2 Nov
2023

Annual Quant Insights Conference

The Short Lira Put Option Investment Wealth or Trap of Price Spikes Causing Disastrous Losses

Uwe Wystup

MATHFINANCE

MathFinance in a nutshell

- We offer
  1. pricing and valuation of options, derivatives and structured products
  2. currency risk hedging strategies and investment strategy validation
  3. financial models and investment strategy validation
  4. expert reports, conflict resolution and expert witness service in capital markets claims
  5. derivatives business development for growing markets, also with professional training
- International client base from Sydney to Salt Lake City
- Clients include banks, asset managers, high net worth individuals (HNWIs), courts, law firms, software vendors
- USP
  1. using highest academic standards combined with high quality German engineering, plus more than 100 years of front office experience of the senior partners, all 4 of which hold professor positions in Singapore, Germany and Belgium.
  2. in-house valuation library at market makers' standard for volatility surfaces and exotics models
  3. international team with real people you can talk to (family office spirit)
- Examples
  1. banks expands in trading FX options and structured products, MathFinance provides benchmark pricing or validates the pricing models
  2. a legal claim is held against a bank, MathFinance solves the conflict to prevent media coverage or works with a law firm to defend the claim
  3. an investor lost a fortune trading derivatives. MathFinance helps recover the losses.

Content

- **EUR-TRY Market**
- Short EUR Call Strategy
- Ratio Call Spread Strategy
- Derivatives Claims
- Conclusions

EUR TRY Spot Mar – Sept 2023

Source: Eikon (Refinitiv)

EUR TRY Spot 2000 - 2023

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Source: Eikon (Refinitiv)

EUR TRY Vol Matrix 8 Sept 2023

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idd.ice.com/sd-fx/FXUI/VolSurface?sessionID=777fb4e9-ce0a-4295-9e13-7faaa01571ed&dataSourceId=1&baseCurrencyID=7&termCurrencyID=97&feedHourId=-1&tra...

https://idd.ice.com/sd-fx/FXUI/VolSurface?sessionID=777fb4e9-ce0a-4295-9e13-7faaa01571ed&dataSourceId=1&baseCurrencyID=7&termCurrencyID=97...

Volatility Surface

Term Structure | Refresh F4 | Calculate F2 | ?

Negative 25ΔRR means favor EUR put Click on the strike to open the pricing page

Trade Date Sat, 09 Sep 2023 Currency Pair EUR TRY Spot 28.729

	25ΔRR	25ΔBFly		5 Δ	10 Δ	15 Δ	20 Δ	25 Δ	30 Δ	ATM	30 Δ	25 Δ	20 Δ	15 Δ	10 Δ	5 Δ
1W	1.775	1.313	Vol	23.542	18.254	15.552	14.196	13.415	13.099	13	14.506	15.19	16.275	18.01	21.36	27.408
			Strike	27.166	27.822	28.139	28.322	28.451	28.547	28.851	29.203	29.326	29.487	29.72	30.132	30.99
1M	4.8	1.488	Vol	16.366	15.54	15.175	14.961	14.829	14.705	15.6	18.491	19.629	20.852	22.428	24.683	28.332
			Strike	27.198	27.753	28.09	28.344	28.555	28.742	29.367	30.235	30.557	30.951	31.48	32.275	33.74
2M	6.075	1.725	Vol	17.656	17.068	16.868	16.77	16.723	16.624	17.85	21.408	22.798	24.345	26.346	29.144	33.271
			Strike	26.823	27.609	28.1	28.481	28.803	29.096	30.077	31.56	32.121	32.824	33.784	35.248	37.925
3M	6.625	1.963	Vol	18.692	18.179	17.988	17.873	17.799	17.668	18.975	22.886	24.424	26.073	28.18	31.075	35.222
			Strike	26.625	27.609	28.239	28.733	29.154	29.537	30.8	32.81	33.585	34.554	35.881	37.909	41.625
6M	9.325	2.313	Vol	20.116	19.814	19.823	19.87	19.927	19.934	22.075	27.237	29.252	31.383	34.086	37.608	42.007
			Strike	26.753	28.202	29.145	29.904	30.563	31.169	33.169	37.028	38.604	40.621	43.464	47.909	56.062
9M	11.123	2.613	Vol	22.076	21.765	21.841	21.968	22.097	22.199	24.915	30.867	33.22	35.711	38.879	42.926	47.714
			Strike	26.977	28.946	30.231	31.271	32.183	33.022	35.728	41.844	44.463	47.89	52.862	60.88	76.11
1Y	12	2.675	Vol	22.85	22.555	22.698	22.898	23.093	23.295	26.375	32.599	35.093	37.723	41.075	45.313	50.158
			Strike	27.714	30.121	31.694	32.974	34.104	35.142	38.411	46.76	50.464	55.382	62.66	74.7	98.2
2Y	12.55	3.175	Vol	25.748	24.28	23.762	23.602	23.594	23.773	27.075	33.399	36.144	39.115	43.015	48.014	54.128
			Strike	30.27	35.071	38.139	40.519	42.556	44.358	49.272	66.19	74.68	86.63	105.78	141.13	223.78
3Y	12.729	3.675	Vol	24.366	23.259	22.802	22.911	23.392	24.092	26.602	33.749	36.121	38.704	41.897	46.879	59.955
			Strike	34.243	40.3	44.382	47.429	49.942	52.192	58.54	84.21	98.38	118.39	150.18	215.09	501.74
4Y	12.817	4.174	Vol	24.556	23.408	22.867	22.925	23.398	24.105	26.363	33.645	36.215	38.968	42.376	47.85	62.87
			Strike	39.649	47.818	53.466	57.698	61.17	64.26	72.14	109.25	132.47	166.43	223.11	349.84	1070.9
5Y	12.87	4.674	Vol	24.904	23.72	23.105	23.073	23.511	24.208	26.217	33.575	36.381	39.319	42.939	48.918	66.142
			Strike	43.812	54.044	61.29	66.79	71.27	75.24	84.26	132.69	167.29	219.73	311.56	536.96	2253.4
7Y	12.93	5.676	Vol	25.824	24.491	23.751	23.542	23.866	24.516	26.05	33.367	36.797	40.12	43.939	49.99	66.562
			Strike	50.335	64.85	75.45	83.76	90.5	96.41	106.72	174.86	240.53	347.95	551.08	1107.4	6498
10Y	12.975	7.175	Vol	21.982	21.982	21.982	21.649	23.581	26.19	26.15	33.507	38.185	38.238	36.584	35.491	35.491
			Strike	88.13	99.9	100.68	113.1	119.35	124.43	135.42	173.65	334.13	550.26	769.44	1077.1	1384.8

