期权波动率 (Option Volatility) 从入门到精通

#5 - 波动率微笑和波动率偏离 (Volatility Smile and Volatility Skew)

SAM, PowerUpGammas

FREE TUTORIAL ▶ OPTION VOLATILITY GUIDE

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⊗ AAPL ▾ PUT/CALLs (Side by Side) ▾   191.25 **-1.21 (-0.63%)** ? 🔧

| JUL 07 '23 | JUL 14 '23 | JUL 21 '23 | JUL 28 '23 | MORE ▾ |
| 1 DAY | 8 DAYS | 15 DAYS | 22 DAYS | |

TABBED VIEW   PUT/CALL   30 STRIKES   SMART   AAPL   100

IV: 18.1%

			CALLS					STRIKE	PUTS							
OPTN OPN...	VOLUME	BID	ASK	MARK	TIME VALUE (%)	DELTA	THETA	IV CLOSE	STRIKE	IV CLOSE	THETA	DELTA	TIME VALUE (%)	MARK	BID	ASK	VOLUME	OPTN OPN...
		◆ 71.65	72.40 ◆	72.96	0.32 (2.78%)	0.999	-0.010		120	62.697%	-0.002	-0.001		0.01		0.02 ◆	11	156
		◆ 66.55	67.05 ◆	67.98	0.22 (1.91%)	0.999	-0.011		125	59.855%	-0.003	-0.001	0.01 (0.09%)	0.01	◆ 0.01	0.03 ◆		105
1		◆ 61.70	62.10 ◆	63.01	0.37 (3.21%)	0.998	-0.019		130	58.807%	-0.004	-0.002	0.01 (0.09%)	0.03	◆ 0.01	0.03 ◆	10	41
4	3	◆ 56.60	57.10 ◆	58.04	0.27 (2.34%)	0.997	-0.025	45.611%	135	53.458%	-0.006	-0.003	0.02 (0.17%)	0.04	◆ 0.02	0.04 ◆	8	38
9	7	◆ 51.75	52.15 ◆	53.07	0.42 (3.64%)	0.995	-0.027	47.404%	140	49.856%	-0.007	-0.005	0.03 (0.26%)	0.05	◆ 0.03	0.04 ◆	10	288
118	1	◆ 46.65	47.20 ◆	48.10	0.32 (2.78%)	0.994	-0.029	38.277%	145	46.038%	-0.009	-0.006	0.04 (0.35%)	0.06	◆ 0.04	0.05 ◆	4	129
148	4	◆ 41.70	42.20 ◆	43.13	0.37 (3.21%)	0.991	-0.032	42.460%	150	40.961%	-0.011	-0.009	0.06 (0.52%)	0.07	◆ 0.06	0.07 ◆	25	269
30	6	◆ 36.85	37.20 ◆	38.17	0.52 (4.51%)	0.988	-0.035	36.882%	155	38.299%	-0.013	-0.013	0.08 (0.69%)	0.09	◆ 0.08	0.09 ◆	15	197
76	12	◆ 31.90	32.25 ◆	33.21	0.57 (4.94%)	0.983	-0.038	34.593%	160	34.891%	-0.015	-0.017	0.10 (0.87%)	0.12	◆ 0.10	0.12 ◆	28	821
921	2	◆ 26.95	27.35 ◆	28.27	0.62 (5.38%)	0.976	-0.042	32.003%	165	30.454%	-0.018	-0.024	0.13 (1.13%)	0.16	◆ 0.13	0.14 ◆	87	717
223	11	◆ 22.05	22.40 ◆	23.33	0.72 (6.25%)	0.965	-0.045	26.162%	170	27.353%	-0.021	-0.035	0.15 (1.30%)	0.19	◆ 0.15	0.20 ◆	556	3.68K
325	10	◆ 17.15	17.55 ◆	18.45	0.82 (7.11%)	0.942	-0.053	26.926%	175	24.027%	-0.028	-0.059	0.29 (2.52%)	0.30	◆ 0.29	0.31 ◆	768	3.66K
1.42K	177	◆ 12.30	12.80 ◆	13.69	0.97 (8.41%)	0.889	-0.065	22.204%	180	21.398%	-0.040	-0.112	0.56 (4.86%)	0.53	◆ 0.56	0.58 ◆	7.83K	11.1K
5.96K	207	◆ 8.15	8.35 ◆	9.30	1.82 (15.79%)	0.777	-0.082	20.028%	185	19.924%	-0.057	-0.226	1.20 (10.41%)	1.10	◆ 1.20	1.27 ◆	1.32K	6.50K
