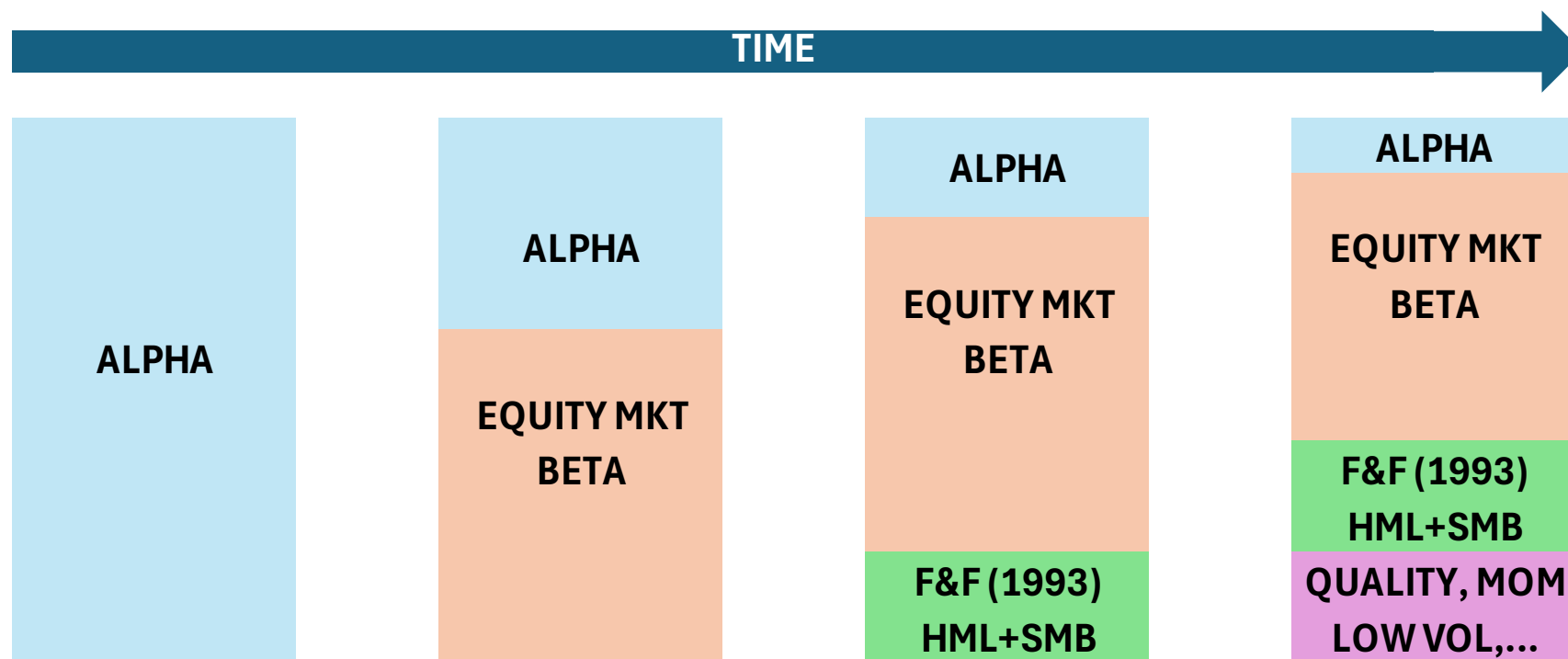


Polish Equity Risk Factors and Their Implementation Costs

Juliusz Jabłecki

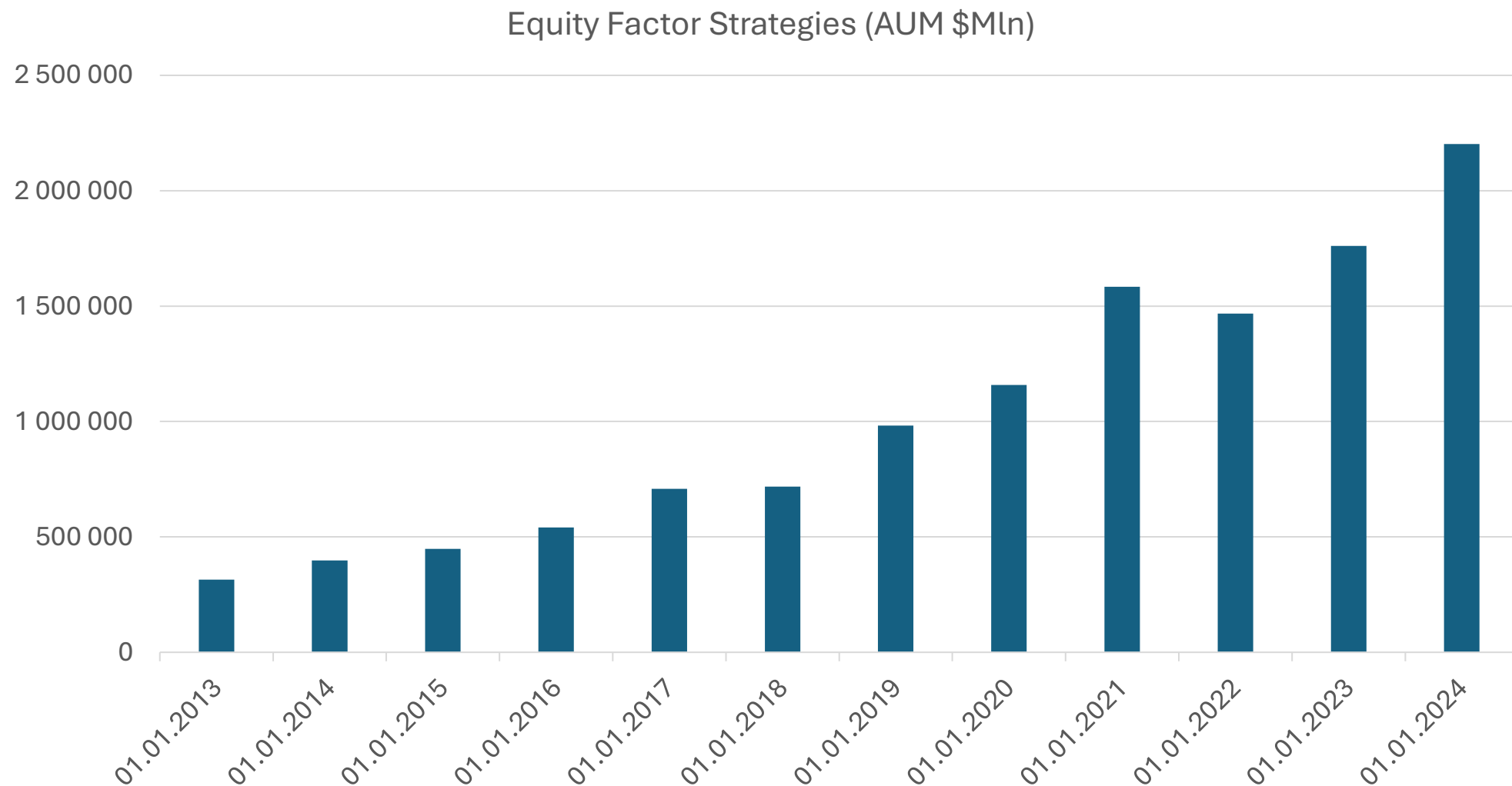
QFRG seminar, May 26, 2025

Factors and the evolution of „alpha”



- Factor premia = systematic anomalies to CAPM, harvested through portfolios tilted to particular stock characteristics
- Invesco Global Systematic Investing Study 2024: 80% of investors with \$22 trillion in AuM consider factor strategies relevant to their approach

Factor investing has become a global theme



So why are Polish investors deprived of that benefit?