Source: ICE Data (SuperDerivatives)

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- EUR-TRY Market
- **Short EUR Call Strategy**
- Ratio Call Spread Strategy
- Derivatives Claims
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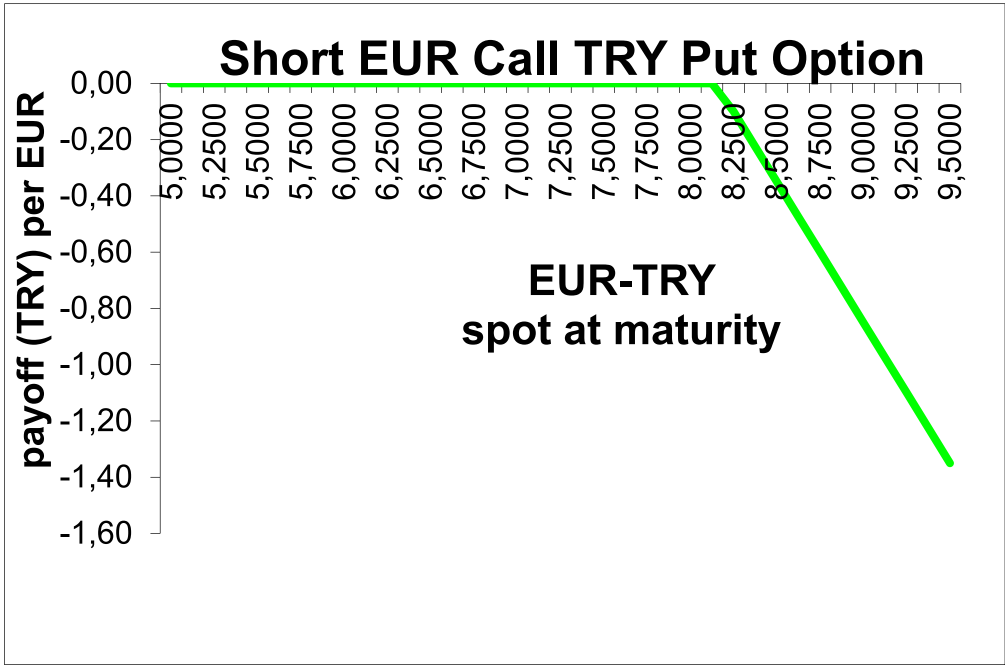

Short EUR Call TRY Put Strategy

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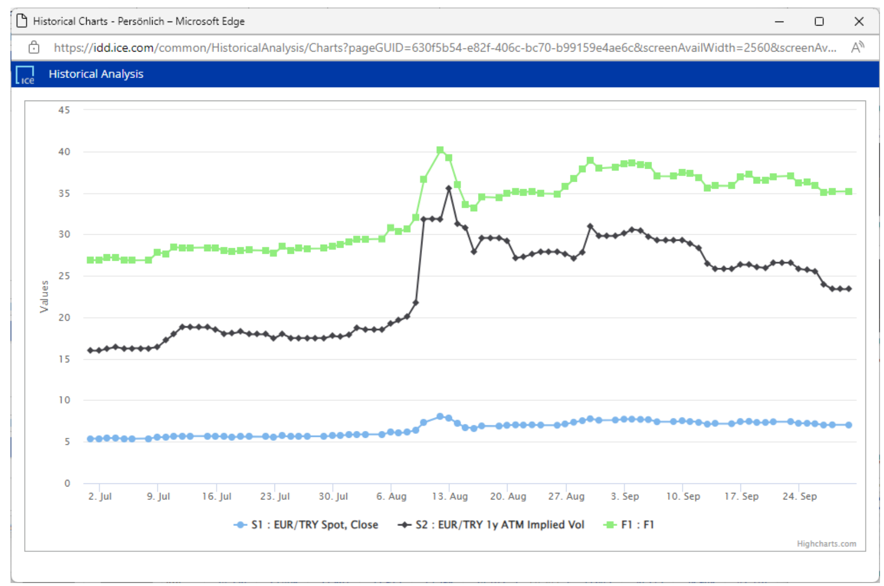
Idea: EUR-TRY moving up, but steady, volatility high
➔ Sell OTM EUR call
➔ keep premium

