

From a dealer's bid and ask prices for an option, you can extract the forecast for the underlying currency that the option price implies.

Thus far, to begin your assessment of an option, we've asked you to express your forecast for the underlying currency as a six-sigma span of end-of-period prices.

We've assumed that you can do your analysis or think about a currency and readily come up with an end-of-period high price and an end-of-period low price.

Most likely, rather than come up with your forecast out of the blue, you would find it easier to express how and how much you disagree with what everybody else thinks—the consensus forecast.

Fortunately, with the simulator, you can do exactly that.

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Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.0 %
Foreign RfR (r_f)	4.0 %

Option	
Days to Expiration	365
● Call ● Put ● No Option	
Strike Price	11.02769
Market price of call	0.50000

Days per Year 365

From an option's price and a couple of other pieces of information, you can use the standard model for valuing FX options to extract the forecast for the underlying currency that the option price implies.

You can use the implied forecast as your reference and, if you disagree with it, express how you disagree with it by your choice of end-of-period high and low prices.

To extract the implied forecast from an option price, we also need:

- the spot price,
- the domestic risk-free rate,
- the risk-free rate of the underlying foreign currency and
- the option's strike price.

Let's say that, for this option, the dealer's ask price is 0.501 and bid price is 0.499.

To find the implied forecast, we use the midpoint of the ask and bid prices, which is 0.500.

Let's say the domestic risk-free rate is 7.0% geometric; the foreign currency's risk-free rate is 4.0% geometric.

Once you have entered this information, click ...

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Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.000%
Foreign RfR (r_f)	4.000%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

Calculate Implied Volatility.
 The simulator extracts the forecast that the option price implies.



Option	
Days to Expiration	365
<input checked="" type="radio"/> Call <input type="radio"/> Put <input type="radio"/> No Option	
Strike Price	11.02769
Market price of call	0.50000

Calculate Implied Volatility

Days per Year	365
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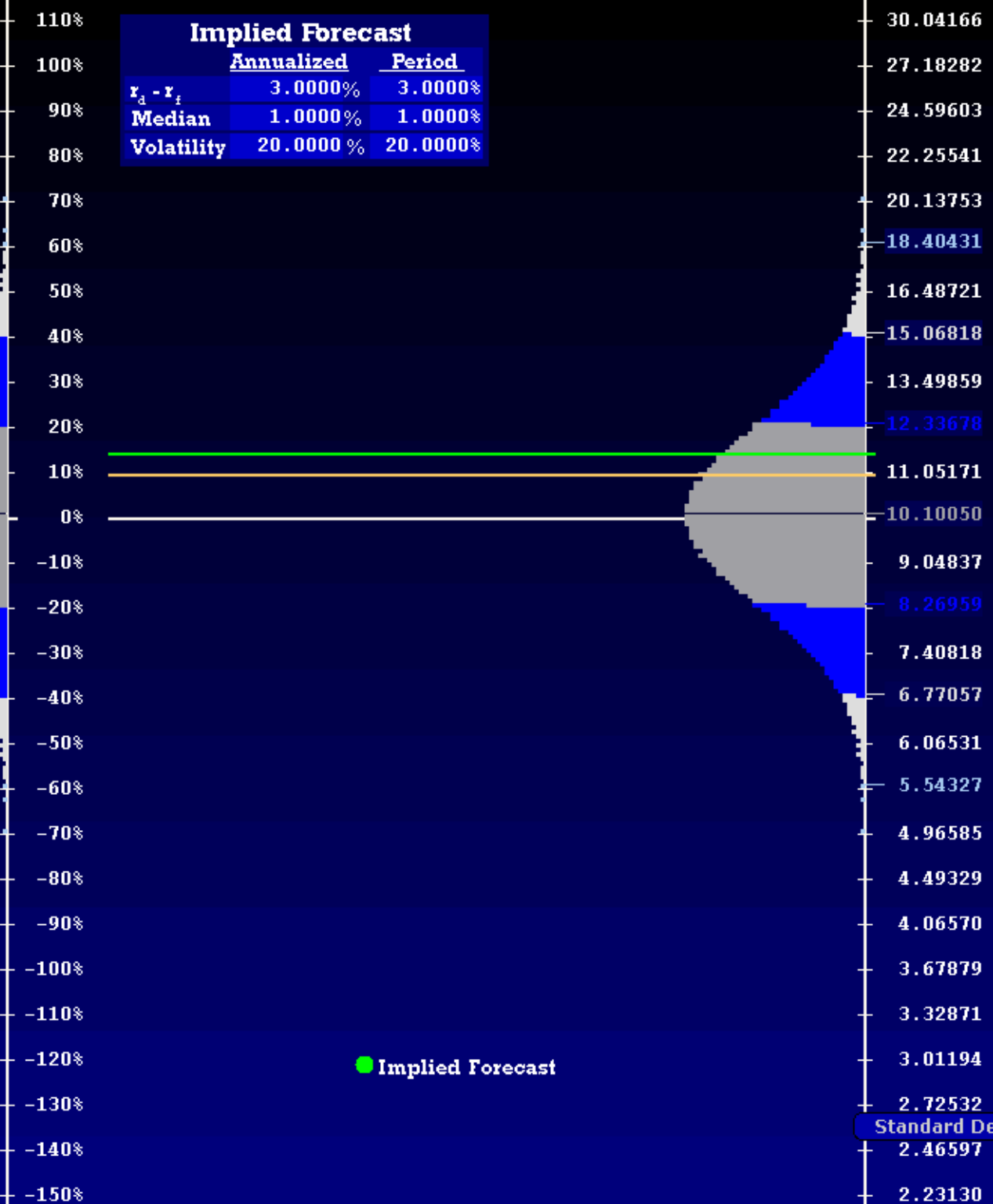
Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.000%
Foreign RfR (r_f)	4.000%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

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Option	
Days to Expiration	365
● Call ● Put ● No Option	
Strike Price	11.02769
Market price of call	0.50000

Days per Year 365



Standard Devs

Click *Standard Devs*.

Within the standard framework for valuing foreign exchange options, the implied forecast embodies the market-equilibrium view of how the spot price of a foreign currency is likely to evolve relative to a domestic currency over the option's time to expiration.

We call this the market-equilibrium forecast because its estimate of expected volatility is derived from the market-equilibrium price of the option. The market-equilibrium price of the option is arrived at through an auction process in the financial markets. The equilibrium price is the price at which the supply of a particular option (ask prices) finds equilibrium with the demand for it (bid prices.)