Factors don't „work” on the Polish stock market

Or maybe...

Factors work in theory but are not implementable in practice?

Backtest design

- **Universe:** 100 largest stocks (by market capitalization) over the period 2014-2024
- **Rebalance frequency:** Monthly
- **Factor construction:**
 - stocks evaluated on different „screens” and percentile-ranked
 - rank distributions are winsorized at +/- 2 standard deviations
 - long top 33 stocks, short bottom 33 stocks
 - stocks are equally weighted

Factor screens

- **Value:** Book/Price, Earnings/Price (12-month trailing) and Sales/Market Equity
- **Momentum:** the average of a stock's 6 & 12 month total returns, skipping the most recent 2-weeks
- **Quality:** a composite of the average of Return on Equity and Return on Invested Capital (profitability) and debt-to-market cap (leverage)
- **Low Volatility:** the average of a stock's trailing 6 & 12 month volatility defined as the standard deviation of daily returns

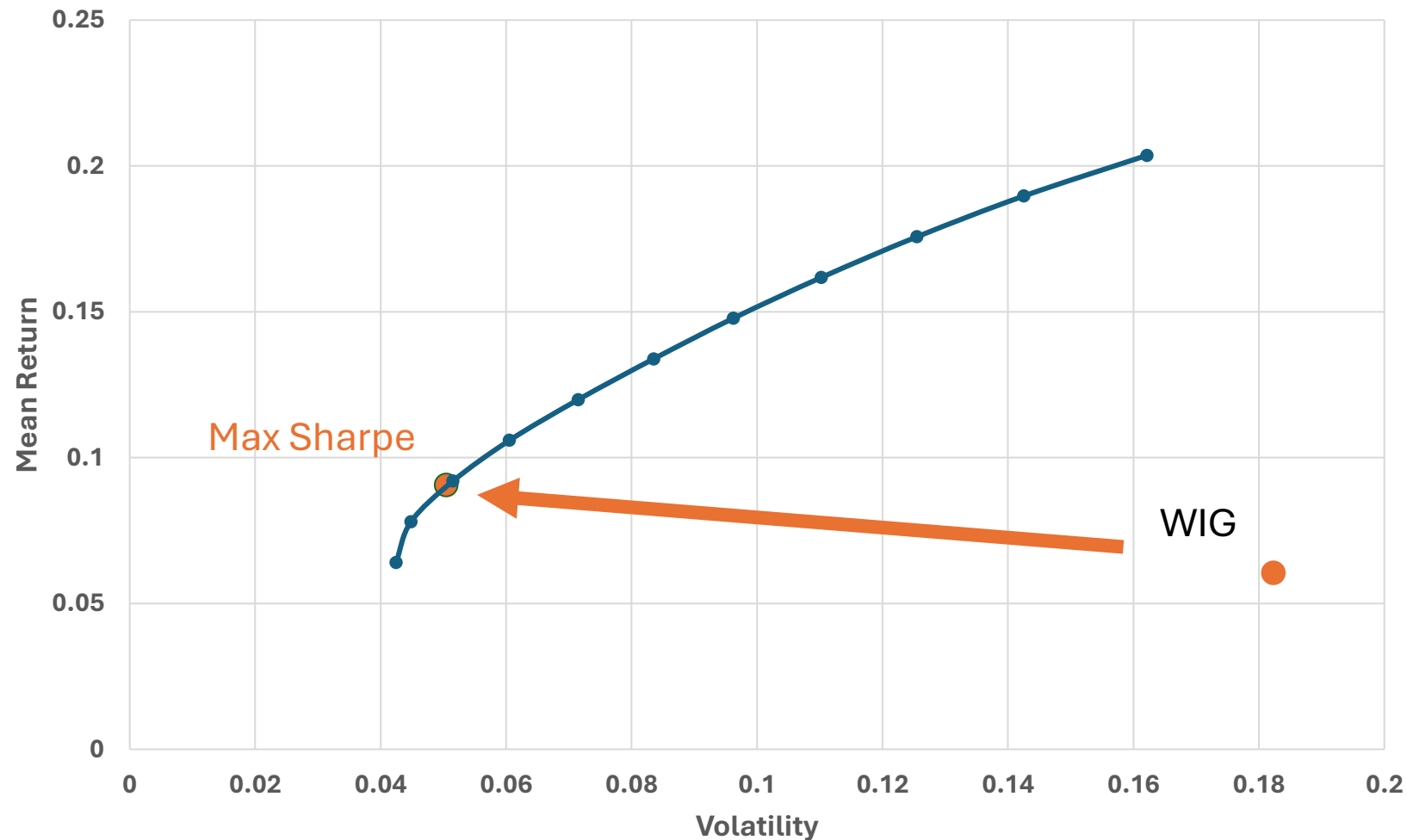
Universe snapshot (December 2024)

Company Name	Mkt Cap Rank	VALUE	MOMENTUM	QUALITY	LOW-VOL
PKOBP	1	41	75	40	77
ORLEN SA	2	97	14	29	83
SANTANDER BANK	3	46	40	40	63
PZU	4	85	68	38	43
DINO POLSKA SA	5	18	40	87	12
PEKAO	6	68	38	36	59
INPOST SA	7	5	--	72	88
INGBSK	8	49	34	60	50
ALLEGRO.EU SA	9	13	19	47	50
LPP	10	22	58	77	30
MBANK SA	11	35	45	21	52
KGHM	12	41	30	30	31
CD PROJEKT SA	13	4	96	89	45
PGE SA	14	79	20	12	41
BNP PARIBAS BANK	15	85	26	20	60
BUDIMEX	16	21	8	97	48
HANDLOWY	17	62	32	46	89
CCC SA	18	19	100	68	5
ALIOR BANK SA	19	88	59	88	37
MILLENNIUM	20	46	48	26	50
ORANGE POLSKA SA	21	76	47	23	97
BENEFIT	22	14	80	85	58
X-TRADE BROKERS	23	26	80	99	27
KRUK SA	24	45	35	48	84
ASSECOPOL	25	81	84	22	95
INTERCARS	26	64	28	44	77
ENEA	27	100	87	24	35
KETY	28	31	33	78	59
TAURONPE	29	77	44	4	48
CYFRPLSAT	30	86	83	10	20