6.03K	1.98K	◆ 4.60	4.70 ◆	5.54	3.27 (28.37%)	0.592	-0.092	18.722%	190	18.767%	-0.067	-0.415	2.66 (23.08%)	2.34	◆ 2.66	2.73 ◆	2.04K	7.96K
7.04K	2.88K	◆ 2.13	2.23 ◆	2.70	2.13 (18.48%)	0.367	-0.080	17.949%	195	17.180%	-0.056	-0.650	1.33 (11.54%)	4.54	◆ 5.00	5.60 ◆	233	1.06K
10.0K	4.79K	◆ 0.81	0.85 ◆	1.06	0.81 (7.03%)	0.178	-0.053	17.722%	200	17.374%	-0.030	-0.854	0.00 (0.00%)	8.04	◆ 8.50	10.10 ◆	296	436
9.30K	1.87K	◆ 0.30	0.33 ◆	0.39	0.30 (2.60%)	0.079	-0.030	18.393%	205	17.228%	-0.008	-0.969	0.00 (0.00%)	12.57	◆ 13.50	14.40 ◆	78	104
3.47K	898	◆ 0.14	0.15 ◆	0.16	0.14 (1.21%)	0.036	-0.018	19.988%	210	27.943%	0.000	-1.000	0.00 (0.00%)	17.54	◆ 17.05	19.40 ◆	381	111
1.14K	235	◆ 0.07	0.08 ◆	0.09	0.07 (0.61%)	0.019	-0.011	21.474%	215	23.794%	0.000	-1.000	0.00 (0.00%)	22.54	◆ 22.90	24.25 ◆	2	3
924	732	◆ 0.04	0.05 ◆	0.05	0.04 (0.35%)	0.011	-0.007	23.278%	220		0.000	-1.000	0.00 (0.00%)	27.54	◆ 27.90	29.25 ◆		
533	5	◆ 0.02	0.04 ◆	0.04	0.02 (0.17%)	0.007	-0.005	26.665%	225		0.000	-1.000	0.00 (0.00%)	32.54	◆ 32.90	34.35 ◆		
168	1	◆ 0.01	0.03 ◆	0.03	0.01 (0.09%)	0.005	-0.004	29.064%	230		0.000	-1.000	0.00 (0.00%)	37.54	◆ 37.90	39.25 ◆		
248	125	◆ 0.01	0.02 ◆	0.02	0.01 (0.09%)	0.003	-0.003	30.430%	235		0.000	-1.000	0.00 (0.00%)	42.54	◆ 42.90	44.35 ◆		
186	115		0.05 ◆	0.01		0.003	-0.003	31.207%	240		0.000	-1.000	0.00 (0.00%)	47.54	◆ 47.90	49.30 ◆		
338	166		0.05 ◆	0.01		0.001	-0.002	33.854%	245		0.000	-1.000	0.00 (0.00%)	52.54	◆ 52.90	54.35 ◆		
75			0.02 ◆	0.00		0.001	-0.001	34.077%	250		0.000	-1.000	0.00 (0.00%)	57.54	◆ 57.90	59.25 ◆		
49			0.03 ◆	0.00		0.000	-0.001	38.354%	255		0.000	-1.000	0.00 (0.00%)	62.54	◆ 62.90	64.25 ◆		
10	3		0.02 ◆	0.00		0.000	0.000	41.112%	260		0.000	-1.000	0.00 (0.00%)	67.54	◆ 67.90	69.30 ◆		

Volatility Smile / Skew

- 理论中的 U-Shaped 波动率曲线
- Reverse Skew (Put Skew) & Forward Skew (Call Skew)

Assumptions of the Black-Scholes-Merton Model:

- *The underlying price follows a lognormal probability distribution as it evolves through time.* 股价的回报呈现对数正态分布

A lognormal probability distribution is one in which the log return is normally distributed. For example, if a stock moves from 100 to 110, the return is 10% but the log return is ln(1.10) = 0.0953 or 9.53%. This assumption is reasonable for most assets that offer options. Additionally, the variance of the return is assumed to be constant for the life of the option.