Market equilibrium prices are dynamic. A net influx into the auction of buyers willing to pay higher prices will drive up the price at which transactions clear the market. A net influx of sellers willing to sell at lower prices will drive down the price at which transactions clear the market.

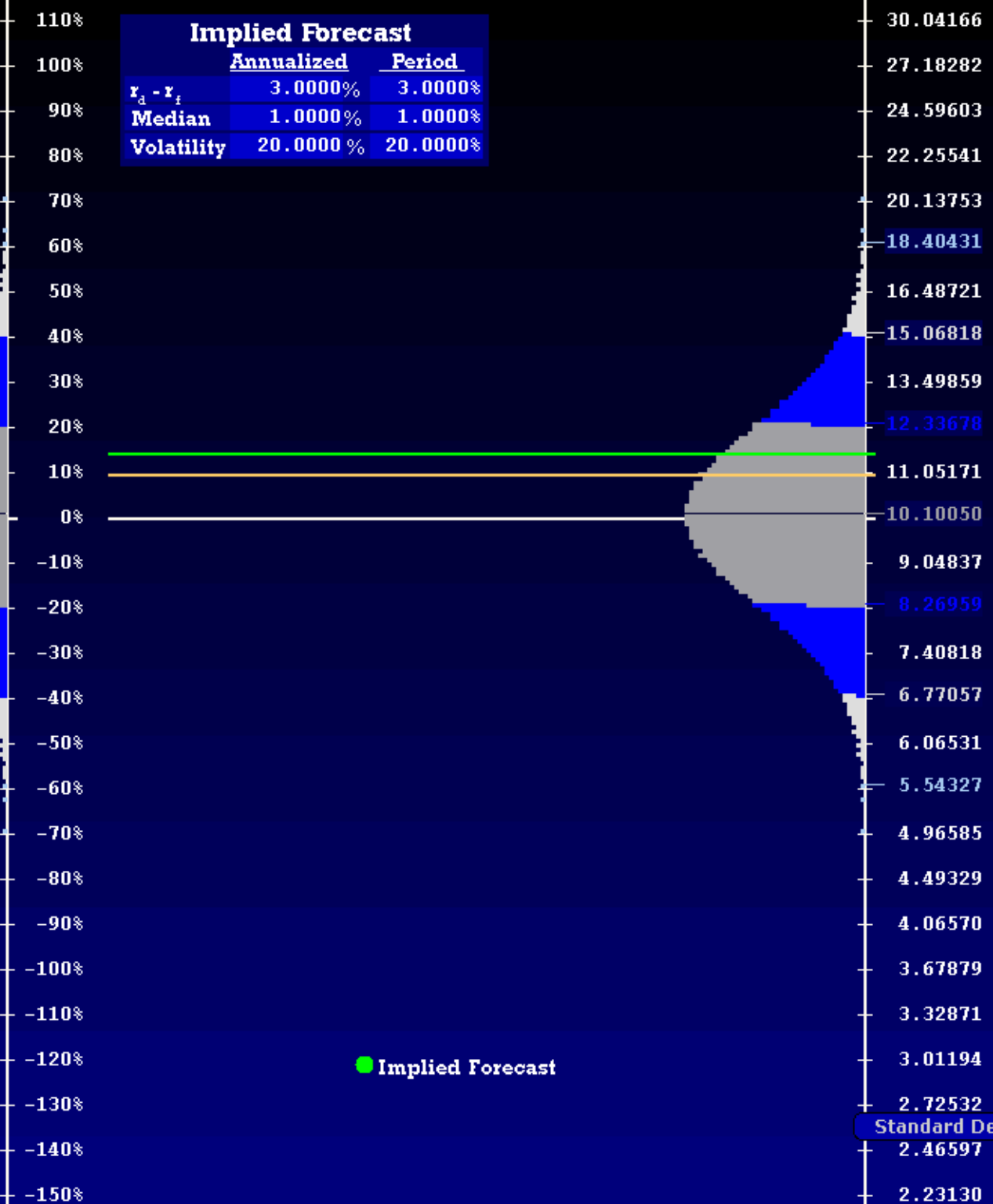
Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.000%
Foreign RfR (r_f)	4.000%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

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Option	
Days to Expiration	365
● Call ● Put ● No Option	
Strike Price	11.02769
Market price of call	0.50000

Days per Year 365



Standard Devs
2.46597

The six-sigma end-of-period price span of this implied forecast is from a high of 18.40431 to a low of 5.54327.

If you disagree with this forecast, then— depending on how you disagree— you believe your dealer's price for this option either undervalues it or overvalues it.

Let's say you've been studying unfolding or impending events in the home country of either the domestic or foreign currency. You think the market at large is underestimating the impact of these events on the future exchange rate between the two countries.

You think the spot price of the foreign currency is more likely to go up than the market-equilibrium view says. You think the spot price is likely to be more volatile than the market-equilibrium view says.

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Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.0%
Foreign RfR (r_f)	4.0%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

You decide that an end-of-period high price of 24.59603 and an end-of-period low price of 6.77057 best express how you disagree with the market-equilibrium view.

Option	
Days to Expiration	365
<input checked="" type="radio"/> Call <input type="radio"/> Put <input type="radio"/> No Option	
Strike Price	11.02769
Market price of call	0.50000

To calculate your forecast from 99.7% of its price range:

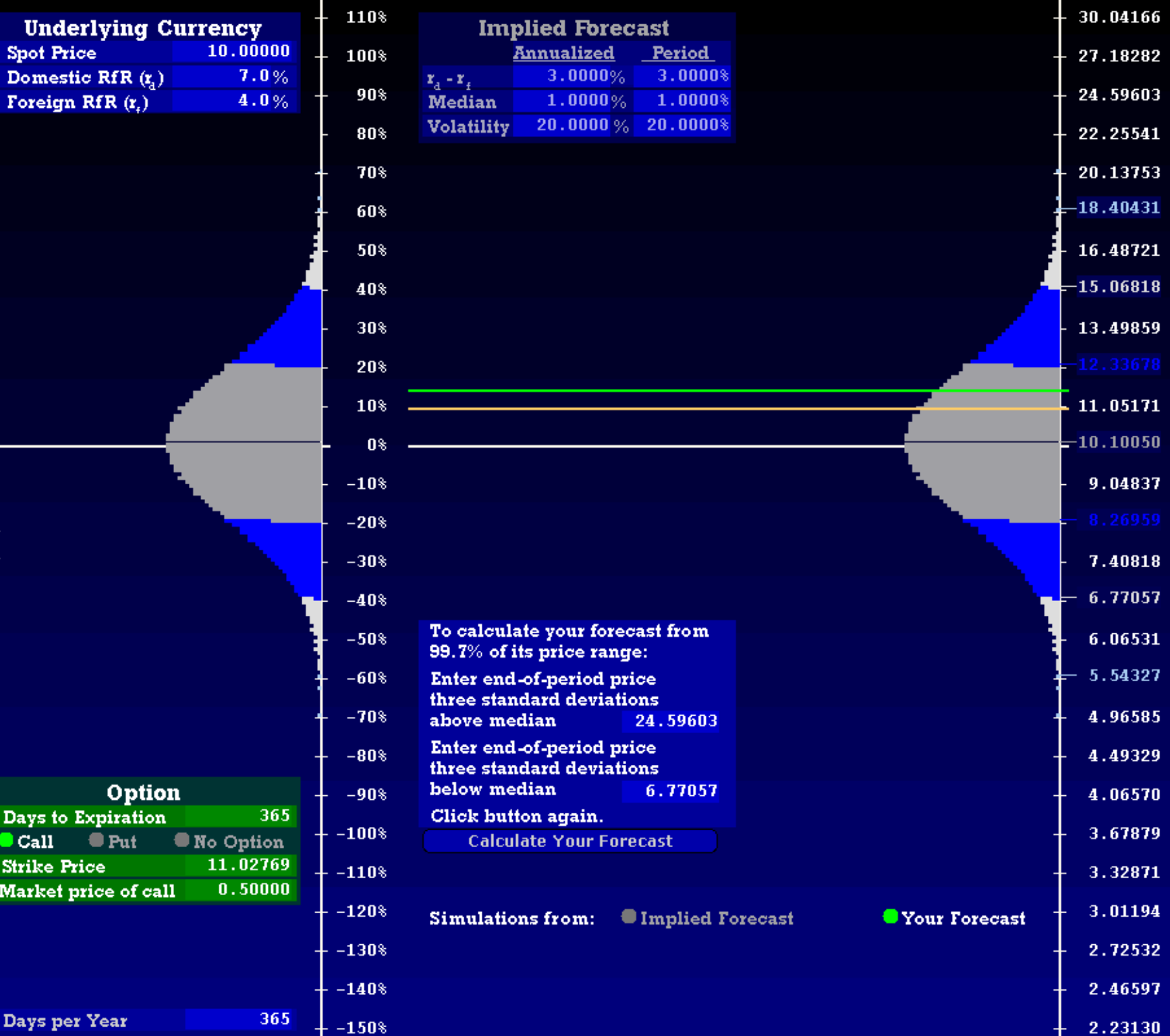
Enter end-of-period price three standard deviations above median

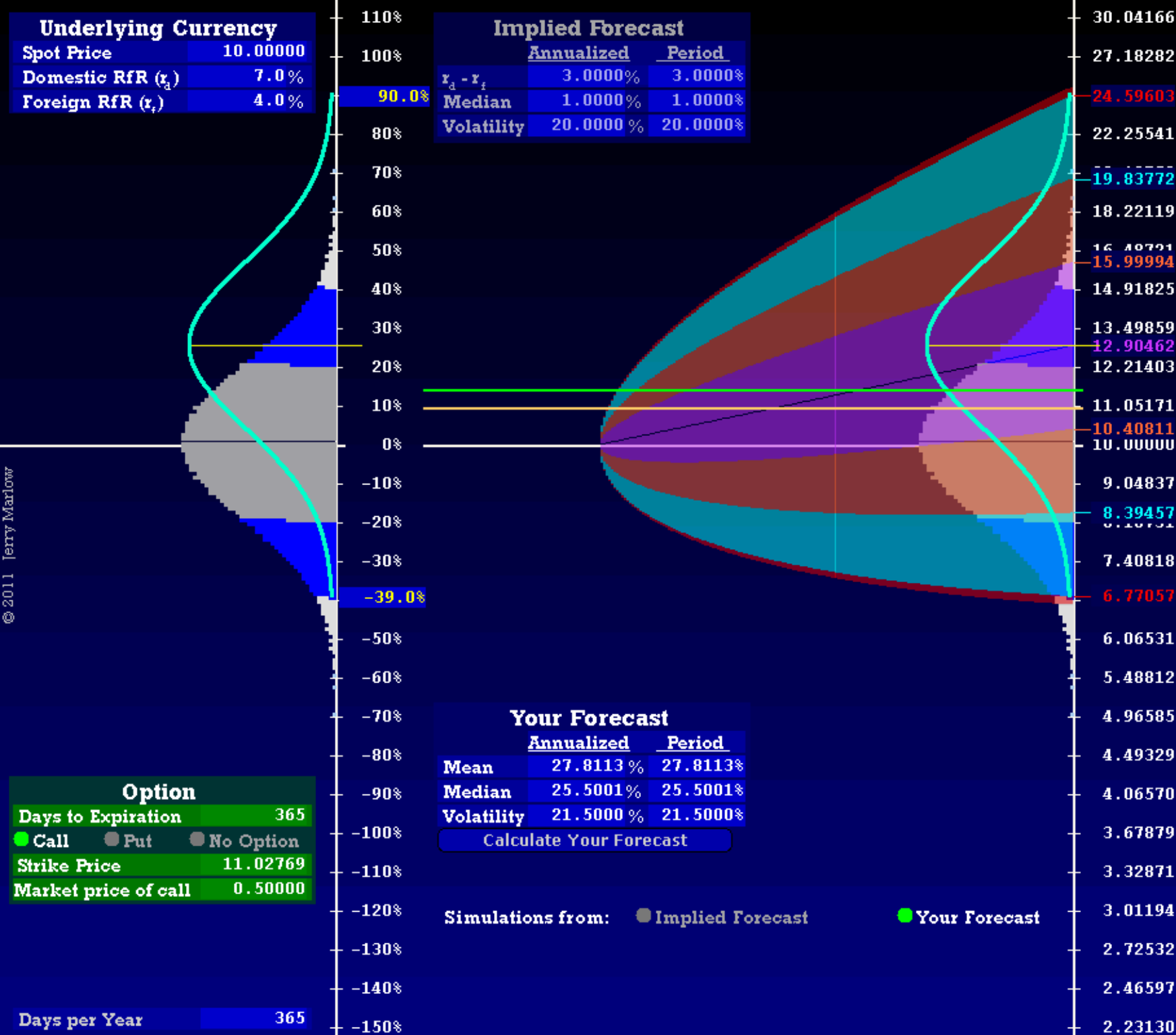
Enter end-of-period price three standard deviations below median

Click button again.