Gross performance: factors do work

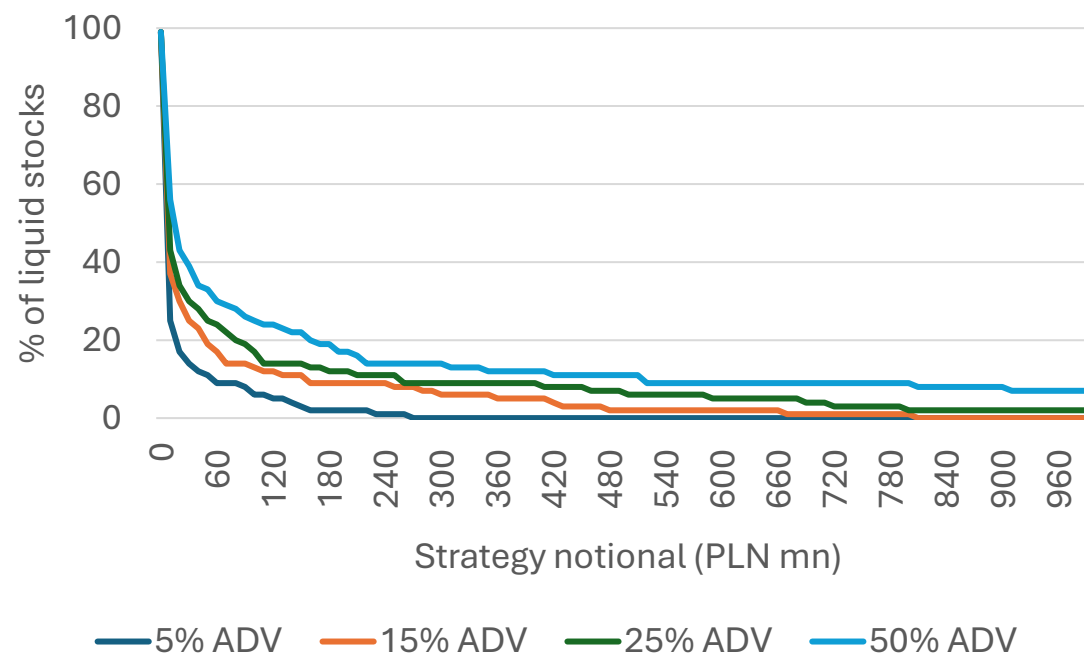
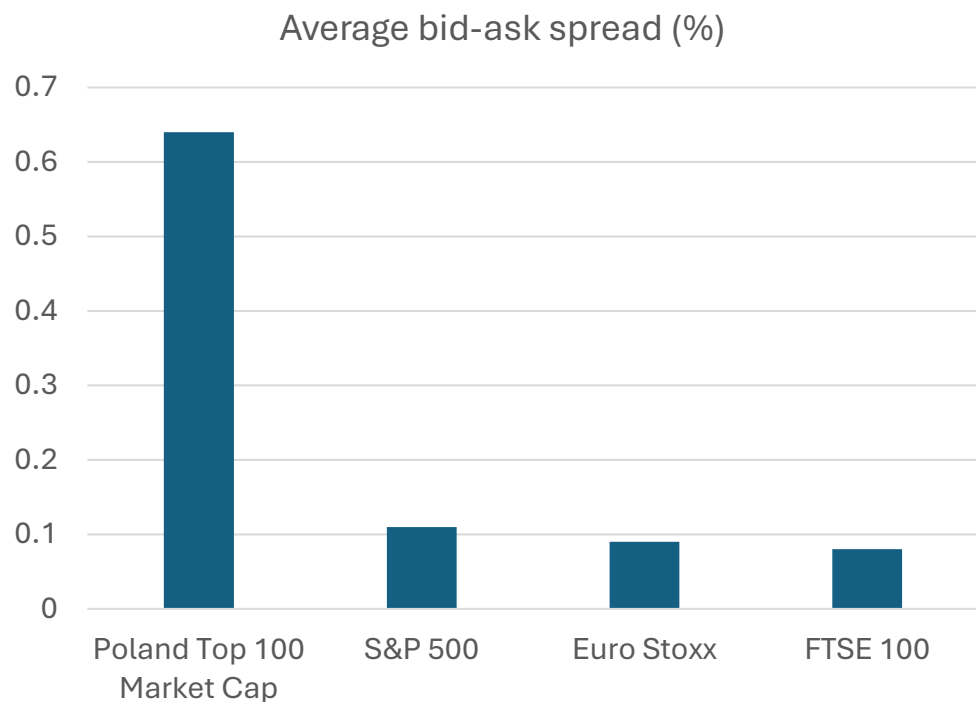
		Mean return(%)	Volatility (%)	Sharpe ratio	t-stat	Correlation to WIG
Market	WIG	6.04	18.23	0.33	1.05	1.00
Value	Top tercile	7.29	19.73	0.37	1.17	0.85
	Bottom Tercile	7.71	16.39	0.47	1.49	0.80
	Top-Bottom	-0.42	15.33	-0.03	-0.09	0.33
Momentum	Top tercile	17.68	17.34	1.02	3.22	0.75
	Bottom Tercile	-2.68	20.06	-0.13	-0.42	0.87
	Top-Bottom	20.36	16.22	1.26	3.97	-0.27
Quality	Top tercile	11.92	14.44	0.83	2.61	0.75
	Bottom Tercile	4.82	18.97	0.25	0.80	0.89
	Top-Bottom	7.10	13.46	0.53	1.67	-0.45
Defensive	Top tercile	7.82	12.63	0.62	1.96	0.86
	Bottom Tercile	5.51	20.18	0.27	0.86	0.84
	Top-Bottom	2.31	12.28	0.19	0.60	-0.49

Mean-variance optimal portfolio: 17% WIG, 33% momentum, 20% value, and 15% each to quality and low-volatility



First line of implementation challenges: t-costs

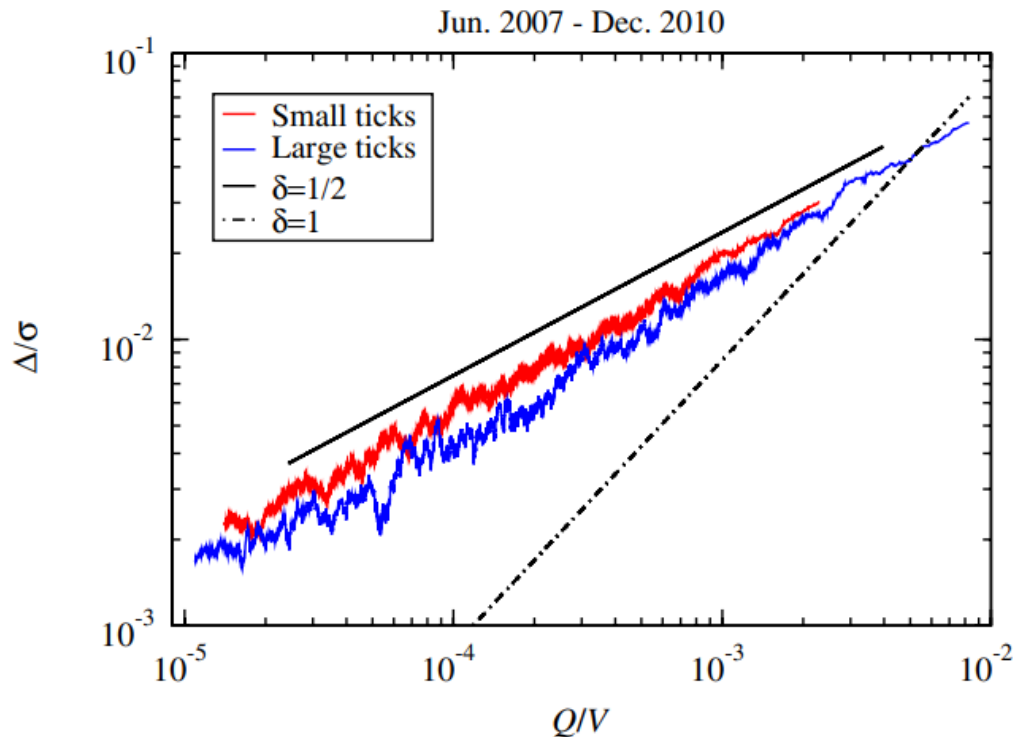
- Total cost = Commissions + Spread + MI
- Commission sourced from a live fund b-marked to MSCI Poland Index with \$300 AuM ~ 2 bps
- Actual bid-ask spreads reported by the exchange