- *Interest rates remain constant and known.* 利率被假设为恒定不变

The model uses the risk-free rate to represent this constant and known rate. During periods of rapidly changing interest rates, these 30 day rates are often subject to change, thereby violating one of the assumptions of the model. The assumption also becomes a problem for pricing options on bonds and interest rates.

- *The volatility of the underlying asset is known and constant.*

The volatility of the underlying is specified in the form of the standard deviation of the log return. This is the most critical assumption. 股价的（未来）波动率被假定为恒定不变

- *No transaction costs or taxes.*

- *No cash flows on the underlying.* 不存在现金股利
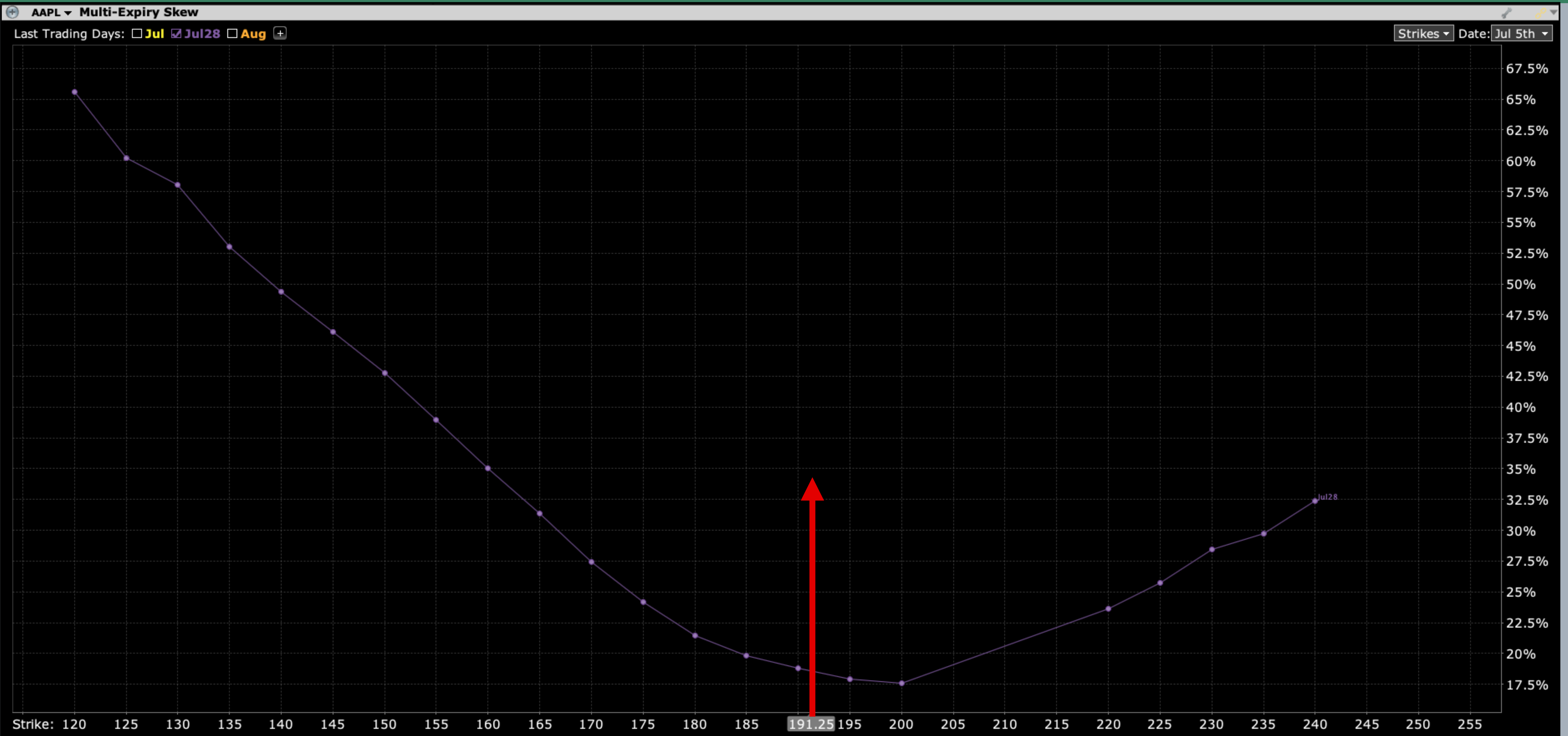
- *European exercise terms are used.* 合约需要持有到期