➔ Hope the options will expire OTM
➔ Danger: Price Spikes



Source: ICE Data (SuperDerivatives)

Short EUR Call TRY Put Strategy

Position	Type	Strike	EUR notional	Expiry Date	Delivery Date
Sell	EUR Call TRY Put	8.1500	50,000,000	25 OCT 2019	28 OCT 2019

- Investor sells EUR Call in May 2018 for EUR 950,000
- Spot ref 5.20, vol 18%, 17% delta OTM

Both spot and volatility spike on 10 AUG 2018
source: ICE Data

Short EUR Call TRY Put Strategy

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Position	Type	Strike	EUR notional	Expiry Date	Delivery Date
Sell	EUR Call TRY Put	8.1500	50,000,000	25 OCT 2019	28 OCT 2019

- 10 AUG 2018 Spot ref 7.30, vol 26%, 58% delta near ATMF
- Force-closed for EUR 14,320,000
- Refinitiv offer EUR 10,630,000 (EOD)
- On forward spread 2500, volatility spread 2% offer on morning of 10 AUG: EUR 8,880,000

→ Hold to maturity gain: EUR 950,000
→ Fair value loss: EUR 7,930,000
→ Forced-close loss: EUR 13,670,000
→ Legal claim: EUR 5,740,000

Short EUR Call TRY Put Strategy

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Market Data on 10 AUG 2018
Bloomberg, Tullets, Fenics

vendor	BBG	BBG	BBG	Eikon	Eikon	Eikon	Eikon	Eikon	Eikon	Eikon
source	OVDV			Fenics	Fenics	Tullet&Tokyo (LDN)	Tullet&Tokyo (LDN)	Tullet&Tokyo (LDN)	Fenics	Fenics
spot	ATM vol	forward	EUR dep	ATM vol	ATM spread	swap points	swap spread	forward	25 RR	25 BF
1D				50,375%	14,850%				8,275%	1,212%
1W	61,218%	7,3858	-0,3381%	67,657%	7,250%	0,0330205	0,000635	7,3617	9,875%	1,163%
1M	48,540%	7,4719	-0,3216%	51,875%	2,550%	0,1473320	0,002450	7,4760	9,625%	1,225%
2M		7,6232	-0,3434%	44,625%	2,050%	0,3035200	0,003066	7,6322	9,575%	1,250%
3M	38,145%	7,7753	-0,3528%	40,500%	2,200%	0,4539785	0,011753	7,7827	9,575%	1,337%
6M	33,455%	8,2595	-0,3534%	35,525%	1,750%	0,9429795	0,009399	8,2717	9,550%	1,425%
9M	31,440%	8,7626	-0,3517%	33,225%	1,550%	1,4515190	0,022458	8,7802	9,650%	1,500%
1Y	30,040%	9,0915	-0,3500%	31,825%	**1,450%**	1,9404195	**0,010995**	9,2691	9,750%	1,575%
18M	29,940%	10,2946	-0,3235%	32,550%		2,9053065	**0,122969**	10,2340		
2Y		11,6489	-0,2793%	33,275%	1,650%	3,9435250	0,125156	11,2722	10,325%	2,050%

Broadly consistent among major platforms/brokers
Variability / liquidity issues / **watch spreads**

Short EUR Call TRY Put Strategy

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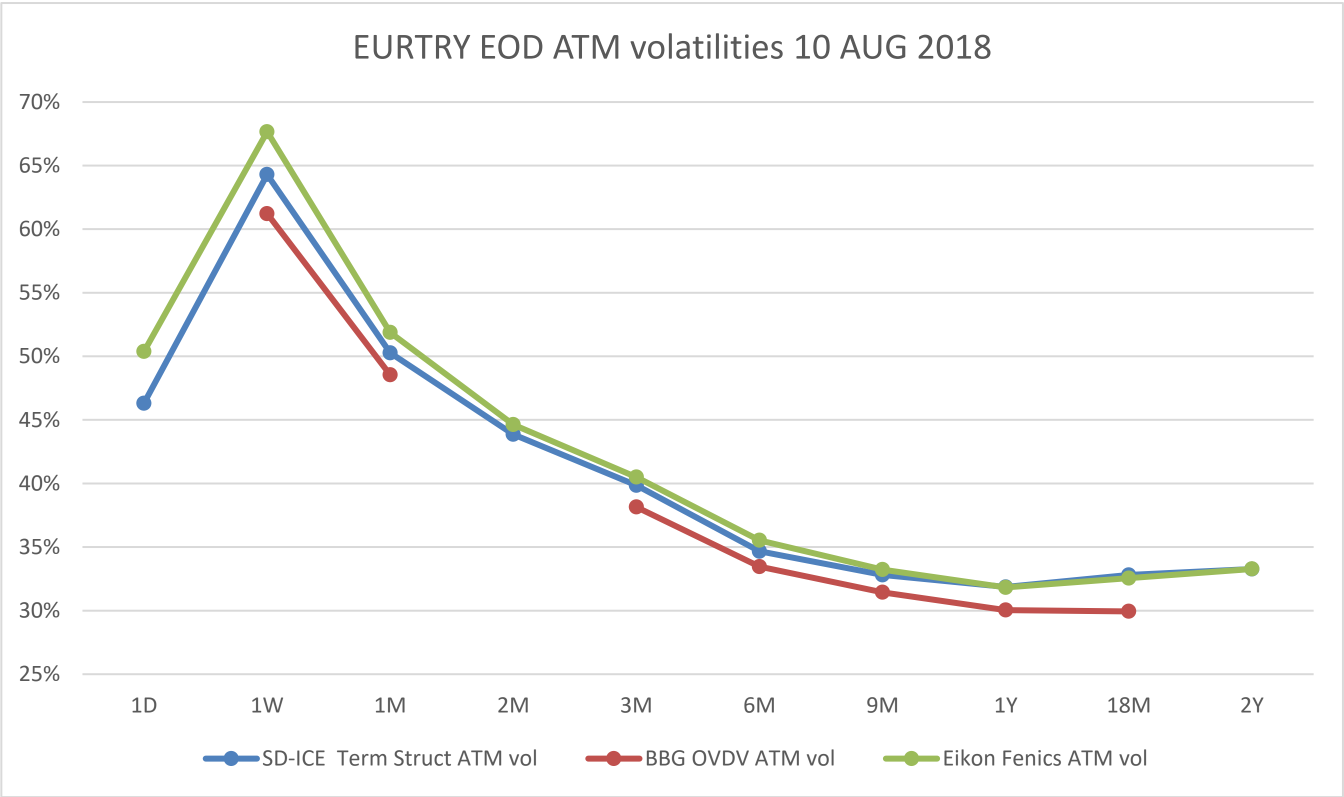
Market Data on 10 AUG 2018
ICE, Bloomberg, Eikon