Simple inventory risk impact model (Grinold & Kahn 1999)

$$\text{Market Impact} \propto \sigma \sqrt{\frac{t_{\text{clear}}}{250}} \propto \frac{\sigma}{\sqrt{250}} \sqrt{\frac{\text{Order Size}}{\text{ADV}}}$$

Impact analysis of 50,000 HF orders (Toth 2011)



Simple model benchmarked against BBG prop TCA function

OPL PW PLN ↑ 9.840 -0.048 W9.840 / 9.842W 10 x 100
At 11:38 d Vol 181,086 O 9.930W H 9.930W L 9.768W Val 1.78M

Security OPL PW Equity Reports Settings

Shares 40,000 Start 05/21/25 11:51 Risk Weight Medium Volatility 25.24% Comm 0 cps
Part% End With Auction ADV 1.3MLN

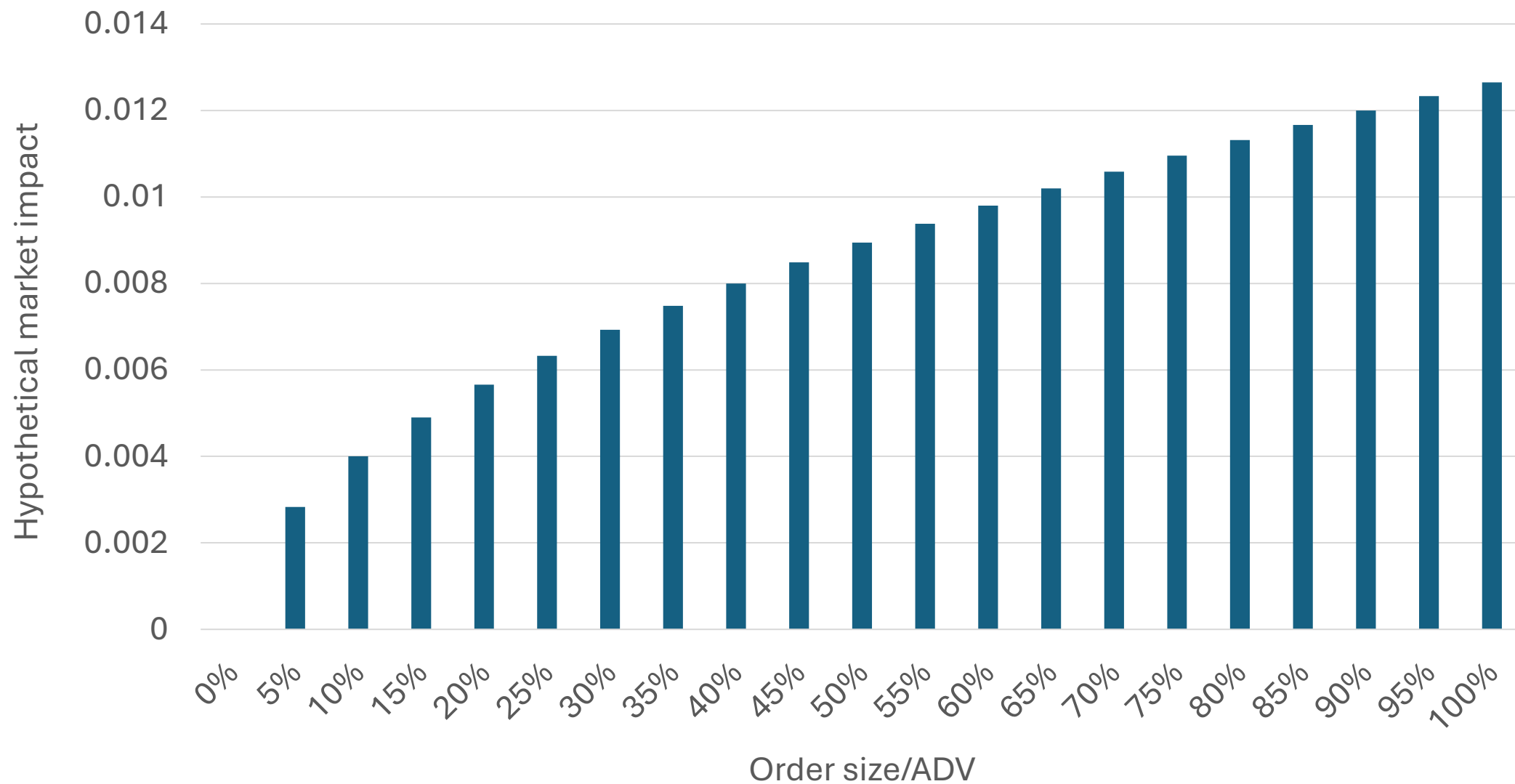
Execution Strategy

	Part%	Duration	Trd Cost	Wgt Risk	Total Cost
10	5%	1 day	16.7	44.5	61.2
11	(Close) 8%	04:59	19.7	24.2	43.9
12	10%	04:22	22.5	22.6	45.1
13	15%	03:26	27.7	20.1	47.7
14	20%	02:45	32.1	18.0	50.1
15	30%	01:54	39.8	14.9	54.7
16	100%	00:32	66.2	7.9	74.1
17	Block		53.0		

