

FX Column: Basis Madness

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Today I cover three striking examples how different theory can be from practice. At university we often assume there is no arbitrage in financial markets. Lots to learn. And more than the usual basis spread in cross currency swaps that we have learned to consider from 2008 latest. We cover commodities, currency options and interest rates. And believe it or not, all of the following is actually serious.

1. Basis: Natural gas prices in the US and in Canada in August 2022 show a difference of USD 10 in the US and CAD 0 in Canada.
2. Free currency options: Turkish lira put options are now free of charge, and have been since December 2021. Time to go shopping (and re-adjust your training slides on option pricing).
3. EUR central bank interest rate has been lowered to 4% in May 2022. What? The CFA Franc in West Africa is practically pegged to the EUR, yet the central bank interest rates differ by 3.5%.

Basis: Natural Gas Prices in the US and in Canada in August 2022 show a difference of USD 10 in the US and CAD 0 in Canada.

This is what I learned at the Canadian tax court in Toronto from a gas trading expert. He explained me that in August 2022 he has to pay clients for taking his Alberta gas. At times where in Europe many countries are trying to source gas at basically any price, this seems hard to believe. [Figure 1](#) shows the price of Henry Hub natural gas futures at the CME in the US approaching USD 10, [Figure 2](#) the price of Alberta gas in CAD dropping to a value near zero or even negative on August 17 2022.

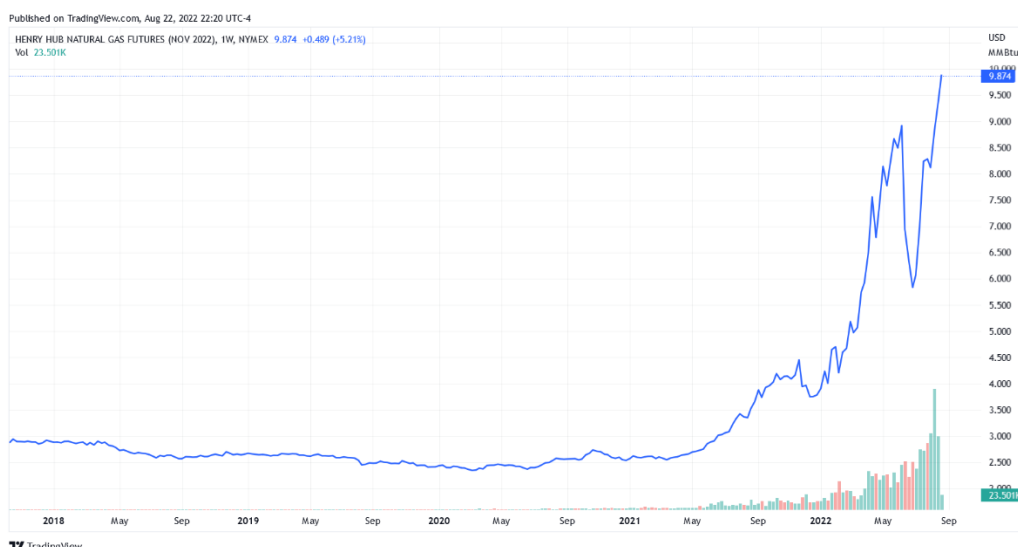
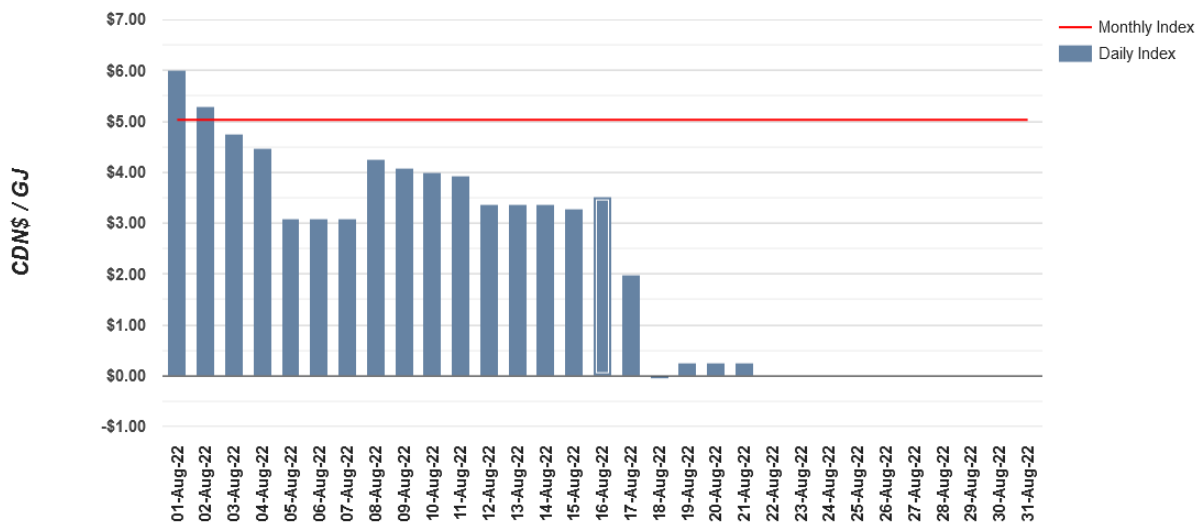