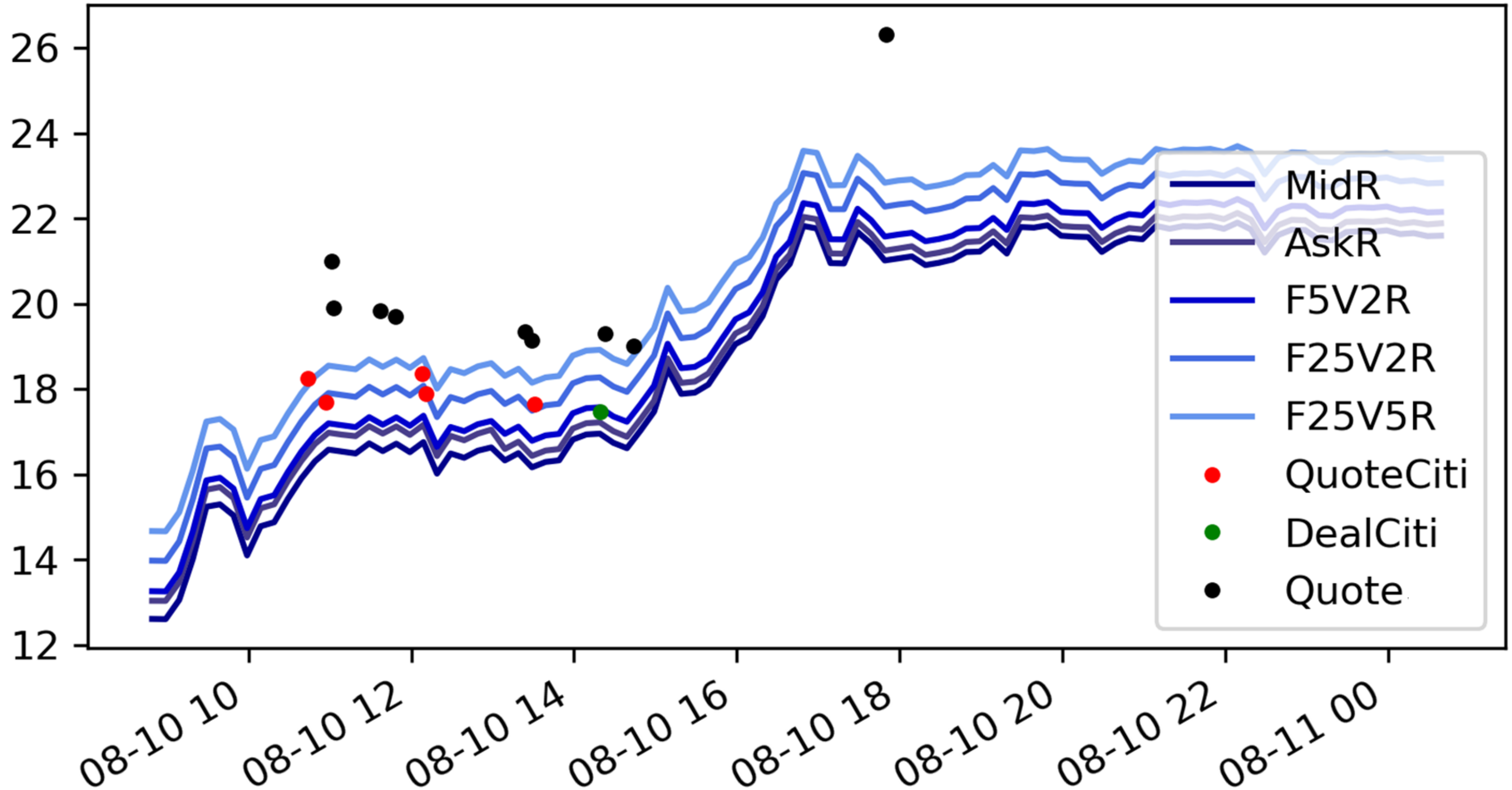


Broadly consistent among major platforms/brokers
Variability / liquidity issues / intraday data hard to trace