Beyond Current Day

BBG: 27.7 bps vs 25 bps for square-root model

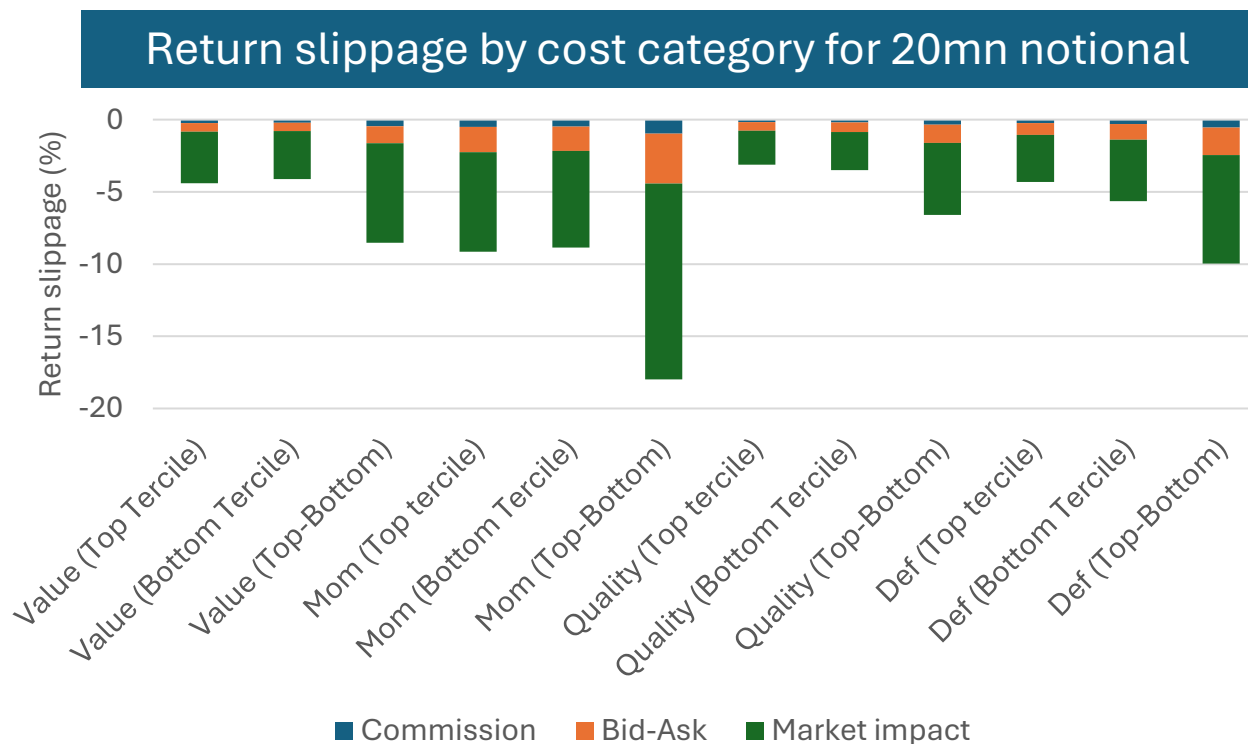
Estimated market impact as a function of order size for a hypothetical stock with annualized vol=20%



Trading costs severely affect factor performance

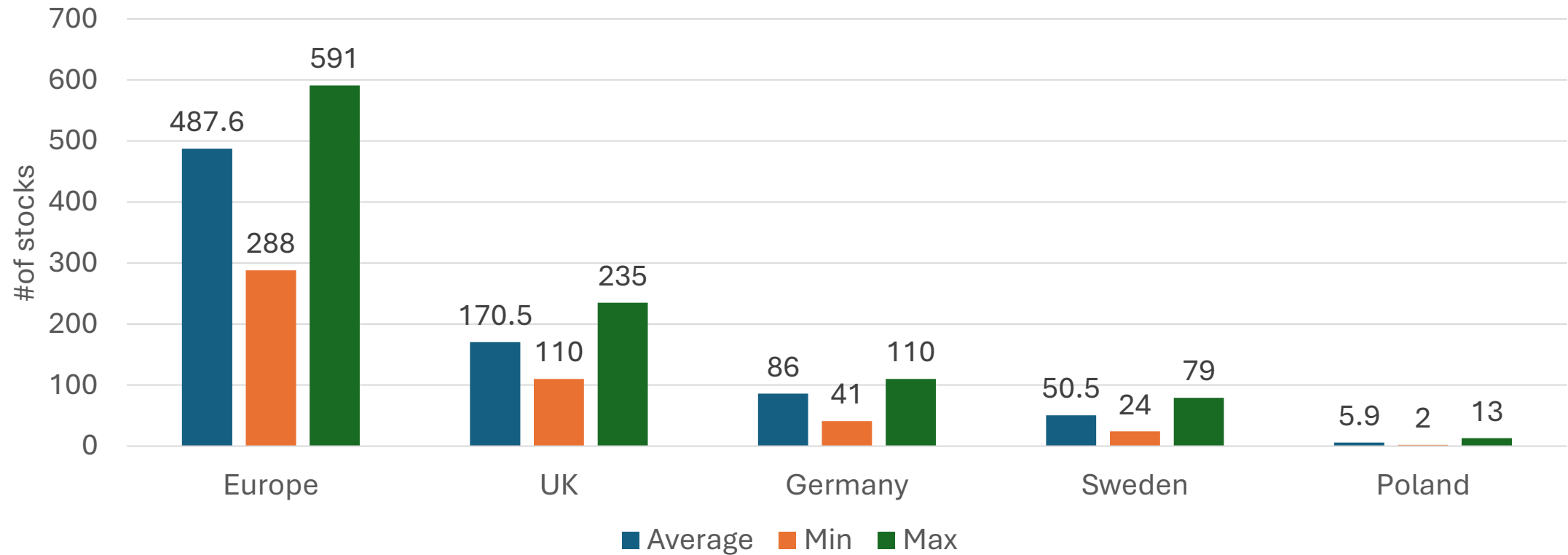
$$Cost = commission + \frac{bid - ask\ spread}{2 \times mid\ price} + \frac{\sigma}{\sqrt{250}} \sqrt{\frac{Order\ Size}{ADV}}$$

Factor/Strategy notional		1 mn	10 mn	20 mn	50 mn	100 mn	200 mn
Value	Top tercile	5.5	3.9	2.9	1.0	-1.2	-4.3
	Bottom Tercile	6.0	4.5	3.6	1.8	-0.3	-3.1
	Top-Bottom	-4.0	-7.1	-9.0	-12.7	-16.9	-22.9
Momentum	Top tercile	13.9	10.6	8.5	4.5	0.0	-6.4
	Bottom Tercile	-6.3	-9.6	-11.5	-15.4	-19.8	-26.0
	Top-Bottom	12.9	6.3	2.4	-5.5	-14.4	-27.0
Quality	Top tercile	10.6	9.5	8.8	7.4	5.9	3.7
	Bottom Tercile	3.4	2.1	1.3	-0.2	-1.9	-4.4
	Top-Bottom	4.4	2.0	0.5	-2.4	-5.7	-10.3
Defensive	Top tercile	6.0	4.5	3.5	1.6	-0.5	-3.5
	Bottom Tercile	3.2	1.1	-0.1	-2.6	-5.4	-9.4
	Top-Bottom	-1.8	-5.5	-7.7	-12.0	-17.0	-23.9



What about shorting?

Shorting statistics for selected European markets (2015-2024)



December 2024: only 12 short positions in 8 unique companies listed on WSE

So why are Polish investors deprived of that benefit?

Factors don't „work” on



Polish stock market

Or maybe...