Figure 1: Henry Hub Natural Gas Futures: the price for the Nov 2022 futures at CME is near USD 10 on 22 August 2022. Source: NGX2022 CME Group¹

¹ https://www.cmegroup.com/apps/cmegroup/widgets/productLibs/esignal-charts.html?type=p&code=NG&title=NOV_2022_Henry_Hub_Natural_Gas_&venue=1&monthYear=X2&year=2022&exchangeCode=XNYM&interval=1

There seems to be a problem with the transition, transportation and storage of gas when we approach the cold season, at least between Canada and the US markets are strongly distorted. Hence, not all gas well owners get automatically rich when gas prices globally explode. In fact, those in Alberta need tremendous amounts of capital to cover their running costs while selling their gas at a negative price.



Actual prices are based on a volume weighted average of transacted prices for all physically delivered natural gas at the Alberta AB-NIT market center (www.ngx.com).

Figure 2: Price of Natural Gas in Alberta, Canada, has dropped to zero CAD in August 2022.
 Source: Gas Alberta Inc²

At that price, I fail to understand why Germany’s chancellor and vice-chancellor have spent three days in Canada in late August 2022 ignoring this issue entirely.

Free TRY Put Options in the KKM Scheme

At the end of 2021, the Turkish government introduced the KKM-scheme for deposits from 3 up to 12 months. The scheme means that investors can convert foreign currency, e.g. USD, to Turkish Lira TRY and are guaranteed a coupon and are guaranteed a conversion of their TRY nominal plus interest back to USD at the initial rate.

The Daily Sabar reports: “The scheme guarantees that the government will cover any depreciation of lira bank deposits against the dollar through periodic payments. Treasury and Finance Minister Nureddin Nebati said that these additional economic measures will allow the country to move forward with its new growth model based on investment, production, employment and exports. The mechanism will be applied to lira deposits with maturities of three to 12 months, and based on the Central Bank of the Republic of Turkey (CBRT) policy rate. Commenting on the latest move, Taha Meli Arvas, former vice-chairperson of the Capital Markets Board of Turkey (SPK) said

² <https://www.gasalberta.com/gas-market/market-prices>

that with this step, the Turkish government essentially gives holders of the Turkish lira a free put option on the U.S. dollar.”

For more details on the KKM scheme, the volumes traded so far, see

<https://www.dailysabah.com/business/economy/fx-protected-turkish-lira-deposits-surpass-224b-in-value-erdogan/amp>

<https://www.dailysabah.com/business/finance/scheme-to-protect-lira-savings-helps-cut-fx-deposits-turkey>

These USD Call TRY Put options would be quite expensive in the market. Working with a spot reference of 18, an ATM strike of 18, the market implied rates on 26 August 2022 are around 3.26% for USD and 43.20% for TRY on a mid-forward rate of 21.60. Volatility is around 30% mid-market. The USD Call TRY put option would cost about 18.5% of the USD notional. Translated into a 6-months deposit, this option premium would translate into a 37% interest rate. The actual coupon on the deposits would depend on the issuing bank; they quote around 14% at the moment. Compared to the TRY rate implied by the FX forward there is a basis spread of about 30% (3000 basis points). Investors can hence invest in TRY, get TRY interest and the free option, which is broadly equivalent to $14\% + 37\% = 51\%$ coupon p.a. Taking an offer rate of 23 for the 6-months USD-TRY forward, the implied TRY interest rate would be about 59%. So in summary, the premium of the free option is roughly in the range of the loss of TRY interest amount caused by the basis spread.

