. Ordinarily, we can take an option value half way between the marketplace bid and ask prices to be a fair value for an option.

If your spouse’s stock options were market-traded options and they expired in 943 days, we wouldn’t need to make all these calculations. We simply could use the average of the marketplace bid and ask prices. But, in our example, your spouse’s options are employee stock options and they expire in 7 years or 2,557 days.

$$c = Se^{-qT}N(d_1) - Ke^{-rT}N(d_2)$$

where

$$d_1 = \frac{\ln(S/K) + (r - q + \frac{\sigma^2}{2})T}{\sigma\sqrt{T}}$$

$$d_2 = \frac{\ln(S/K) + (r - q - \frac{\sigma^2}{2})T}{\sigma\sqrt{T}} = d_1 - \sigma\sqrt{T}$$

S=Stock price at time zero

r = Continuously compounded risk-free rate

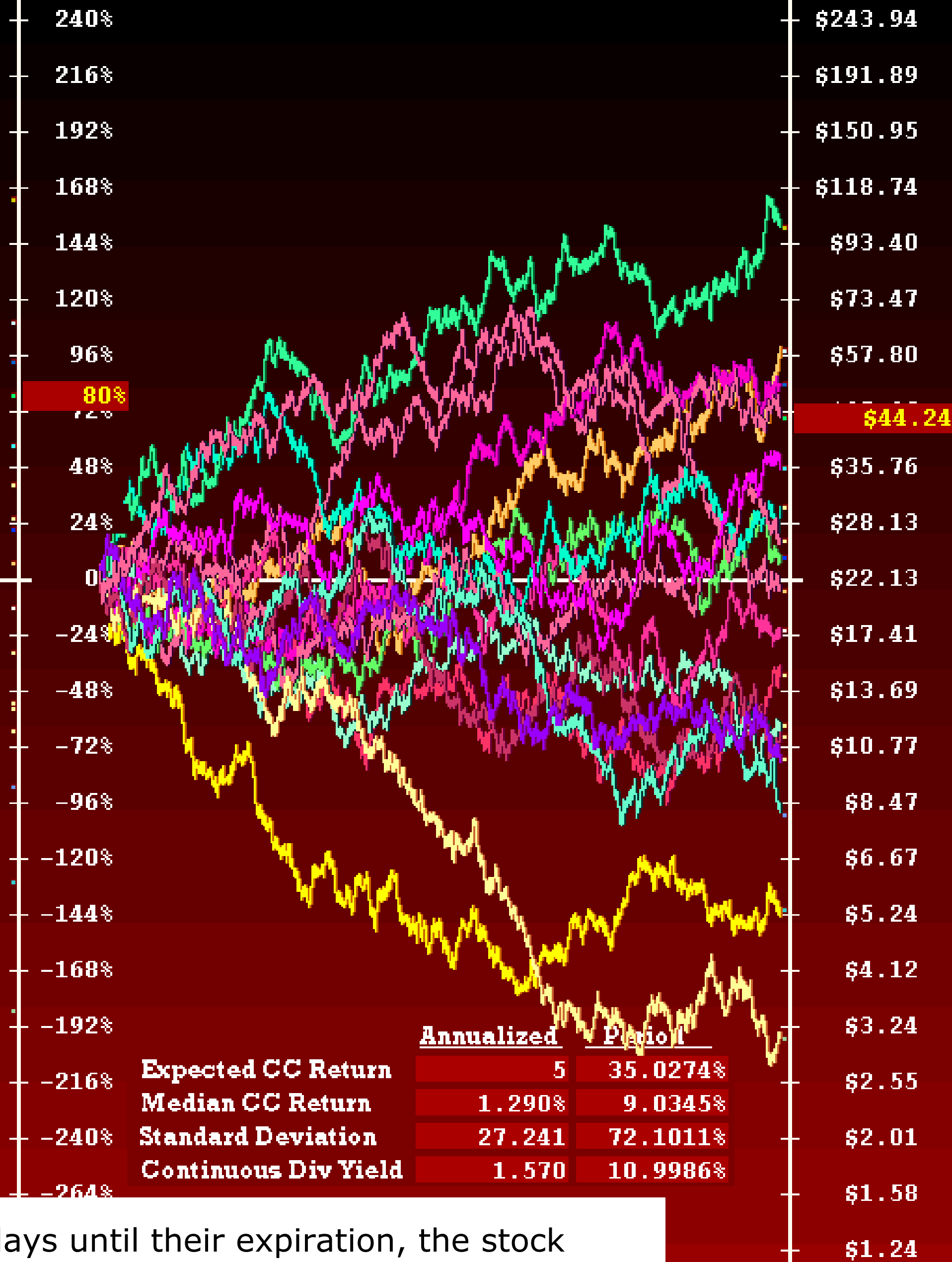