*Factors work in theory
practice?*

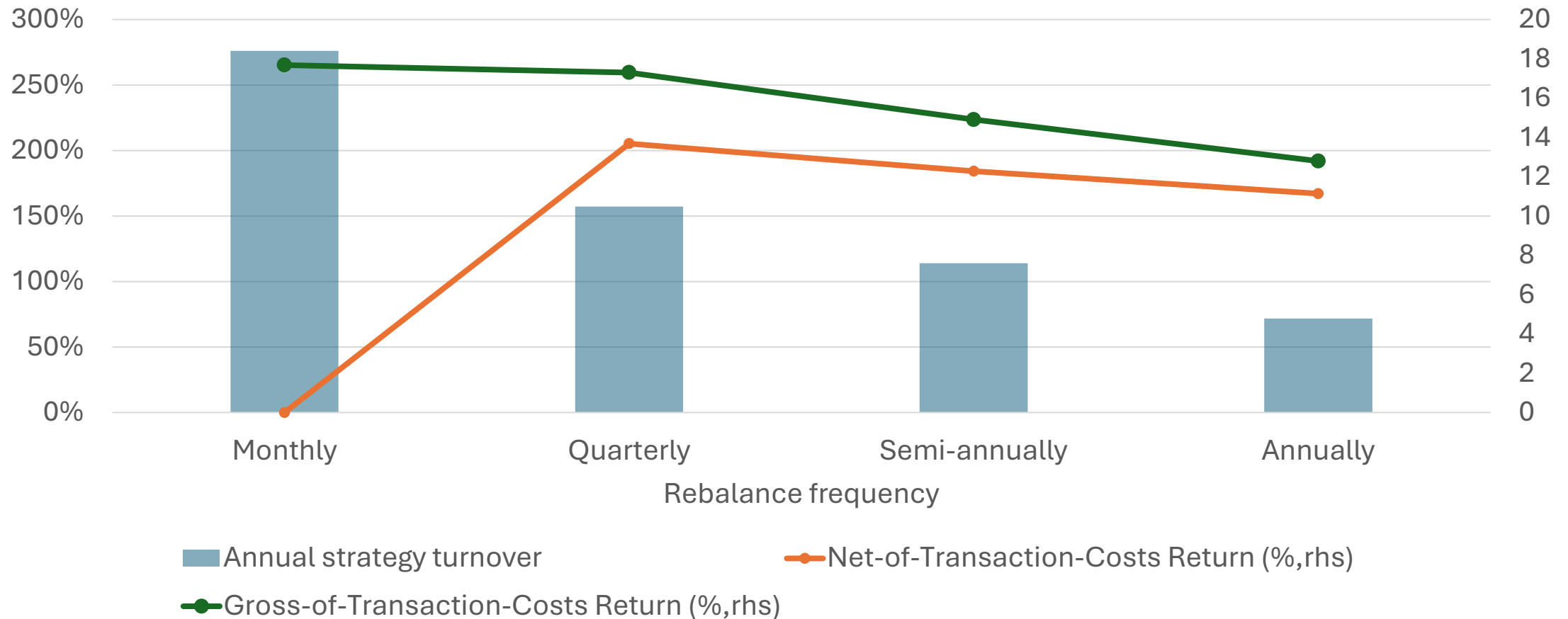


not implementable in

Can we make factor strategies implementable?

Turnover control?

Turnover of the long leg of the momentum portfolio (PLN 100 mn notional)



Towards investable factor portfolios – *a blueprint*

1. Restrict the universe to the largest, most liquid stocks

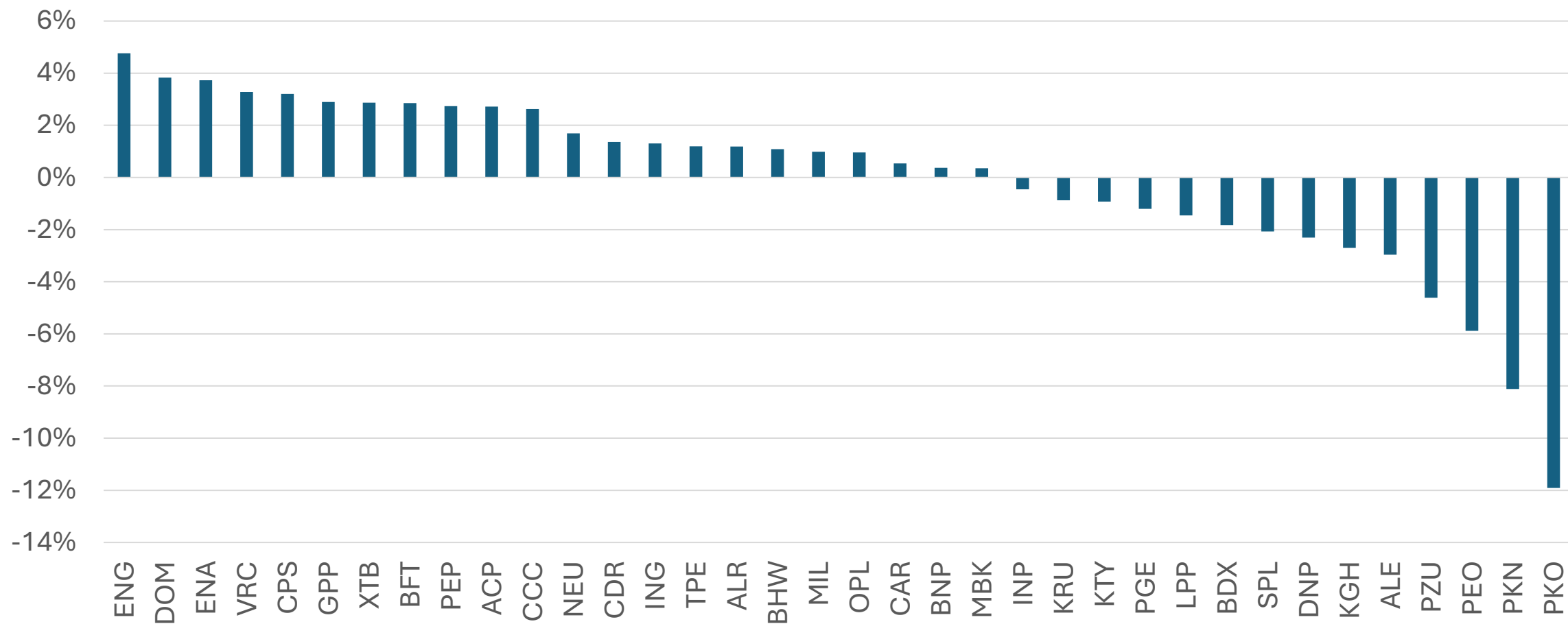
- MSCI Investable Market Index Poland: 30 stocks ~ 99% mkt cap
- benchmark for BlackRock's EPOL fund (>\$300 mln AuM), largest int'l PL fund