Days per Year	365
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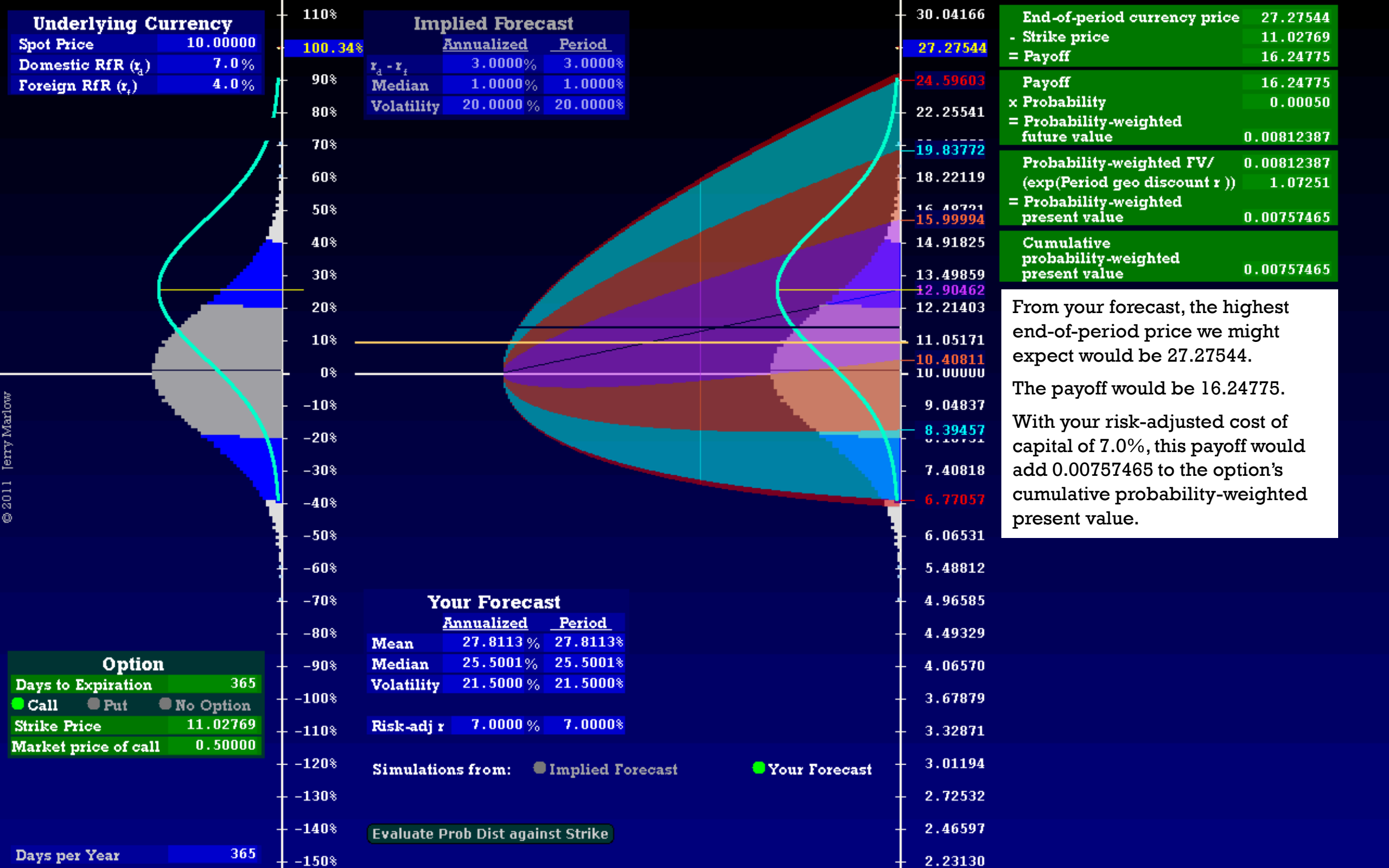
Simulations from: Implied Forecast Your Forecast





Your forecast looks like this. It will give this call a value very different from its market price.

To find the call's value according to your forecast, we evaluate your forecast against the option's strike price.



Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.0%
Foreign RfR (r_f)	4.0%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

Option	
Days to Expiration	365
● Call ● Put ● No Option	
Strike Price	11.02769
Market price of call	0.50000

Your Forecast		
	Annualized	Period
Mean	27.8113%	27.8113%
Median	25.5001%	25.5001%
Volatility	21.5000%	21.5000%

Risk-adj r 7.0000% 7.0000%

Simulations from: ● Implied Forecast ● Your Forecast

Evaluate Prob Dist against Strike

30.04166
27.27544
24.59603
22.25541
19.83772
18.22119
16.48721
15.99994
14.91825
13.49859
12.90462
12.21403
11.05171
10.40811
10.00000
9.04837
8.39457
8.19751
7.40818
6.77057
6.06531
5.48812
4.96585
4.49329
4.06570
3.67879
3.32871
3.01194
2.72532
2.46597
2.23130

End-of-period currency price	27.27544
- Strike price	11.02769
= Payoff	16.24775
Payoff	16.24775
× Probability	0.00050
= Probability-weighted future value	0.00812387
Probability-weighted FV/ (exp(Period geo discount r))	0.00812387
= Probability-weighted present value	0.00757465
Cumulative probability-weighted present value	0.00757465

From your forecast, the highest end-of-period price we might expect would be 27.27544.

The payoff would be 16.24775.

With your risk-adjusted cost of capital of 7.0%, this payoff would add 0.00757465 to the option's cumulative probability-weighted present value.

Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.0%
Foreign RfR (r_f)	4.0%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

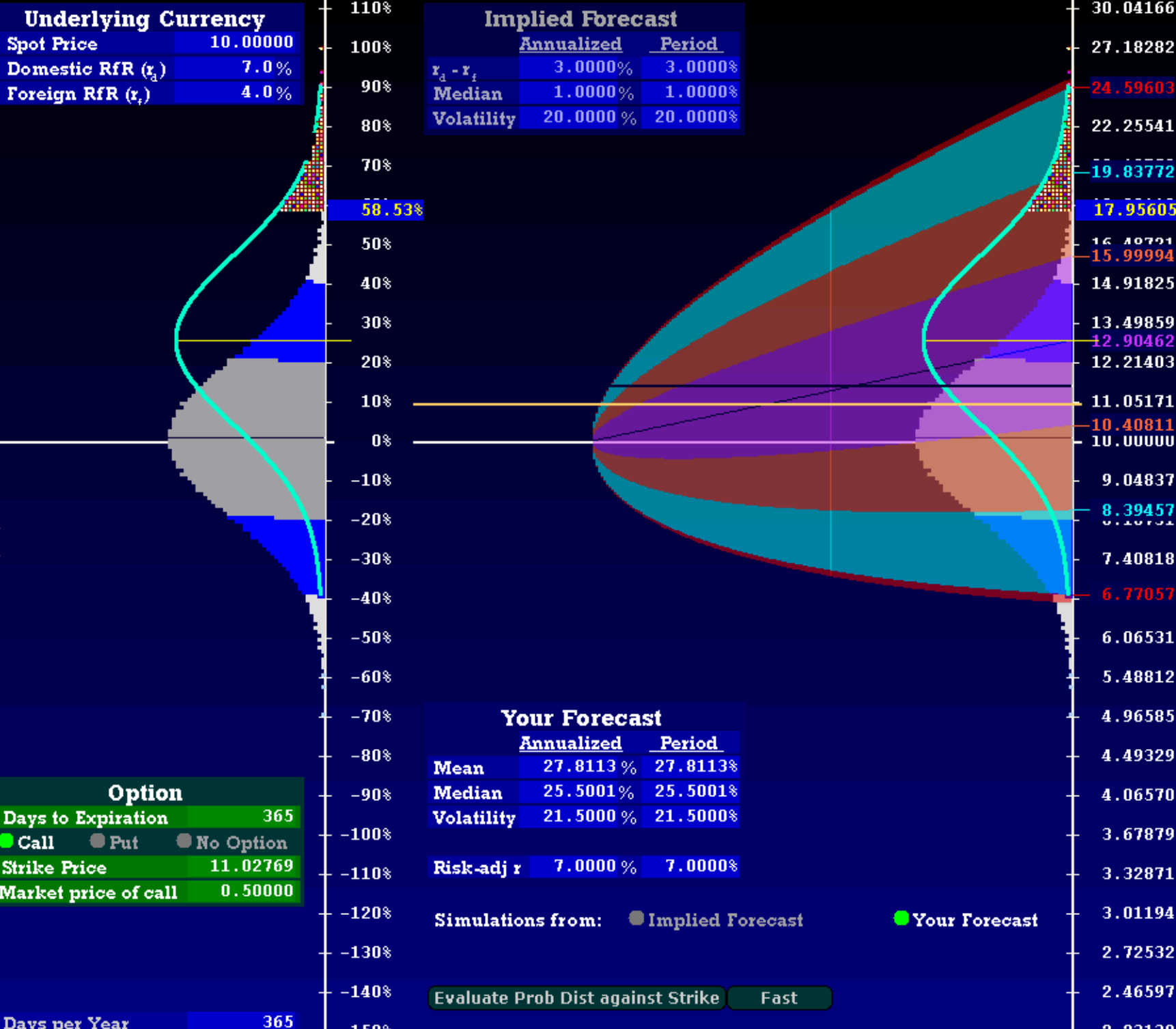
Option	
Days to Expiration	365
● Call ● Put ● No Option	
Strike Price	11.02769
Market price of call	0.50000

Your Forecast		
	Annualized	Period
Mean	27.8113%	27.8113%
Median	25.5001%	25.5001%
Volatility	21.5000%	21.5000%

Risk-adj r 7.0000% 7.0000%

Simulations from: ● Implied Forecast ● Your Forecast

Evaluate Prob Dist against Strike Fast



30.04166
27.18282
24.59603
22.25541
19.83772
17.95605
16.48721
15.99994
14.91825
13.49859
12.90462
12.21403
11.05171
10.40811
10.00000
9.04837
8.39457
8.18751
7.40818
6.77057
6.06531
5.48812
4.96585
4.49329
4.06570
3.67879
3.32871
3.01194
2.72532
2.46597
2.23130

End-of-period currency price	17.95605
- Strike price	11.02769
= Payoff	6.92836
Payoff	6.92836
× Probability	0.00050
= Probability-weighted future value	0.00346418
Probability-weighted FV/ (exp(Period geo discount r))	0.00346418
= Probability-weighted present value	0.00322998
Cumulative probability-weighted present value	0.50931935

We sweep through your forecast's probability distribution. We tally the cumulative probability-weighted present value of its potential future option payoffs.

Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.0%
Foreign RfR (r_f)	4.0%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

Option	
Days to Expiration	365
● Call ● Put ● No Option	
Strike Price	11.02769
Market price of call	0.50000