EUR central bank interest rate has been lowered to 4% in May 2022.

To clarify: The CFA Franc in West Africa is practically pegged to the EUR, yet the central bank interest rates differ by 3.5%: The ECB rate is 0.5%, the rate of the Central Bank of West African States is 4%. So here is the story:

Let's start with **XOF**. XOF is neither the exit for Offenbach, nor an old-fashioned precious metal, but the currency code for the CFA Franc. The **West African CFA franc** is the currency of eight independent states in West Africa: Benin, Burkina Faso, Guinea-Bissau, Ivory Coast, Mali, Niger, Senegal and Togo. The acronym CFA stands for *Communauté Financière d'Afrique* ("Financial Community of Africa") or *Communauté Financière Africaine* ("African Financial Community"). The currency is issued by the BCEAO (*Banque Centrale des États de l'Afrique de l'Ouest*, "Central Bank of the West African States"), located in Dakar, Senegal.

Interestingly, it is more or less pegged to the EUR, as it was formerly pegged to the French Franc, see [Figure 3](#). From 2017 there have been some jumps, but the rate is essentially 655.



Figure 3: EUR/XOF historic rates 2017-2022; sourced from Eikon

A peg should imply that the XOF interest rate must match the EUR interest rate, as otherwise there could be an arbitrage opportunity: buy XOF for your EUR, deposit them in Ouagadougou, then change back to EUR after a month at presumably the same spot reference and finally get the interest rate on the EUR that you think you deserve.

EURXOF=		Euro/CFAFranc		CROSS	EURXOF		24AUG22
Bid	Ask	Net.Chng	% chg	Contributor	Loc	Src Deal	Time
B↓ 653.000	660.000	+0.000		ABSA	JHB	ABSA ABSG	2:50
000	000						
B↓ 653.000	660.000			ABSA	JHB	ABSA ABSG	2:46
B↑ 653.000	660.000			ABSA	JHB	ABSA ABSG	2:03
ChangeSummary		Daily View		Calendar Highs & Lows			
		Value	Time	Weekly	Monthly	Yearly	
MTD% chg	+0.00 %	O	17:00	High	High 653.000	High 656.000	
3M% chg	+0.00 %	H	17:00	Date	Date 05AUG22	Date 05MAY22	
6M% chg	+4.41 %	L	17:00	Low	EURXOF=: WEEK_HIGH, WEEKLY HIGH, 3408		621.000
YTD% chg	+2.49 %	C	653.000	Date	Date 05AUG22	Date 28APR22	
Session O/H/L/C							Related Data
Asia		Europe			US		
O		O		O			
H		H		H			
L		L		L			
C		C		C			
(5PM TOK)		(5PM LON)		(5PM NY)			

Figure 4: EUR/XOF spot quotation seen in Eikon

How about market data: I see a spot of 653 – 660 bid – offer by ABSA bank in Johannesburg in Eikon (Figure 4), but also a spot of 648.90 – 657.22 on Eikon’s Euro/CFA France page EURXOF (Figure 5), XE.com shows a 10-year low of 655.883, a 10-year high at 656.017, and a closing spot of 655.957. SuperDerivatives’ FX Option pricer shows a spot reference of 655.92 CFA Franc per EUR on 26 August 2022. While XOF seems pegged to the EUR, there is a lively forward market with quotes as shown in Figure 5.



Figure 5: EUR/XOF forward rates sourced from Eikon

The historic spot as indicated by SuperDerivatives is shown in Figure 6. Notably it appears different from the spot recorded by Reuters in Figure 3.