2. Long only

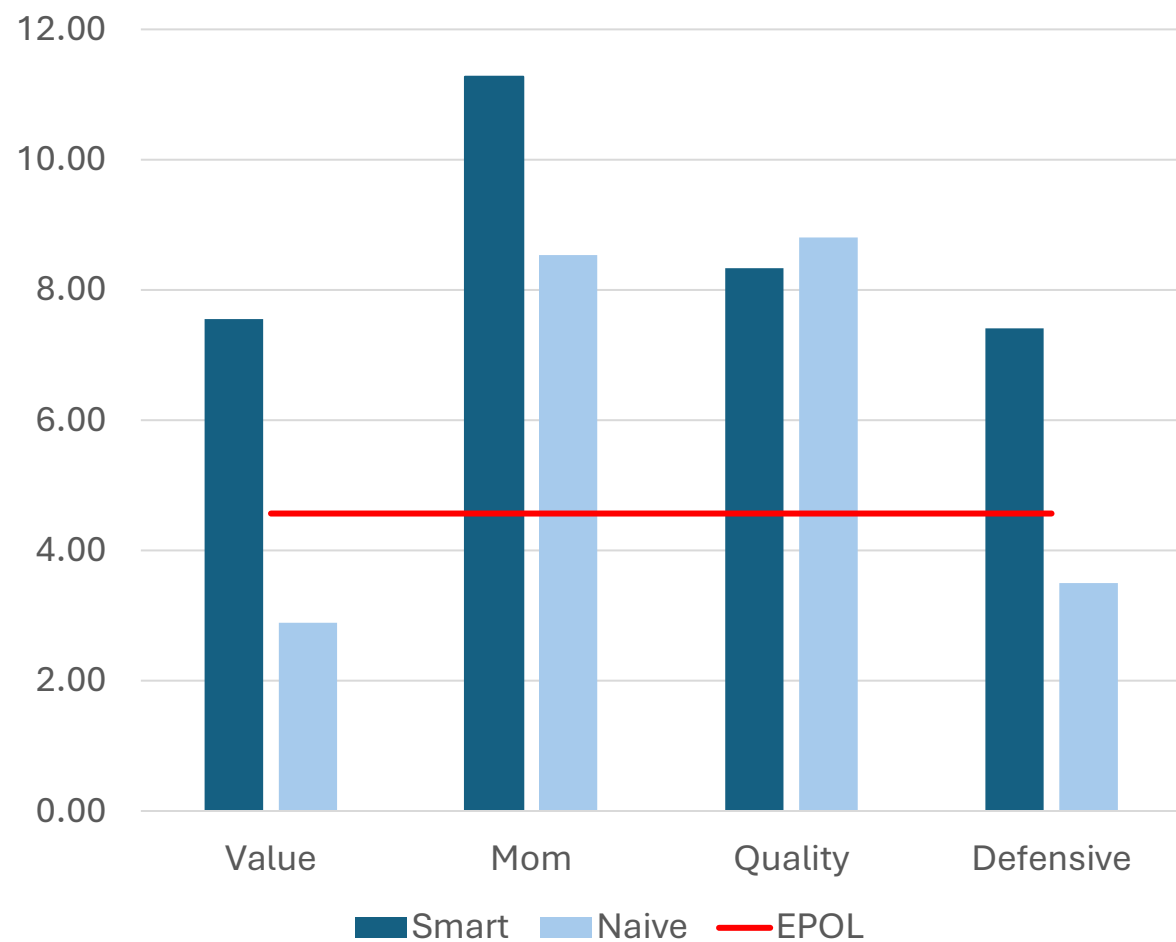
3. Monthly rebalance

4. Weight each stock ~ most recent factor score

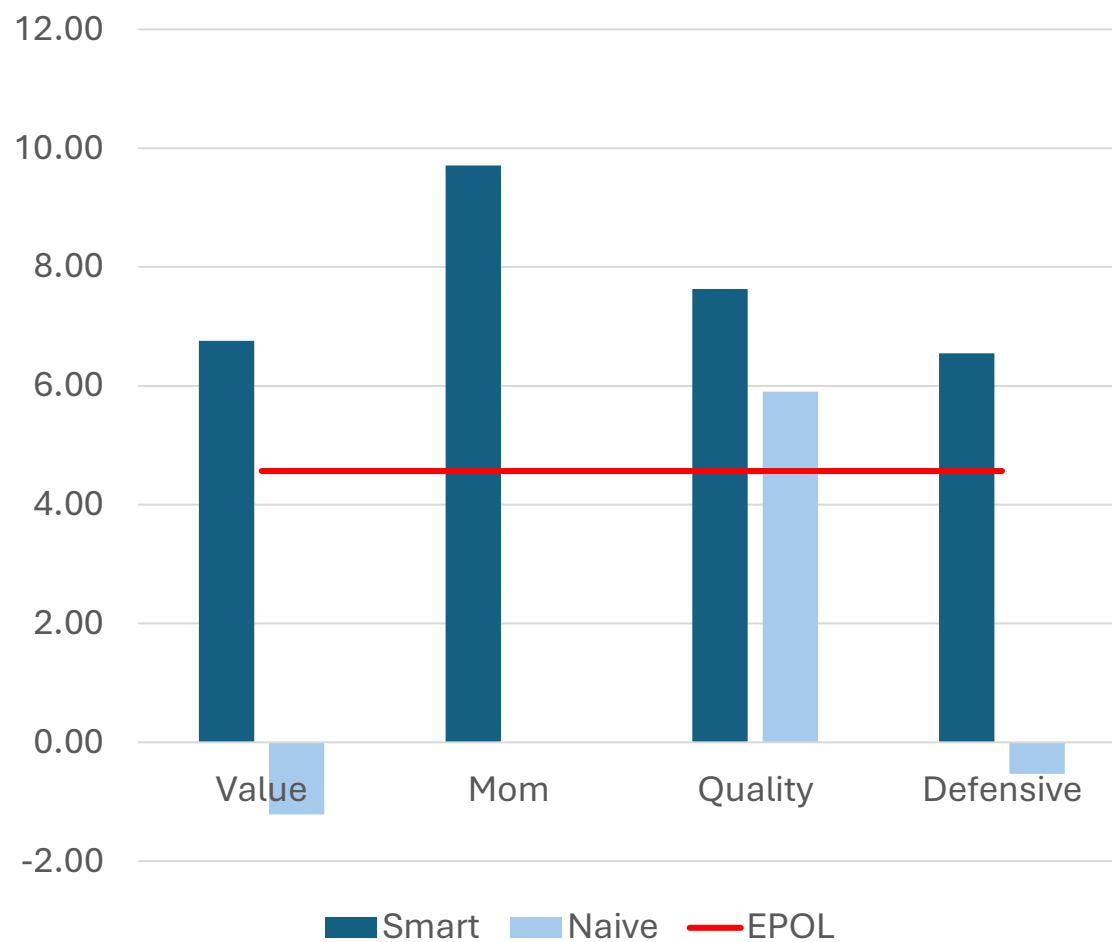
Portfolio allocations of a hypothetical momentum-tilted portfolio vs. MSCI IMI Poland (snapshot as of December 2024)