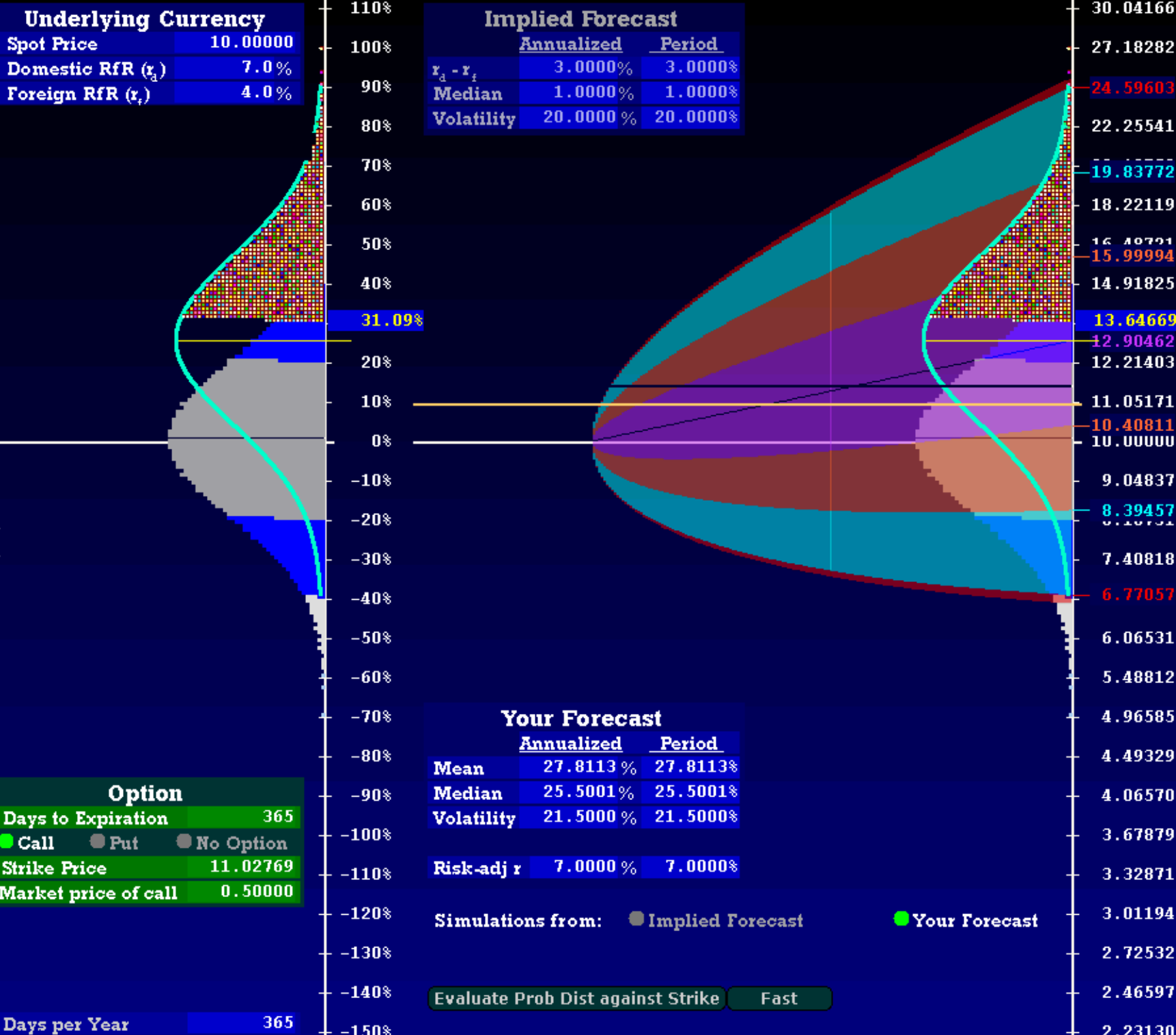
Your Forecast		
	Annualized	Period
Mean	27.8113%	27.8113%
Median	25.5001%	25.5001%
Volatility	21.5000%	21.5000%

Risk-adj r 7.0000% 7.0000%

Simulations from: ● Implied Forecast ● Your Forecast

Evaluate Prob Dist against Strike Fast

Days per Year 365



30.04166
27.18282
24.59603
22.25541
19.83772
18.22119
16.40721
15.99994
14.91825
13.64669
12.90462
12.21403
11.05171
10.40811
10.00000
9.04837
8.39457
7.40818
6.77057
6.06531
5.48812
4.96585
4.49329
4.06570
3.67879
3.32871
3.01194
2.72532
2.46597
2.23130

End-of-period currency price	13.64669
- Strike price	11.02769
= Payoff	2.61900
Payoff	2.61900
× Probability	0.00050
= Probability-weighted future value	0.00130950
Probability-weighted FV/ (exp(Period geo discount r))	0.00130950
= Probability-weighted present value	0.00122097
Cumulative probability-weighted present value	1.84916430

Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.0%
Foreign RfR (r_f)	4.0%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

Option	
Days to Expiration	365
● Call ● Put ● No Option	
Strike Price	11.02769
Market price of call	0.50000

Your Forecast		
	Annualized	Period
Mean	27.8113%	27.8113%
Median	25.5001%	25.5001%
Volatility	21.5000%	21.5000%