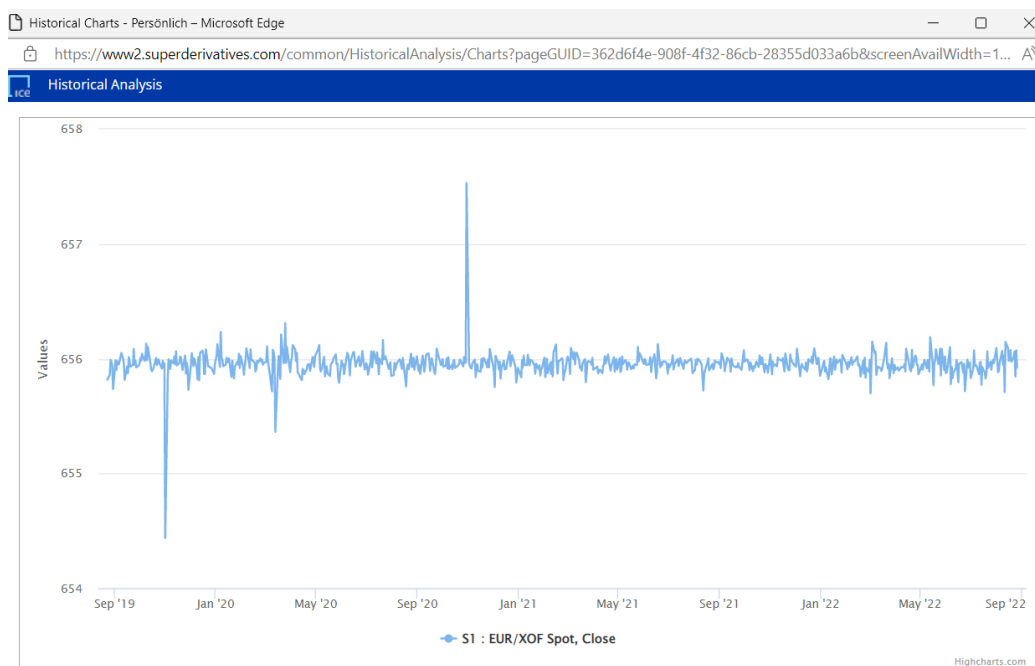
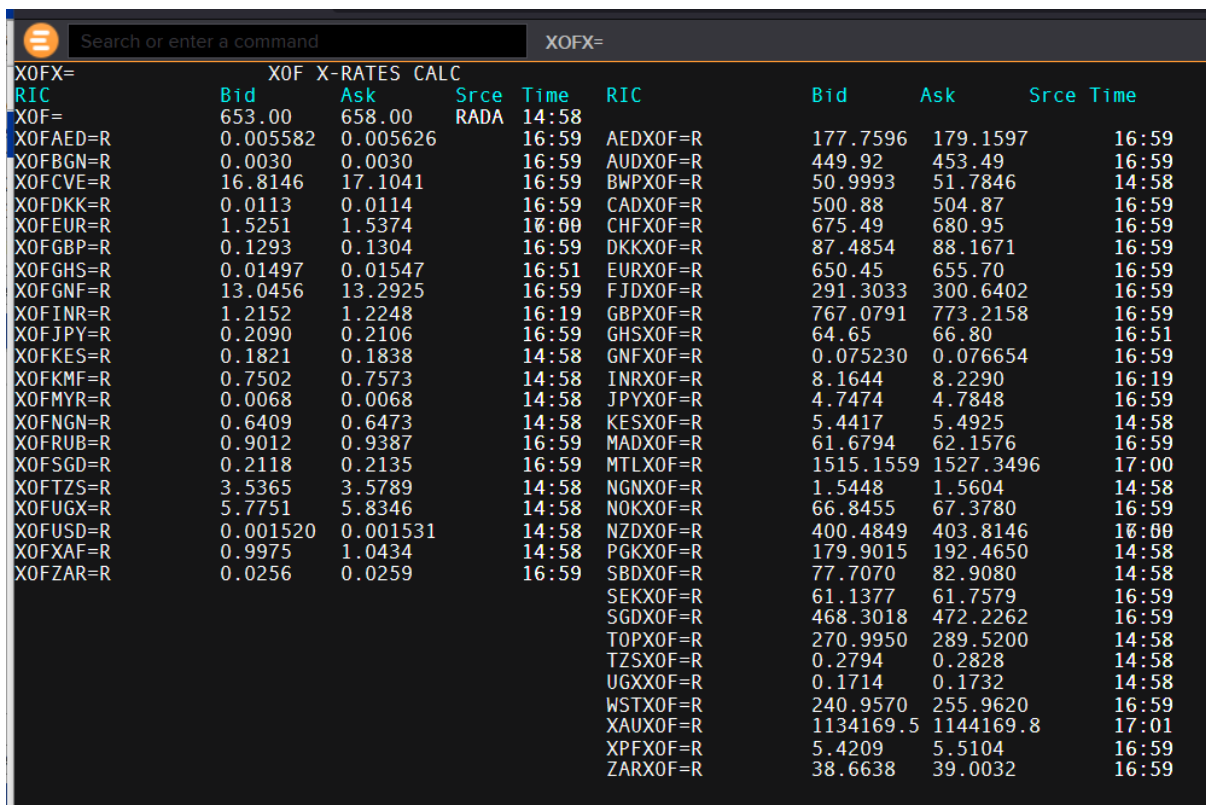