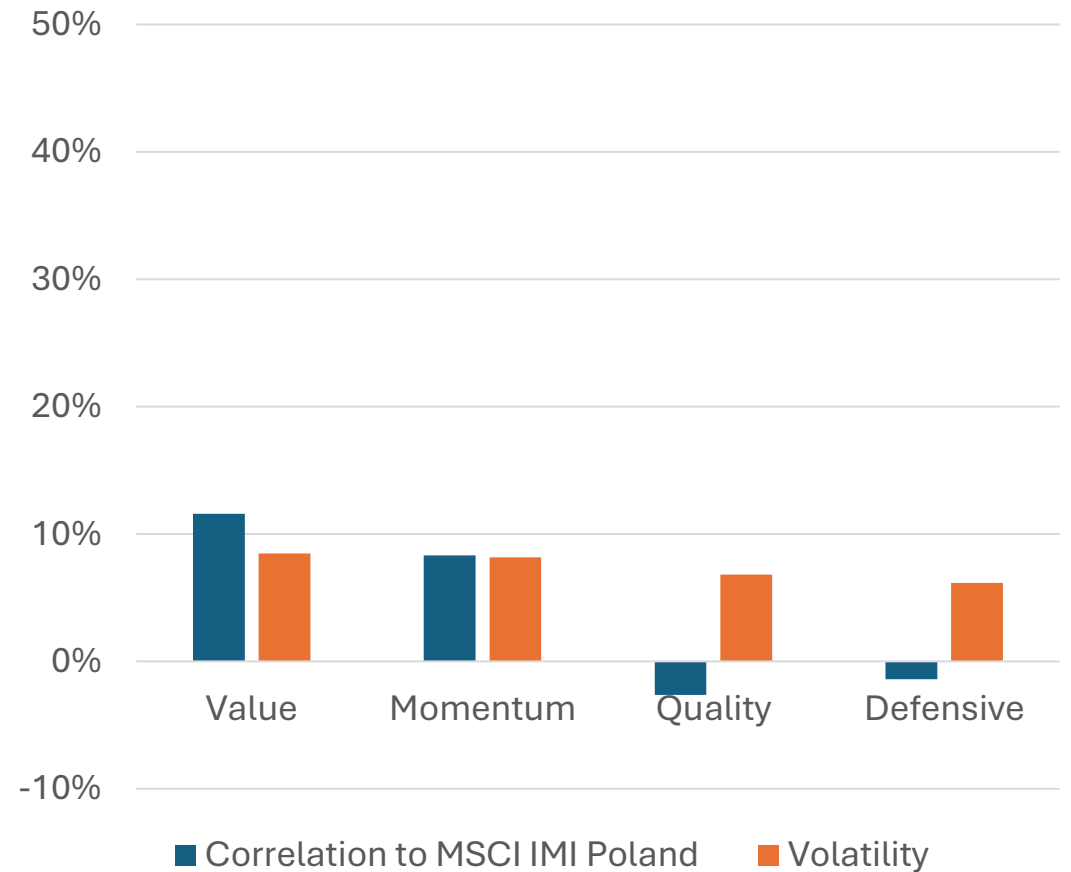
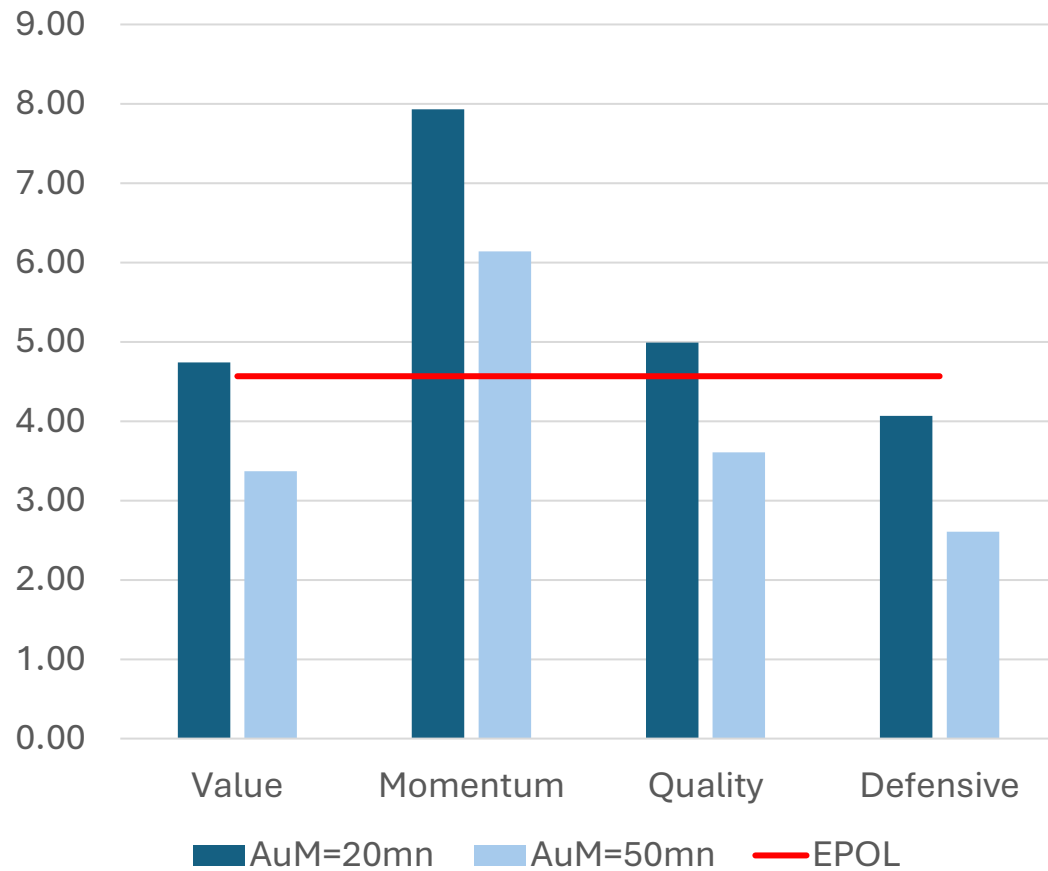
Net performance at 20mn AuM



Net performance at 100mn AuM

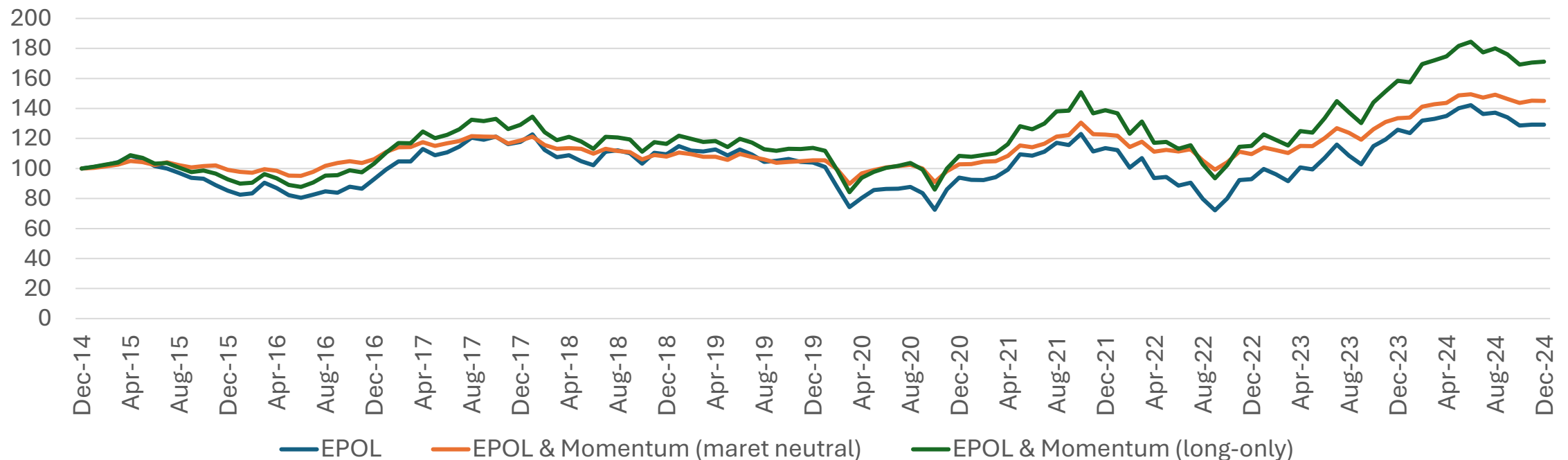


Factor-tilted strategies made market-neutral



Long-only or beta-neutral Sharpe improvement: which free lunch do you prefer?

- **100 mn notional allocated 50/50 to:**
 - Long-only smart Momentum
 - Mkt-neutral smart Momentum
- **Both strategies outperform passive EPOL, doubling Sharpe (0.2→0.4) via different means**



Next steps & research ideas

- Optimize/robustify factor construction
 - signals
 - rebalancing/turnover management
 - „implementation alpha”
- Incorporate execution „latency”
- Multi-factor portfolios: signal vs. portfolio combination