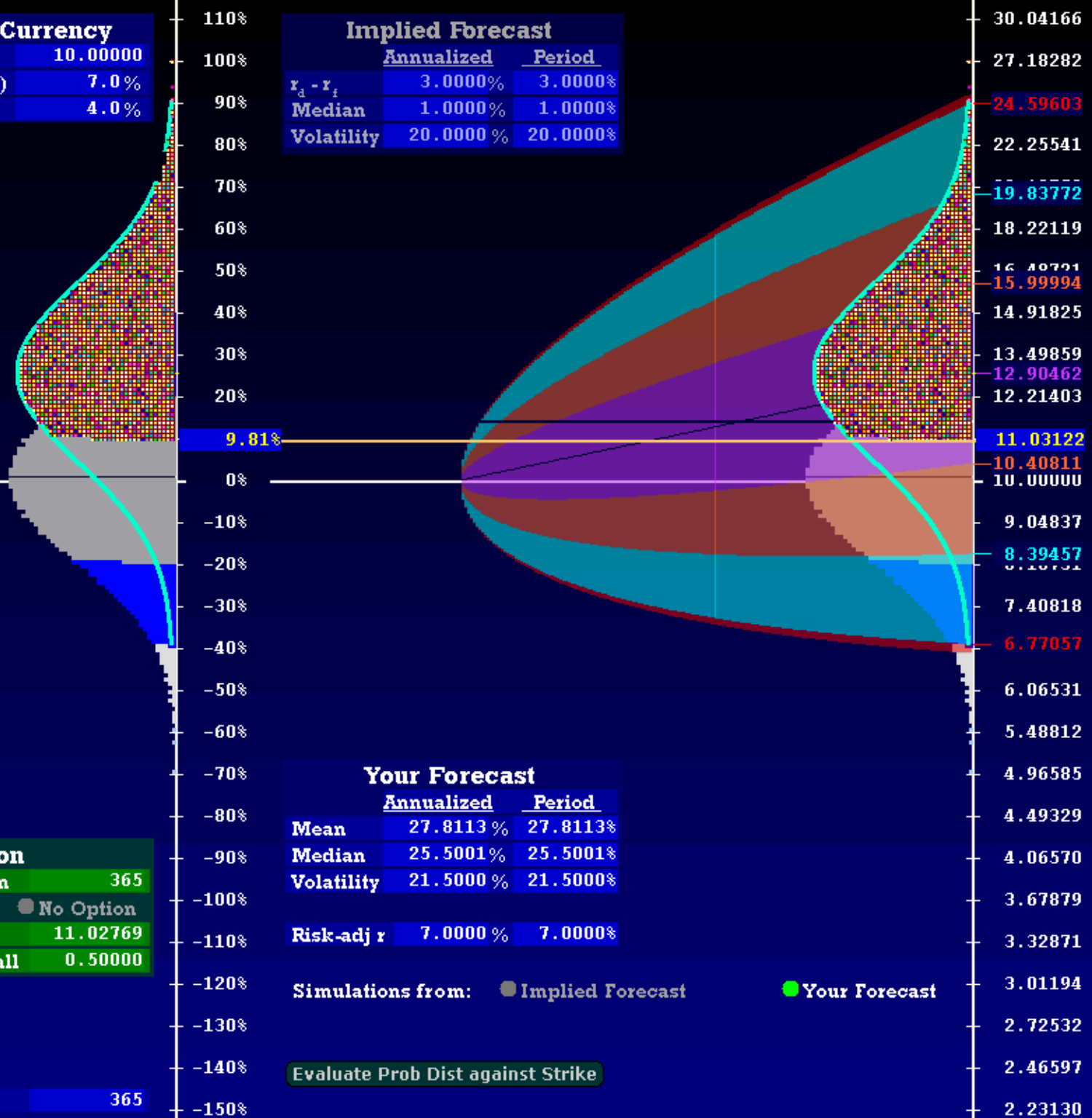
Risk-adj r 7.0000% 7.0000%

Simulations from: ● Implied Forecast ● Your Forecast

Evaluate Prob Dist against Strike

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Days per Year 365



End-of-period currency price	11.03122
- Strike price	11.02769
= Payoff	0.00353
Payoff	0.00353
× Probability	0.00050
= Probability-weighted future value	0.00000177
Probability-weighted FV/ (exp(Period geo discount r))	0.00000177
= Probability-weighted present value	0.00000165
Cumulative probability-weighted present value	2.30181655

30.04166
27.18282
24.59603
22.25541
19.83772
18.22119
16.48721
15.99994
14.91825
13.49859
12.90462
12.21403
11.03122
10.40811
10.00000
9.04837
8.39457
8.18751
7.40818
6.77057
6.06531
5.48812
4.96585
4.49329
4.06570
3.67879
3.32871
3.01194
2.72532
2.46597
2.23130

Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.0%
Foreign RfR (r_f)	4.0%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

Option	
Days to Expiration	365
● Call ● Put ● No Option	
Strike Price	11.02769
Market price of call	0.50000

Your Forecast		
	Annualized	Period
Mean	27.8113%	27.8113%
Median	25.5001%	25.5001%
Volatility	21.5000%	21.5000%

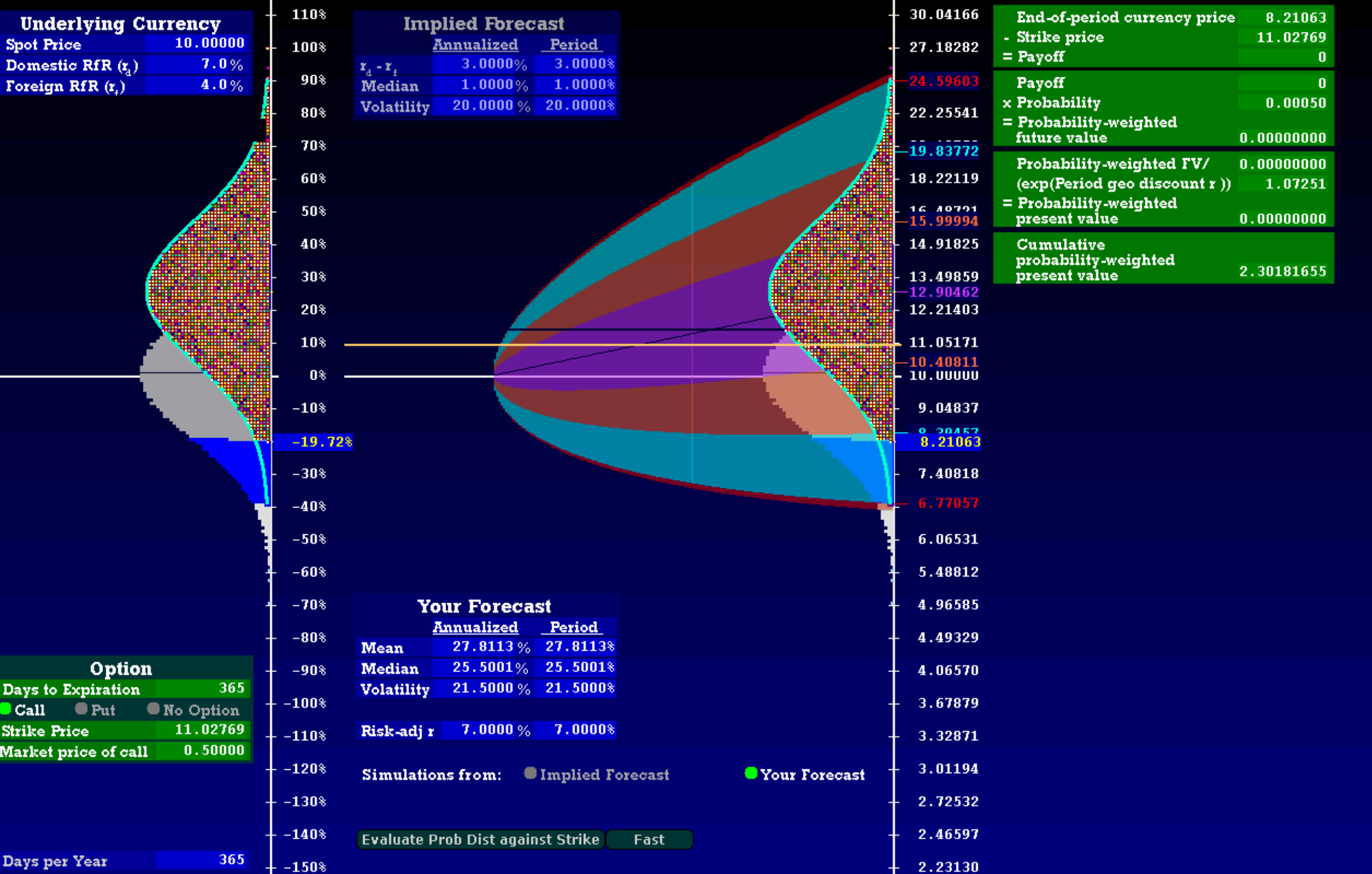
Risk-adj r 7.0000% 7.0000%

Simulations from: ● Implied Forecast ● Your Forecast

Evaluate Prob Dist against Strike Fast

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Days per Year 365



30.04166	End-of-period currency price	8.21063
27.18282	- Strike price	11.02769
	= Payoff	0
24.59603	Payoff	0
22.25541	× Probability	0.00050
	= Probability-weighted future value	0.00000000
19.83772	Probability-weighted FV/ (exp(Period geo discount r))	0.00000000
18.22119	= Probability-weighted present value	1.07251
16.48721		0.00000000
15.99994	Cumulative probability-weighted present value	2.30181655
14.91825		
13.49859		
12.90462		
12.21403		
11.05171		
10.40811		
10.00000		
9.04837		
8.20457		
8.21063		
7.40818		
6.77057		
6.06531		
5.48812		
4.96585		
4.49329		
4.06570		
3.67879		
3.32871		
3.01194		
2.72532		
2.46597		
2.23130		