Figure 6: EUR/XOF historic spot 2019-2022 sourced from SuperDerivatives

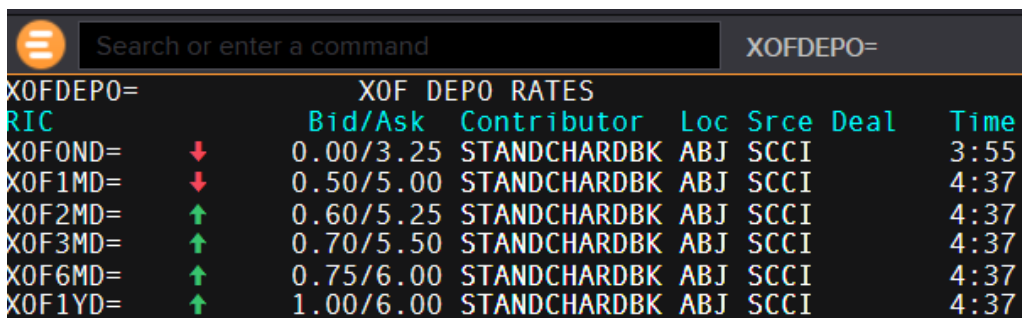
It remains opaque to me where the spot is and also how the historic spot is recorded as there are obvious differences in XE, Reuters and SuperDerivatives. However, the spot rate appears to be pegged with a bid-offer of 8 XOF per EUR as per observed quote in Eikon, higher fluctuations in SuperDerivatives probably due to illiquid and scattered transactions. Calculated cross rates are exhibited in Figure 7. Notably, even if the CFA Franc is expected to be closer to the Euro, the EUR/XOF exchange rate is calculated as a cross rate between EUR/USD and USD/XOF.