q = Continuous dividend yield

T = Option's time to expiration

N(x) = The cumulative normal distribution function

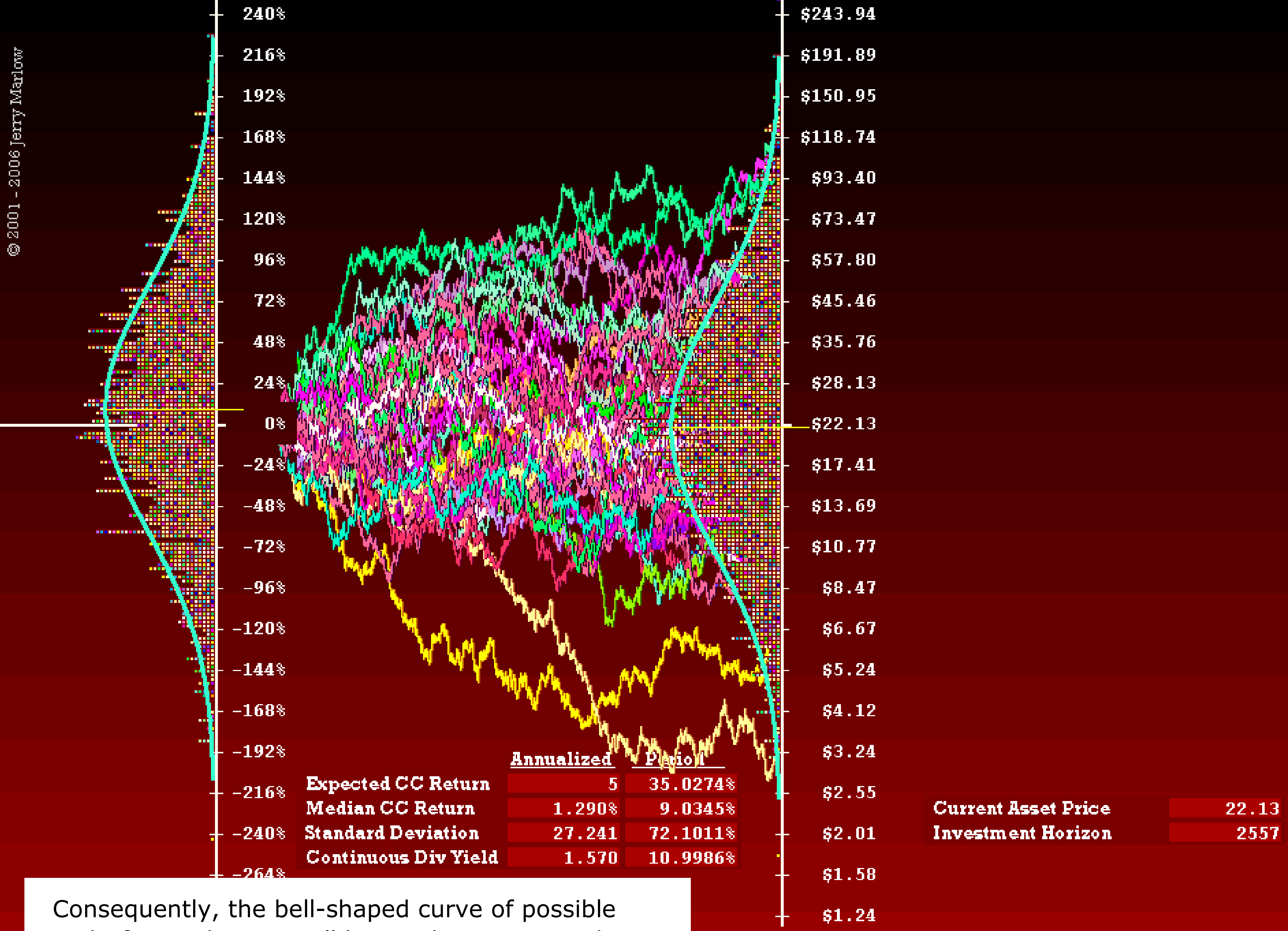
K = The option's strike price

σ = Volatility of the relative price change of the underlying stock price

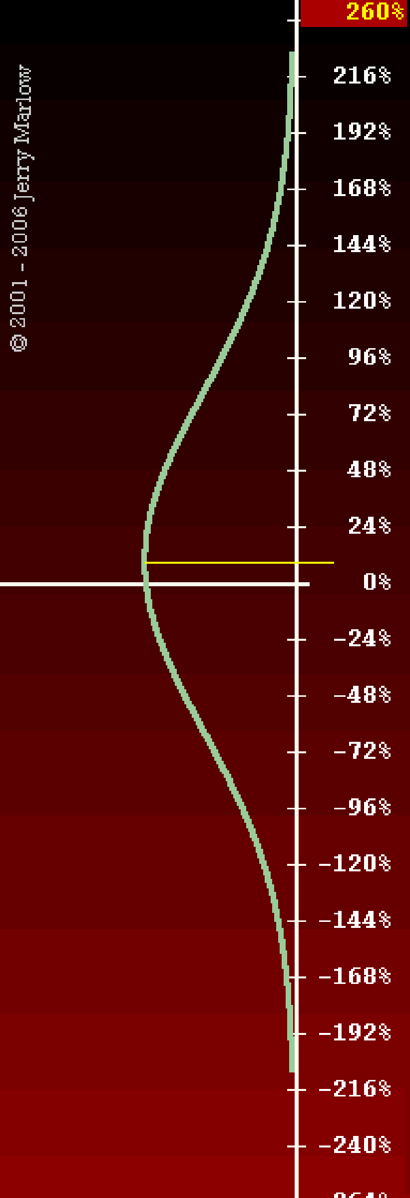


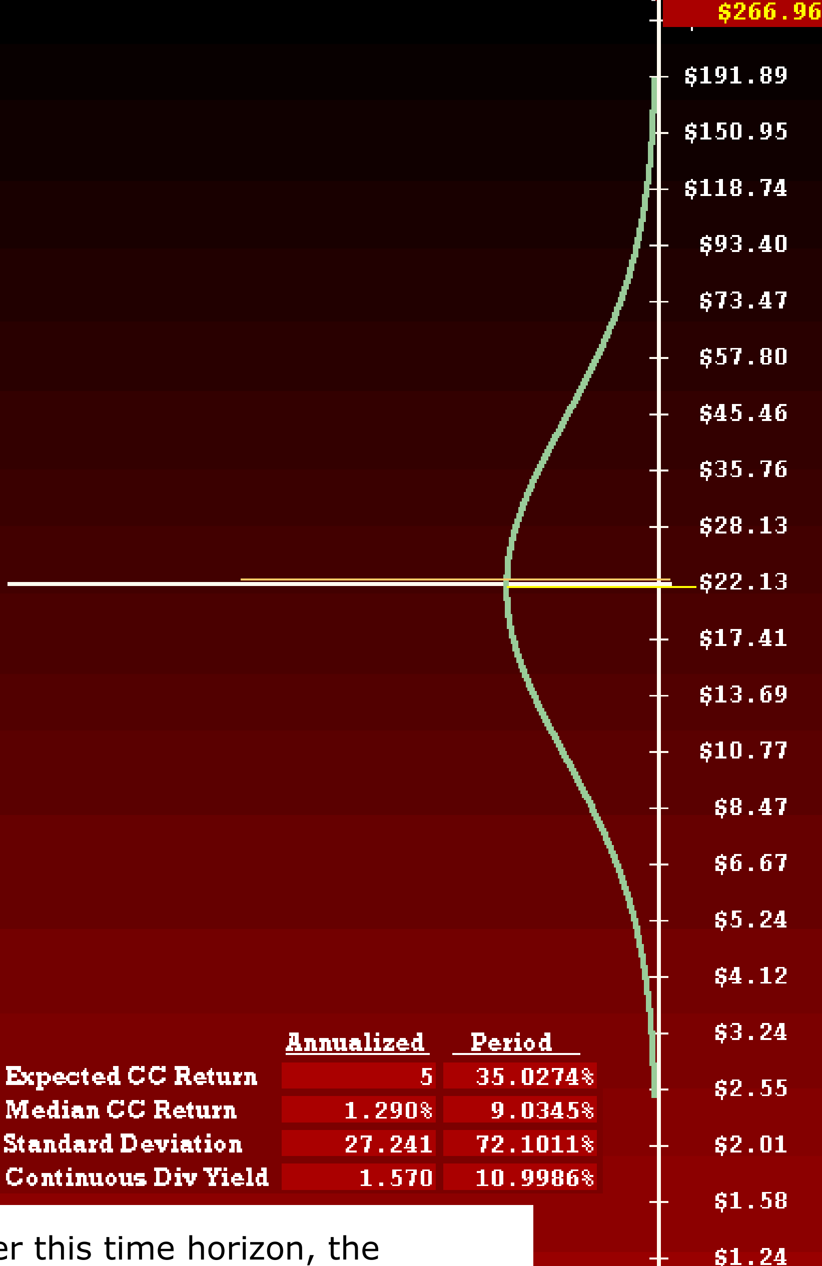
Current Asset Price	22.13
Investment Horizon	2557

