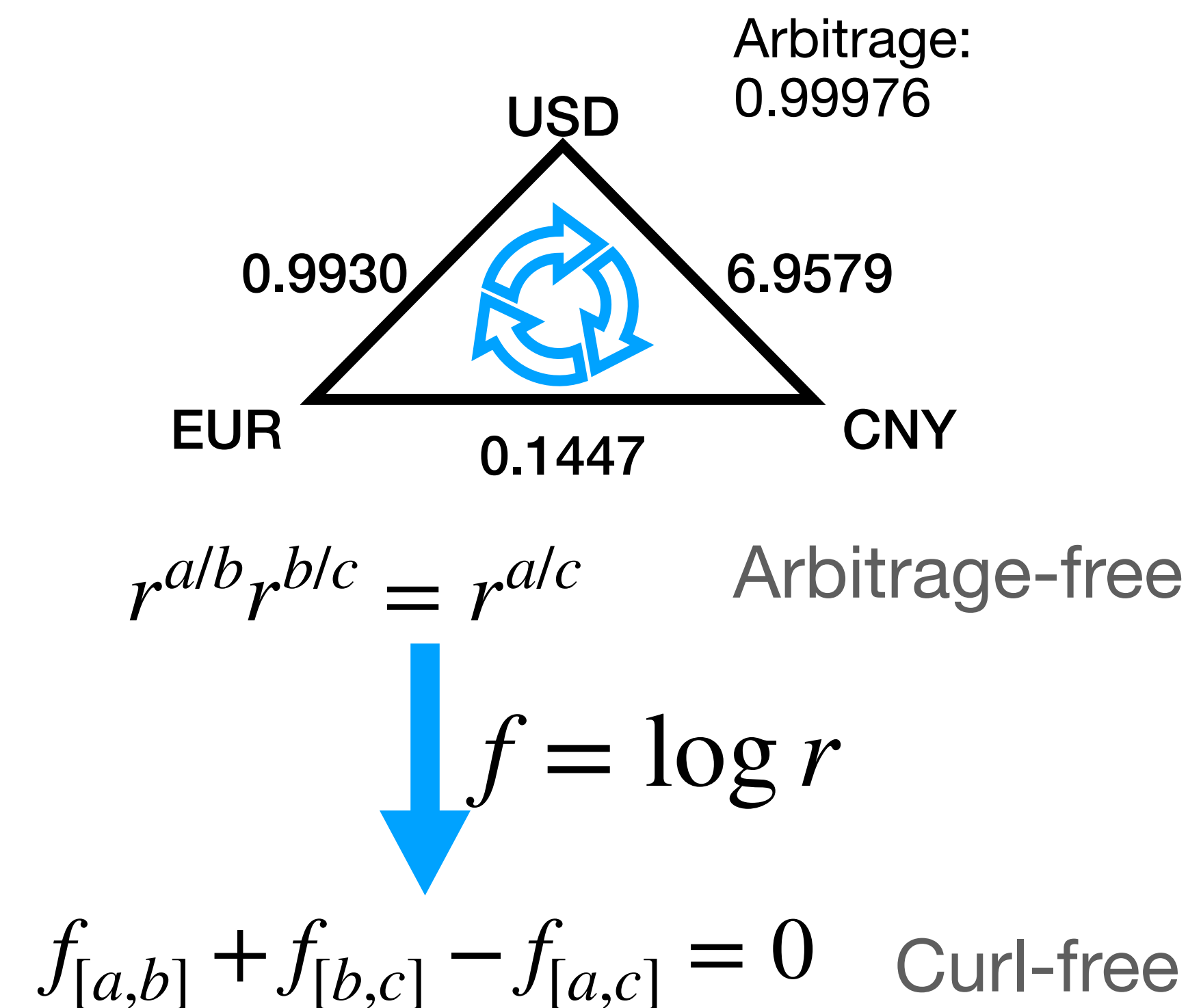
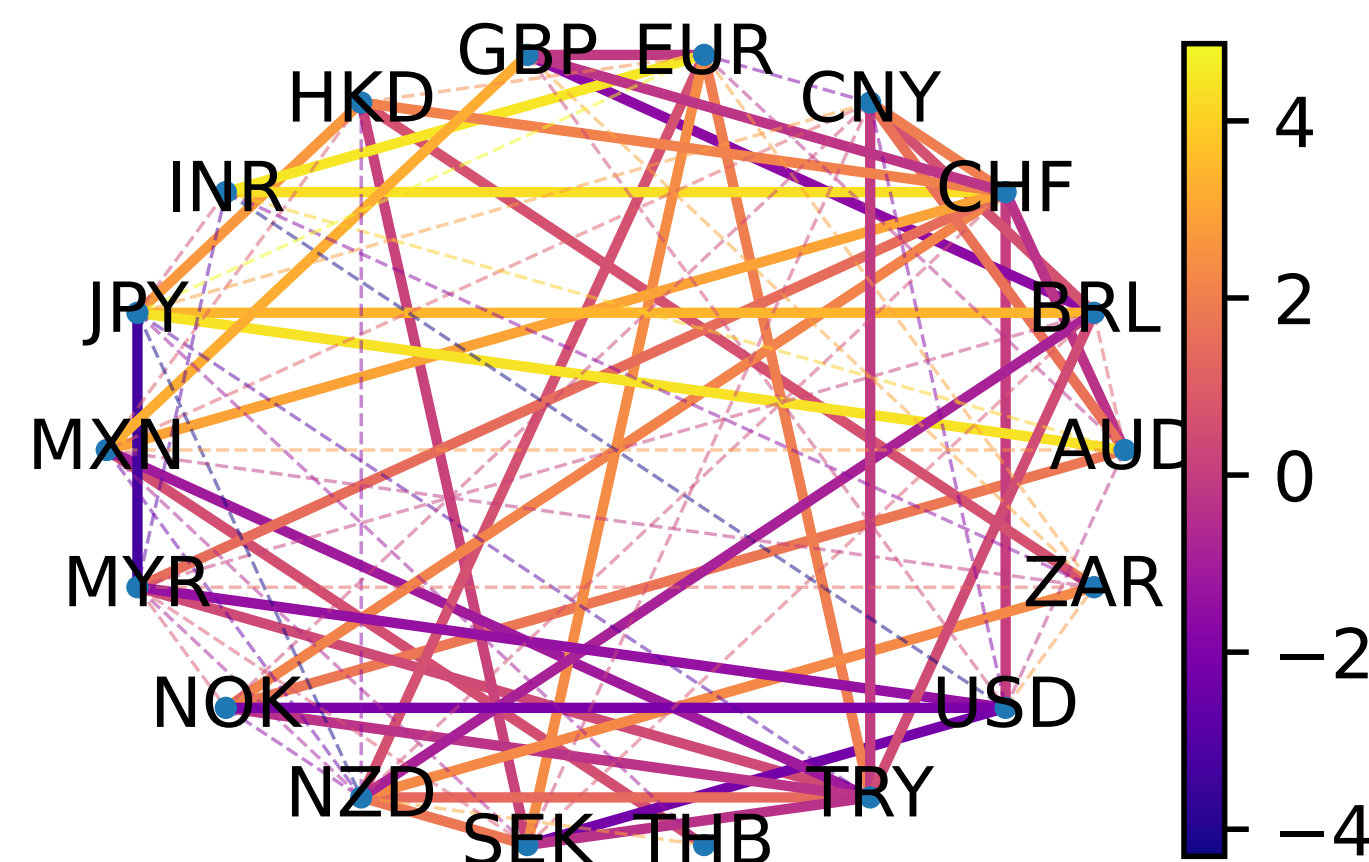