Short EUR Call TRY Put Strategy

- Offer price on closure on 10 AUG 2018:
- depends on time of the day and:
- spreads

→ R: Refinitiv Eikon Data
→ F5V2: Forward 500 vol 2%
→ F25V2: Forward 2500 vol 2%
→ F25V5: Forward 2500 vol 5%



Short EUR Call TRY Put Strategy

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- Offer price on closure on 10 AUG 2018:
- depends on time of the day and:
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➔ Sd: ICE Data (SuperDerivatives)
➔ F5V2: Forward 500 vol 2%
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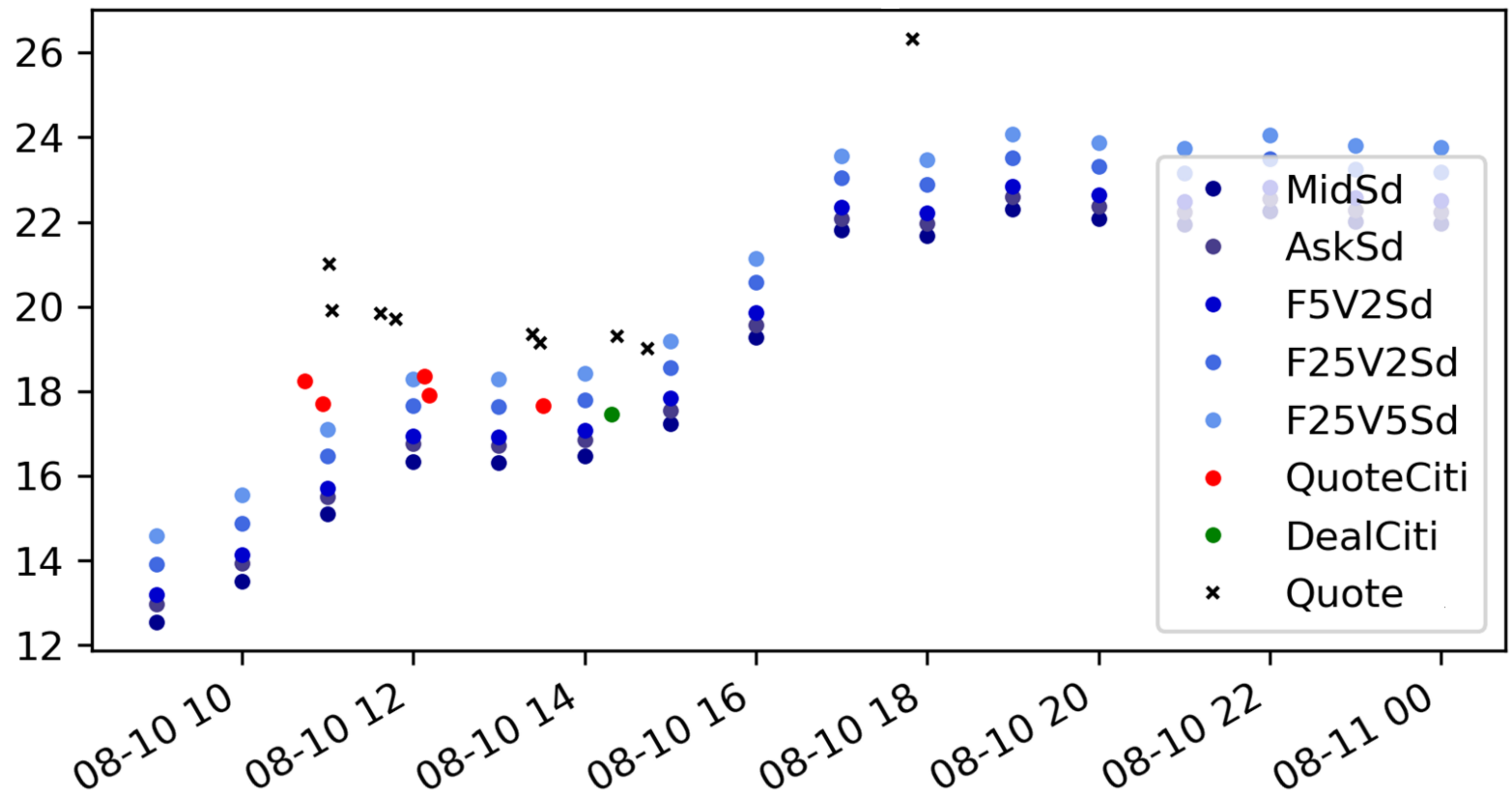