Underlying Currency	
Spot Price	10.00000
Domestic RfR (r_d)	7.0%
Foreign RfR (r_f)	4.0%

Implied Forecast		
	Annualized	Period
$r_d - r_f$	3.0000%	3.0000%
Median	1.0000%	1.0000%
Volatility	20.0000%	20.0000%

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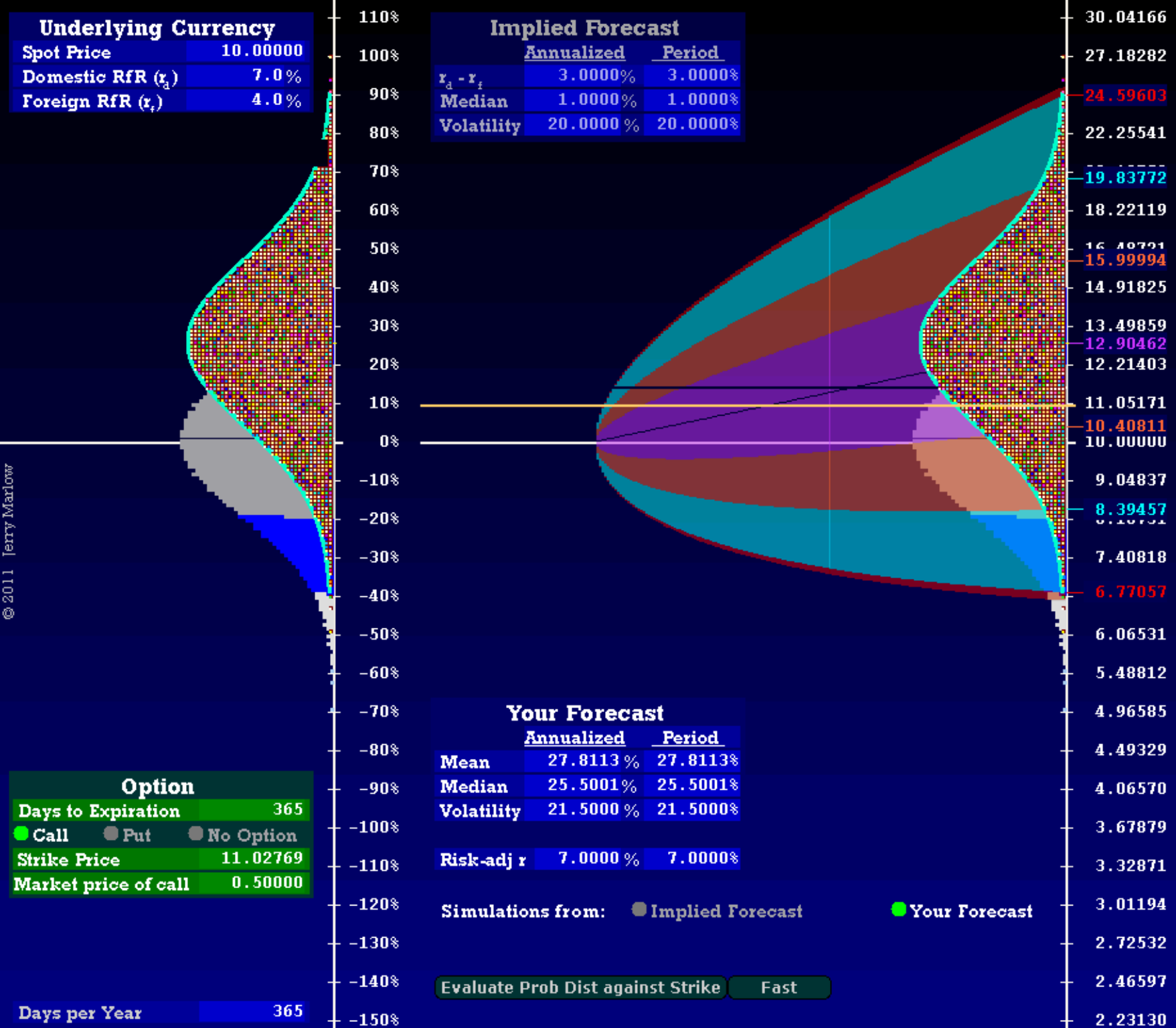
Option	
Days to Expiration	365
● Call ● Put ● No Option	
Strike Price	11.02769
Market price of call	0.50000

Your Forecast		
	Annualized	Period
Mean	27.8113%	27.8113%
Median	25.5001%	25.5001%
Volatility	21.5000%	21.5000%

Risk-adj r 7.0000% 7.0000%

Simulations from: ● Implied Forecast ● Your Forecast

Evaluate Prob Dist against Strike Fast



End-of-period currency price	6.10547
- Strike price	11.02769
= Payoff	0
Payoff	0
× Probability	0.00050
= Probability-weighted future value	0.00000000
Probability-weighted FV/ (exp(Period geo discount r))	0.00000000 1.07251
= Probability-weighted present value	0.00000000
Cumulative probability-weighted present value	2.30181655

According to your forecast, this call is worth 2.302, which is much more than the dealer's ask price of 0.501.

Of course, if you buy this call, your trading platform will show that you have a small loss, because you paid the ask price and, if you had to sell the option right back, you'd have to sell at the bid price of 0.499 which is below the market-equilibrium-forecast price.

The market hasn't realized yet that the market-equilibrium forecast is wrong and your forecast is right. The market view is that its forecast is right and yours is wrong.

To reap the benefit of your superior forecast, you have to hold the option until the spot price evolves as you expect, not as the market-equilibrium forecast expects.