This limitation is not a major concern because very few calls are ever exercised before the last few days of their life. This is true because when you exercise a call early, you forfeit the remaining time value on the call and collect the intrinsic value. Towards the end of the life of a call, the remaining time value is very small, but the intrinsic value is the same.

AAPL ▾ Multi-Expiry Skew

Last Trading Days: ☑Jul28 ☑Aug ☑Sep ... +   Strikes ▾   Date: Jul 5th ▾
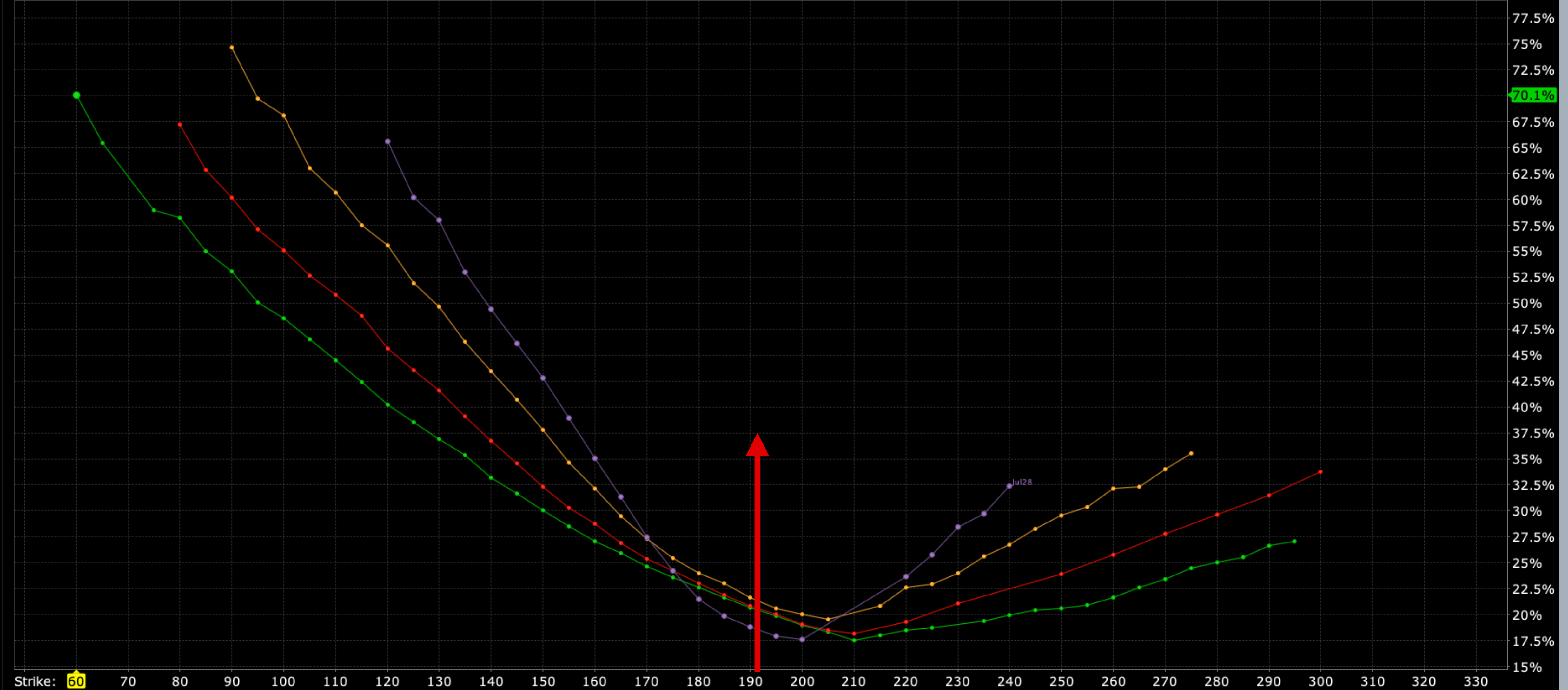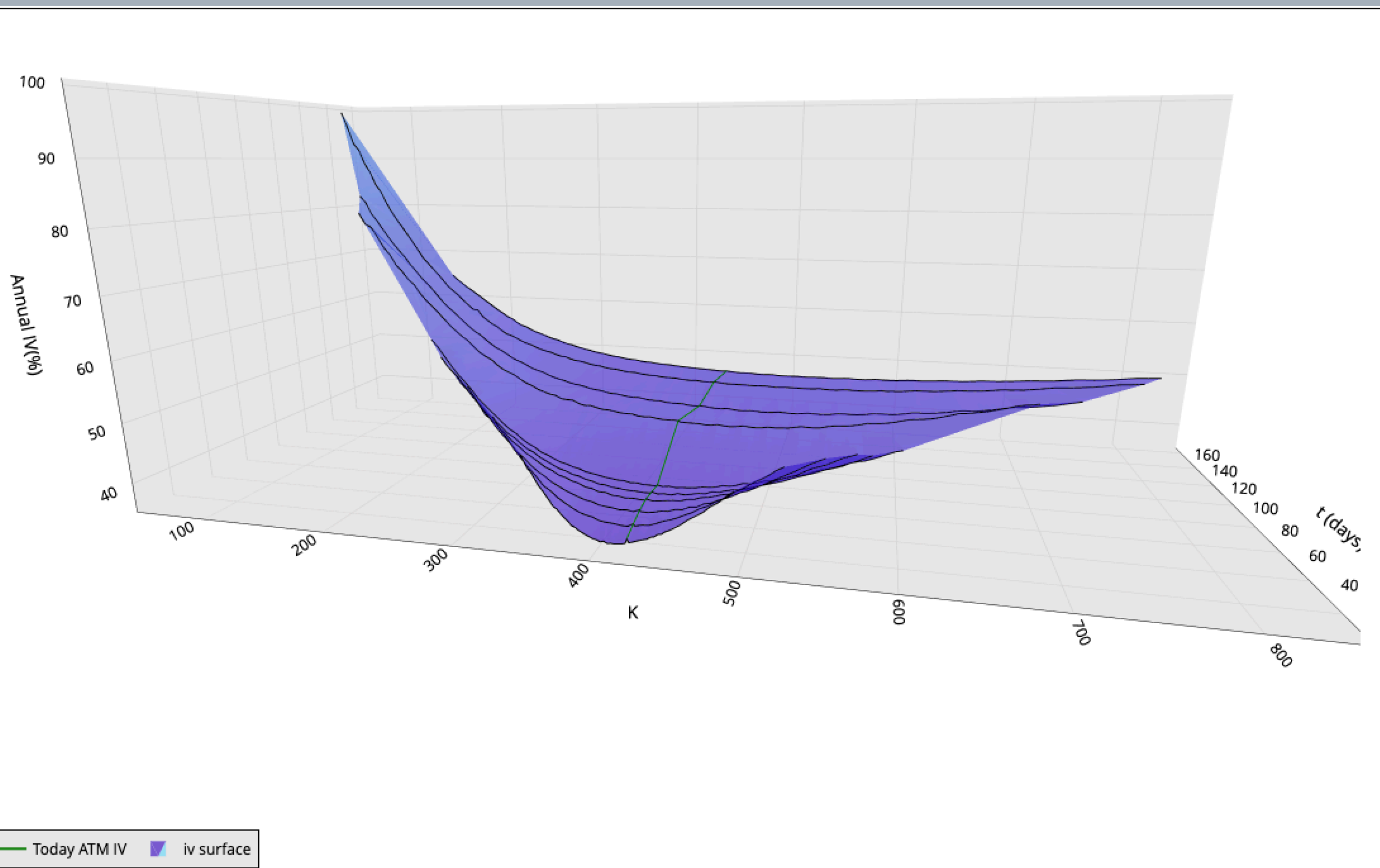
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隐含波动率 3D 曲面
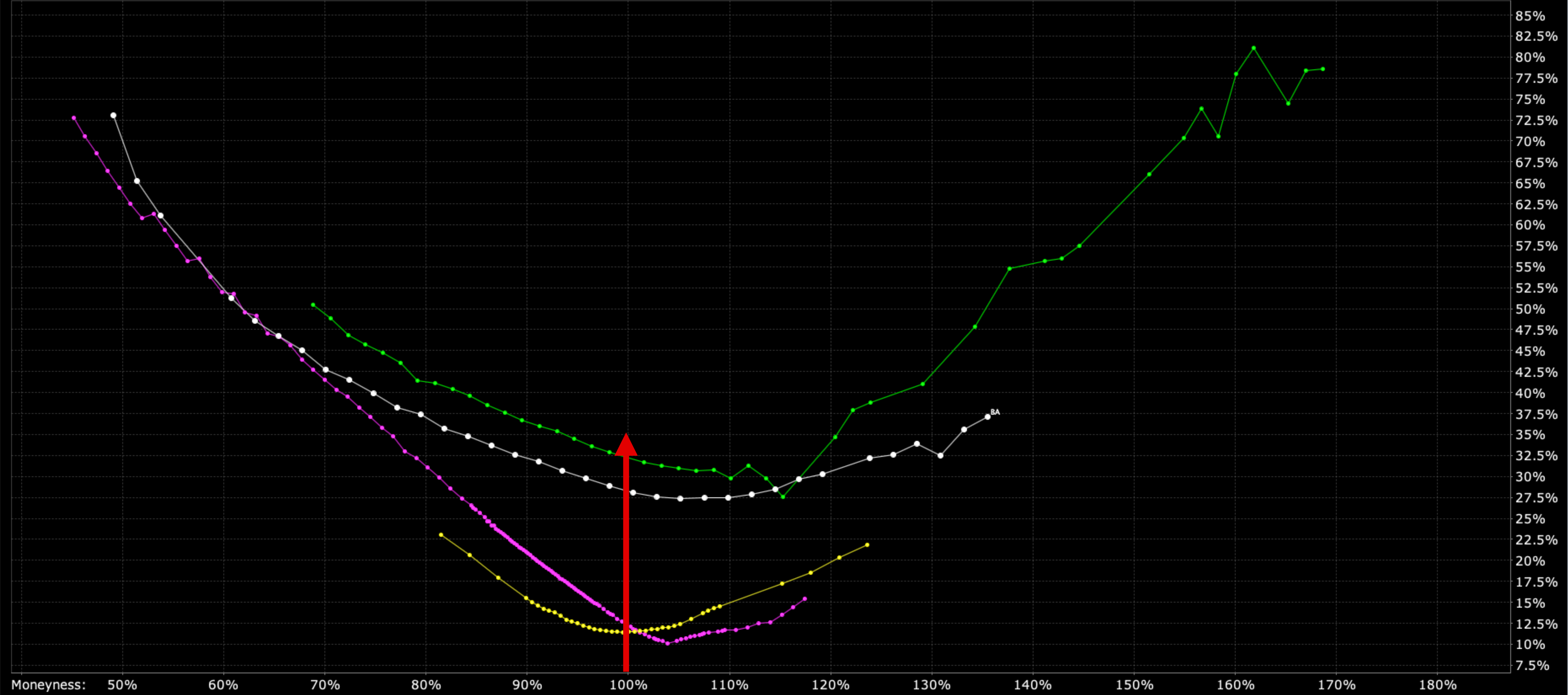
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