With 2,557 days until their expiration, the stock price has much more time to jump around. Accordingly Microsoft’s price may get farther away from its current price.



Consequently, the bell-shaped curve of possible end-of-period prices will be much more spread out.





End-of-period Asset Price	$266.96
- Strike Price	22.50
= Payoff	$244.46

Payoff	$244.46
x Probability	0.00050000
= Probability-weighted Future Value	0.12222831

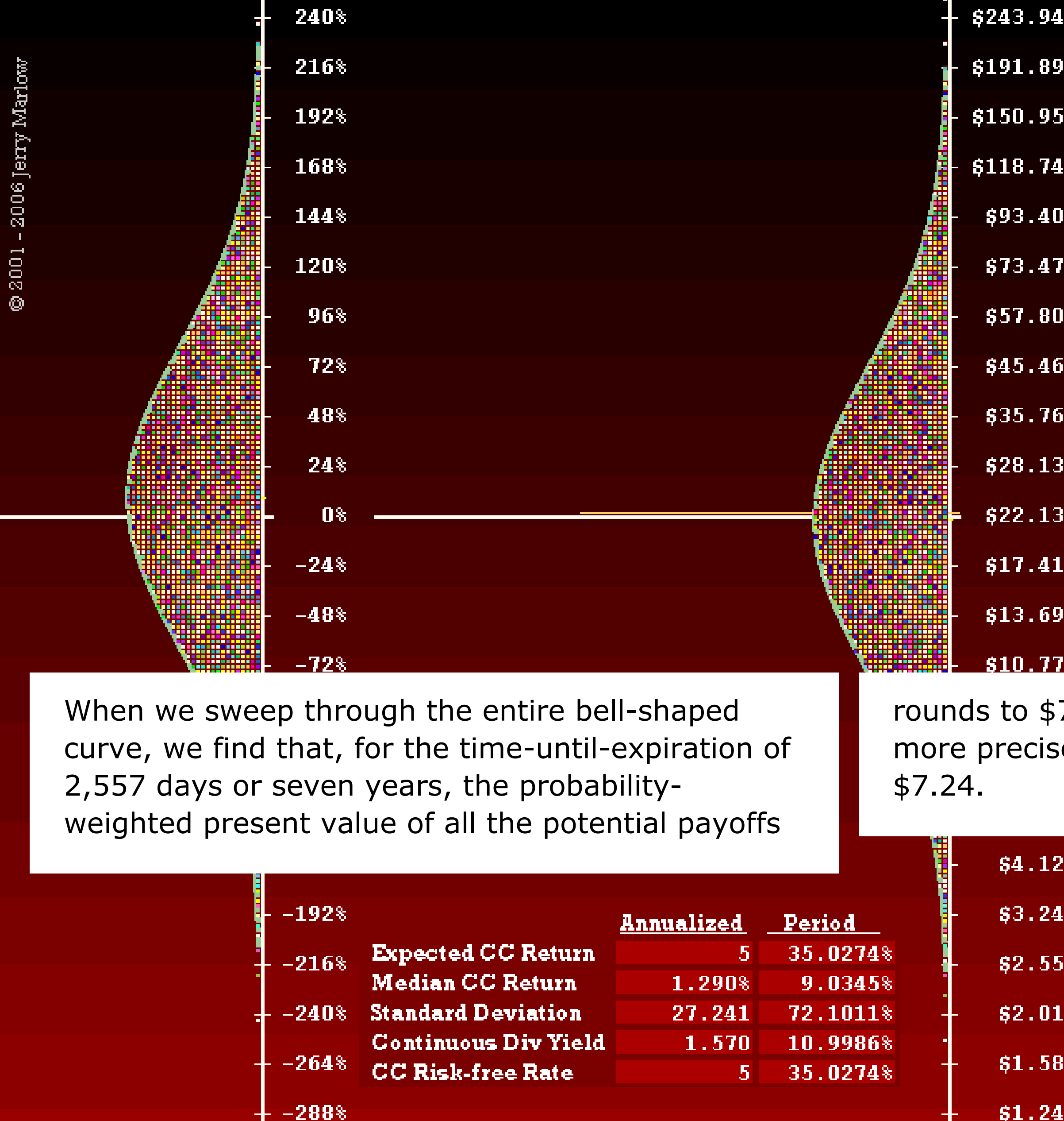
Probability-weighted FV /	0.12222831
(exp(Period Expected R))	1.41945639
= Probability-weighted Present Value	0.08610924