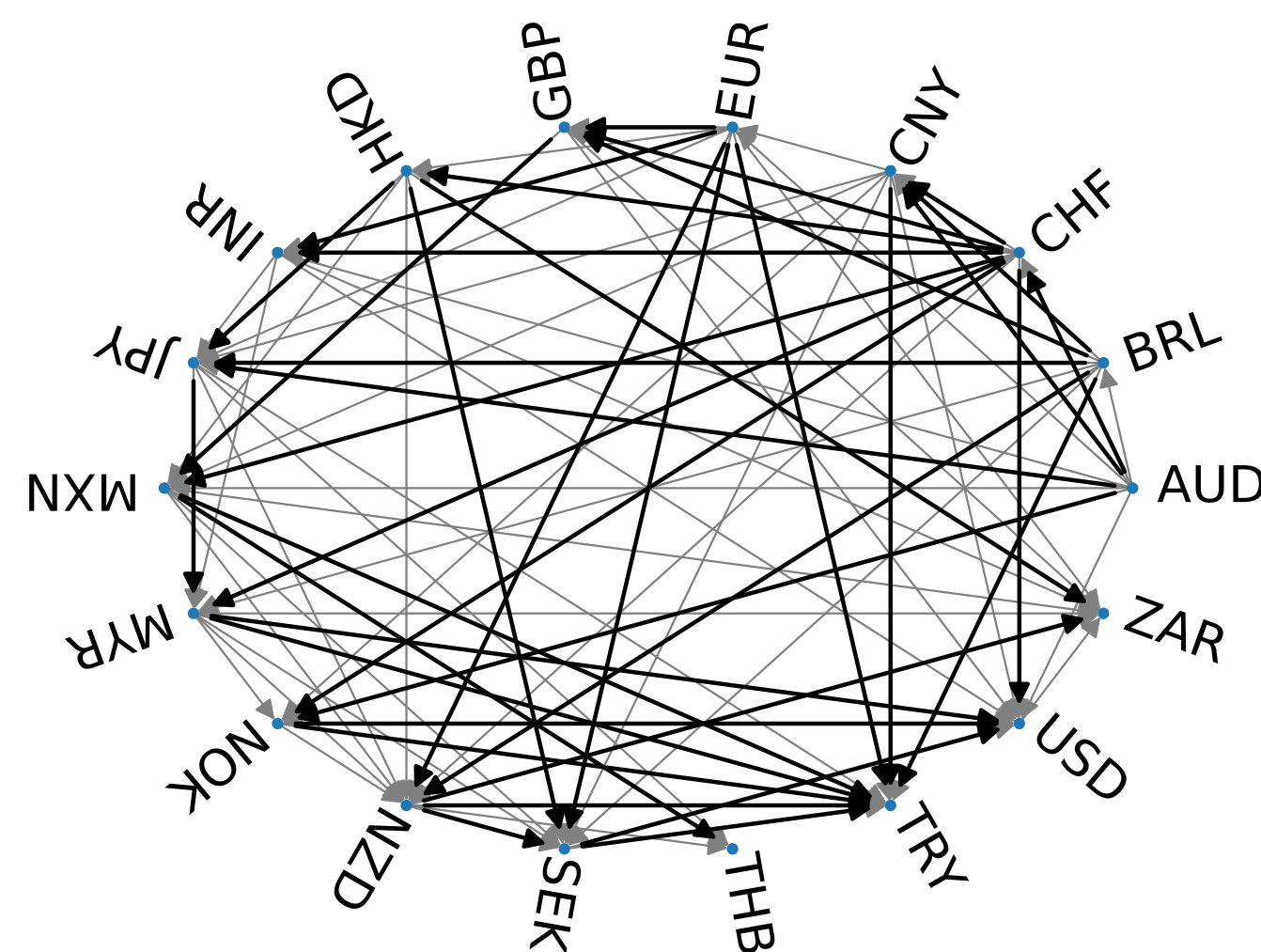