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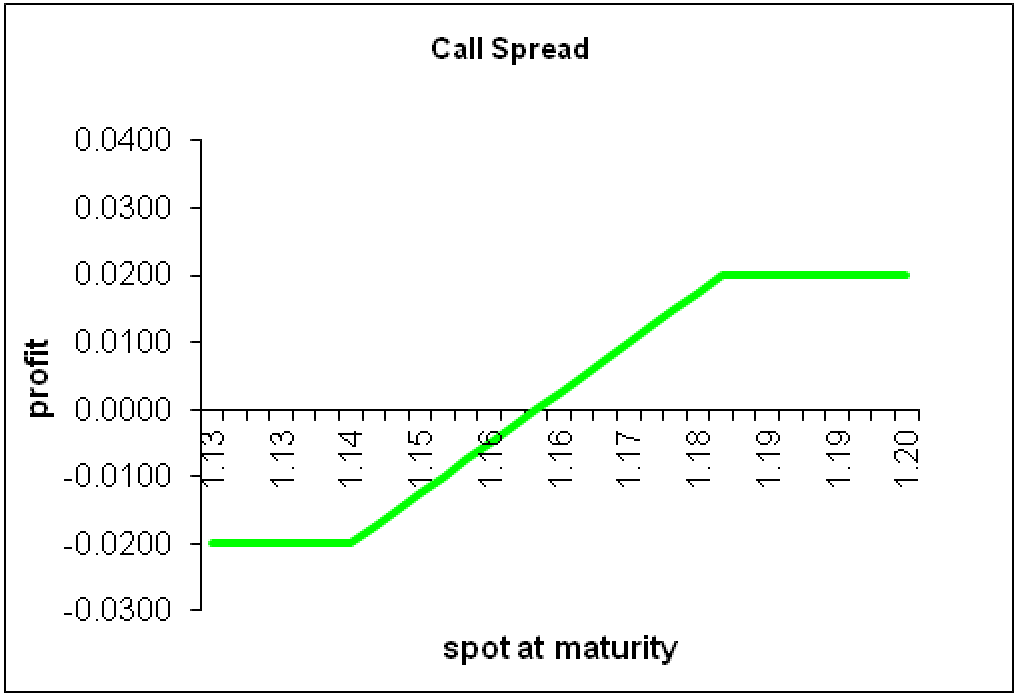

Ratio USD-TRY Call Spread Strategy

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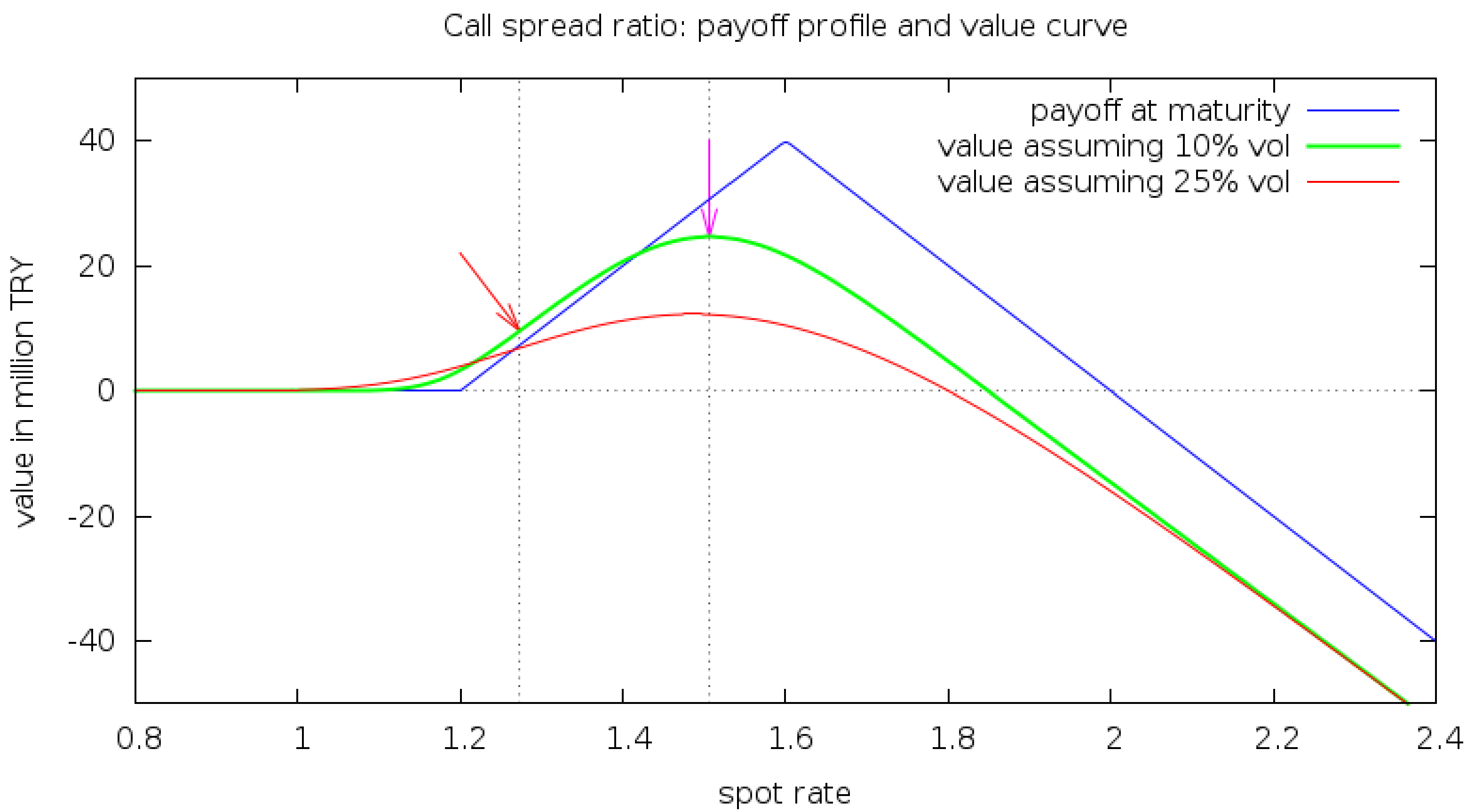
- Zero Cost
- Zero Risk
- Profit = 20 M