XOF X-RATES CALC									
RIC	Bid	Ask	Srce	Time	RIC	Bid	Ask	Srce	Time
XOF=	653.00	658.00	RADA	14:58					
XOFAED=R	0.005582	0.005626		16:59	AEDXOF=R	177.7596	179.1597		16:59
XOFBGN=R	0.0030	0.0030		16:59	AUDXOF=R	449.92	453.49		16:59
XOFCVE=R	16.8146	17.1041		16:59	BWPXOF=R	50.9993	51.7846		14:58
XOFDKK=R	0.0113	0.0114		16:59	CADXOF=R	500.88	504.87		16:59
XOFEUR=R	1.5251	1.5374		16:59	CHF XOF=R	675.49	680.95		16:59
XOFGBP=R	0.1293	0.1304		16:59	DKKXOF=R	87.4854	88.1671		16:59
XOFGHS=R	0.01497	0.01547		16:51	EURXOF=R	650.45	655.70		16:59
XOFGNF=R	13.0456	13.2925		16:59	FJDXOF=R	291.3033	300.6402		16:59
XOFINR=R	1.2152	1.2248		16:19	GBP XOF=R	767.0791	773.2158		16:59
XOFJPY=R	0.2090	0.2106		16:59	GHSXOF=R	64.65	66.80		16:51
XOFKES=R	0.1821	0.1838		14:58	GNFXOF=R	0.075230	0.076654		16:59
XOFKMF=R	0.7502	0.7573		14:58	INRXOF=R	8.1644	8.2290		16:19
XOFMYR=R	0.0068	0.0068		14:58	JPYXOF=R	4.7474	4.7848		16:59
XOFNGN=R	0.6409	0.6473		14:58	KESXOF=R	5.4417	5.4925		14:58
XOFRUB=R	0.9012	0.9387		16:59	MADXOF=R	61.6794	62.1576		16:59
XOFSGD=R	0.2118	0.2135		16:59	MTLXOF=R	1515.1559	1527.3496		17:00
XOFTZS=R	3.5365	3.5789		14:58	NGNXOF=R	1.5448	1.5604		14:58
XOFUGX=R	5.7751	5.8346		14:58	NOKXOF=R	66.8455	67.3780		16:59
XOFUSD=R	0.001520	0.001531		14:58	NZDXOF=R	400.4849	403.8146		16:59
XOFAAF=R	0.9975	1.0434		14:58	PGKXOF=R	179.9015	192.4650		14:58
XOFZAR=R	0.0256	0.0259		16:59	SBDXOF=R	77.7070	82.9080		14:58
					SEKXOF=R	61.1377	61.7579		16:59
					SGDXOF=R	468.3018	472.2262		16:59
					TOPXOF=R	270.9950	289.5200		14:58
					TZSXOF=R	0.2794	0.2828		14:58
					UGXXOF=R	0.1714	0.1732		14:58
					WSTXOF=R	240.9570	255.9620		16:59
					XAUXOF=R	1134169.5	1144169.8		17:01
					XPF XOF=R	5.4209	5.5104		16:59
					ZARXOF=R	38.6638	39.0032		16:59

Figure 7: XOF calculated cross rates in Eikon

Turning to the interest rates, we see a one-year deposit rate of 1.124% in EUR in SuperDerivatives, keeping in mind that deposit rates in the FX option pricer are pre-calculated to match the FX forward. The XOF one-year deposit rate shown in SuperDerivatives is +3.529%. Eikon shows deposit rates up to one year in Figure 8, the mid-rate for one year being also 3.5%, close to SuperDerivatives.



XOF DEPO RATES						
RIC		Bid/Ask	Contributor	Loc	Srce Deal	Time
XOFDEPO=						
XOFOND=	↓	0.00/3.25	STANDCHARDBK	ABJ	SCCI	3:55
XOF1MD=	↓	0.50/5.00	STANDCHARDBK	ABJ	SCCI	4:37
XOF2MD=	↑	0.60/5.25	STANDCHARDBK	ABJ	SCCI	4:37
XOF3MD=	↑	0.70/5.50	STANDCHARDBK	ABJ	SCCI	4:37
XOF6MD=	↑	0.75/6.00	STANDCHARDBK	ABJ	SCCI	4:37
XOF1YD=	↑	1.00/6.00	STANDCHARDBK	ABJ	SCCI	4:37

Figure 8: XOF yield curve of 27 Sept 2018, calculated in Eikon

The Central African Central Bank shows a rate of +4.00% on their web page <https://www.beac.int/>. While the forward rates in Figure 5 seem to reflect the difference of interest rates in principle, the pegged spot would actually call for an arbitrage opportunity.

The CFA France is a very interesting example of distortions in the market. The credit fan club will now probably start calculating the probability of the BCEAO defaulting. The difference of rates is a strong indication that the peg will have to break at some point. This is yet another example of basis madness.

I didn't find any volatility data; currently in Africa we see only volatilities for ZAR (South African Rand) and KES (Kenyan Shilling). XOF may not need any FX options, as one can trade options on EUR instead. Otherwise, the relevance of the West African economy would actually call for options, too. Let's see.

I wish you all best of luck with your arbitrage strategies to beat the basis madness.

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