Filtering for Forex



Currency exchange rates captured from Yahoo!Finance, not arbitrage-free.

	USD	EUR	CNY	HKD	GBP	JPY	AUD
1 USD	1	0.8422	6.3739	7.7666	0.7207	110.1020	1.3377
1 EUR	1.1873	1	7.5681	9.2218	0.8557	130.7314	1.5883
1 CNY	0.1539	0.1321	1	1.2185	0.1131	17.2683	0.2099
1 HKD	0.1288	0.1085	0.8207	1	0.0928	14.1718	0.1723
1 GBP	1.3871	1.1685	8.8414	10.7732	1	152.6758	1.8557
1 JPY	0.0091	0.0077	0.0579	0.0706	0.0066	1	0.0122
1 AUD	0.7475	0.6299	4.7602	5.8001	0.5385	82.1837	1

Curl-free edge filters

For fully-connected graphs:

$$\mathbf{H}_{\text{curl-free}} = \frac{1}{N_0} \mathbf{L}_d$$

For general: need to perform design

Filter learning

- Data-driven: given a training set \mathcal{T} of input-output pairs

$$\min_{\alpha, \beta} \frac{1}{|\mathcal{T}|} \sum \|\mathbf{H}\mathbf{f} - \mathbf{y}\|_2^2 + \gamma r(\alpha, \beta)$$

- Spectral filter design
 - Least-Squares
 - Chebyshev polynomials