Long USD Call 1.20
Short 10 USD Calls 1.60
Margin account



Ratio USD-TRY Call Spread Strategy

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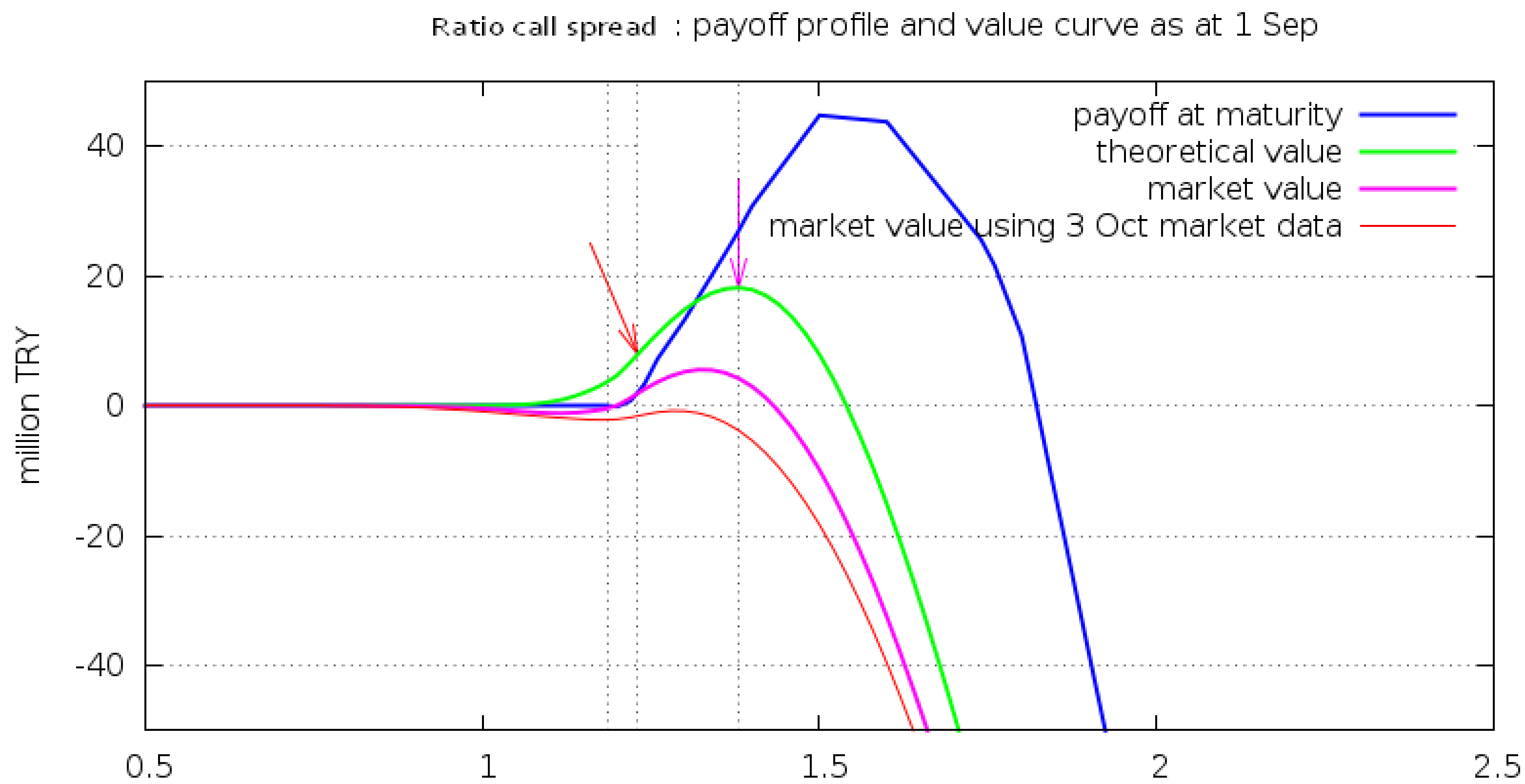
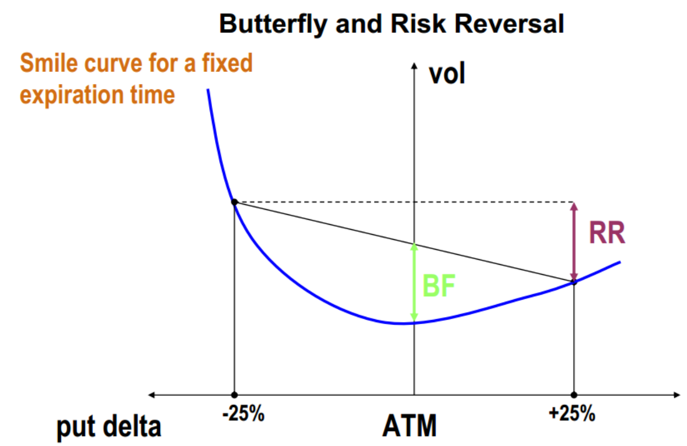
- ➔ Gravity of Loss and Risk underestimated
- ➔ substantially by ignoring the FX smile Risk
- ➔ Loss = 20 M