Cumulative Probability-weighted Present Value	0.08610924

	Annualized	Period
Expected CC Return	5	35.0274%
Median CC Return	1.290%	9.0345%
Standard Deviation	27.241	72.1011%
Continuous Div Yield	1.570	10.9986%

Current Asset Price	22.13
Days to Expire (365 D/Y)	2557
Call Strike Price	22.50

With this forecast over this time horizon, the highest end-of-period price we might expect would be $266.96. It would produce a payoff of $244.46.



End-of-period Asset Price	$1.76
- Strike Price	22.50
= Payoff	$0
Payoff	$0
x Probability	0.00050000
= Probability-weighted Future Value	0.00000000
Probability-weighted FV /	0.00000000
(exp(Period Expected R))	1.41945639
= Probability-weighted Present Value	0.00000000
Cumulative Probability-weighted Present Value	7.22979281

When we sweep through the entire bell-shaped curve, we find that, for the time-until-expiration of 2,557 days or seven years, the probability-weighted present value of all the potential payoffs rounds to $7.23 which is very close to the option's more precise Black-Scholes value which rounds to $7.24.

	Annualized	Period
Expected CC Return	5	35.0274%
Median CC Return	1.290%	9.0345%
Standard Deviation	27.241	72.1011%
Continuous Div Yield	1.570	10.9986%
CC Risk-free Rate	5	35.0274%

Current Asset Price	22.13
Days to Expire (365 D/Y)	2557
Call Strike Price	22.50
Black-Scholes Value	7.2374

To value employee stock options fairly, the Black-Scholes formula is the first step, not the last

If your spouse's options were market-traded options that expire in seven years, then the Black-Scholes value of $7.2374 would be a fair value for each of these options. 100,000 options would have a value of $723,740. With employee stock options, however, in calculating the options probability-weighted present value, other considerations come into play.

If the options are not vested, then valuation must take into account the probability that the options may not vest. If your spouse is required to exercise his or her options within, say, 90 days of leaving employment with Microsoft, then an accurate valuation requires taking into account the effect that this requirement has on the options' probability-weighted time to expiration and, in turn, the option's probability-weighted present value. If the option grant makes other stipulations that affect the options' probability-weighted present value, then those too must be taken into account.

The explanation of Black-Scholes Option Pricing Theory given here leaves out aspects of the theory that would be important in a more comprehensive presentation. A fuller justification of the risk-neutral pricing methodology used here would explain how risk-neutral pricing methodologies relate to delta hedging and non-arbitrage pricing theory. A more comprehensive discussion would show how binomial option pricing models are adaptations of Black-Scholes Option Pricing Theory to the valuation of options that can be exercised prior to expiration.

But my purpose here is not to make you an expert on Black-Scholes Option Pricing Theory. My purpose is to show you that the fair value of your spouse's employee stock options is not their intrinsic value but their probability-weighted present value calculated in a way that is consistent with the way market-traded options are valued.

If you would like to delve deeper into how to value stock options in divorce proceedings, download my seminar notes ***How to Value Stock Options in Divorce Proceedings*** from www.jerrymarlow.com.

Fair's fair. "Intrinsic value" isn't.

The better you and your attorney understand that the fair value of your spouse's employee stock options is not their "intrinsic value" but their probability-weighted present value, the more likely you will be able to convince the court that this is the right valuation methodology to use.

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