Long USD Call 1.20
Short 10 USD Calls 1.60
3 Margin calls, forced closure

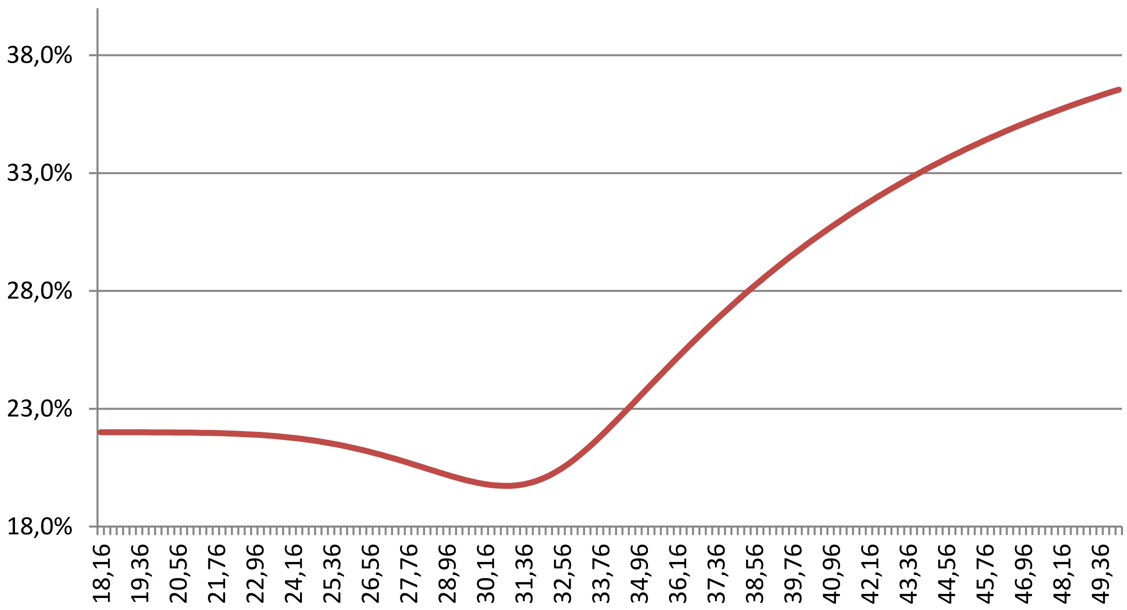


Smile Effect EUR-TRY

- 6 M smile EUR-TRY 8 Sept 2023
- Volatility range 19% - 39%
- Strong skew (TRY weaker)



Volatility smile on strike space



Spot Ref 28.73
ATM 22.078%
RR 9.325%
BF 2.313%
EUR 6M MM 3.553%
TRY 6M MM 37.467%
EURTRY 6M 33.537

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Derivatives Claims

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➔ Litigation / Arbitration
➔ Jurisdiction / mind set
➔ Law firms / court operations

- Historic Data Analysis
- Valuation & Risk Figures
- ISDA, Patents, Software
- Expert reports

Content

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Conclusions

→ Carry trades only work for some time

→ Even in emerging markets and when combined with derivatives and volatility exposure

→ Market spikes can lead to disastrous losses when traded on margin

→ Forced closure can amplify losses

→ Legal claims hard to pursue (time, cost, incompetence of legal system)

- Historic Data Analysis
- Valuation & Risk Figures
- ISDA, Patents, Software
- Expert reports

Available products in MathFinance‘s MFVal:

- European payoffs (No need of exotic model, only MFVal Surface)
    - Plain vanilla (Call, Put), Digital, EKO, EKI
- 1st generation exotics (MLV + PDE)
    - One-Touch, No-Touch, Double-One-Touch, Double-No-Touch, Knock-Out, Knock-In, Reverse-Knock-Out , Reverse-Knock-In, Double-Knock-Out, Double-Knock-In, Barrier-Digital.
- Second generation exotics (LV or MLV or SLV + Monte-Carlo)
    - Target-Redemption Forward (TaRF), Fader, Corridor, Forward-Start Vanilla
- Tools (MLV and SLV 1st Gen Exotics)
    - https://apps-mathfinance.com/ksnbzeru/slvPricer
    - Jupyter notebooks
    - Generic server access to MFVal to price multiple instruments

A parsimonious choice of model

		Payoffs				
		vanillas & European payoffs	TRFs, tarns (target but no barrier)	1st gen exotics (barriers, discrete barriers)	2nd gen exotics, forward-starting barriers, forward strikes, FVAs, cliquets	Option on realized vol / variance
Models	BS + Vol interpolation	✓	×	×	×	×
	Vanna - Volga	✓×	×	✓×	×	×
	Dupire	✓	✓	×	×	×
	Local-Vol Mixture	✓	✓	✓	×	×
	Local-Vol Mixture with transition	✓	✓	✓	✓	✓×
	SLV	✓	✓	✓	✓	✓
	Heston	✓×	✓×	✓×	✓×	✓×

Too simple model, mispricing

Too complex model, overkill

Right complexity

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