Analyst Forecasts and Currency Markets

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Introduction

"Survey expectations of returns negatively predict future returns [...] in three major asset classes: global equities, currencies, and global fixed income. The negative returns of an investment strategy based on survey expectations cannot be explained by standard factors such as carry, momentum, and value."

— Koijen et al. (2015)

Introduction (cont'd)

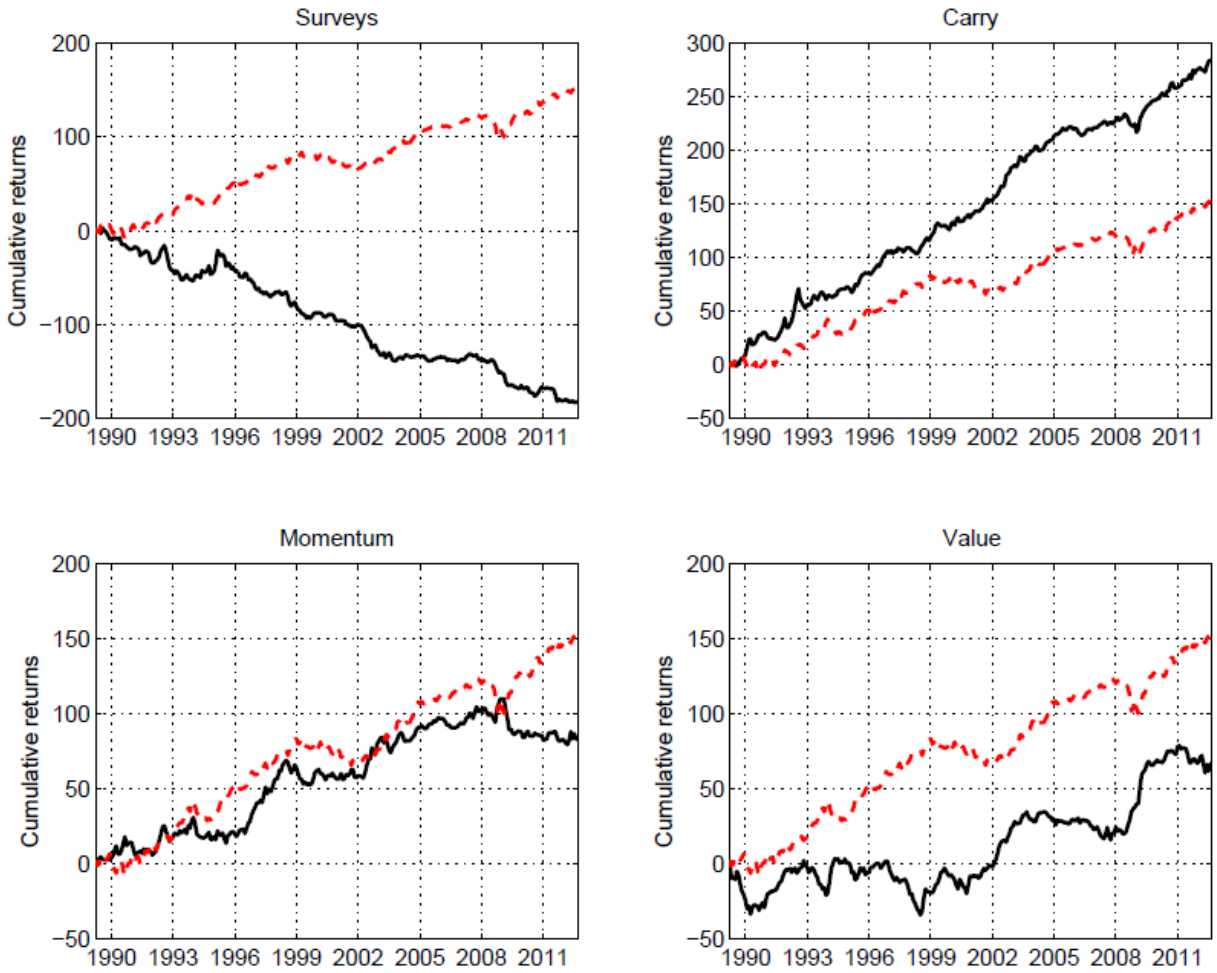


Figure 5 from Koijen et al. (2015). Shows the cumulative returns to passive long benchmarks (red) versus strategies based on surveys, carry, momentum and value.

Related Literature

1. Anomalies and predictability in FX
   - *Meese and Rogoff puzzle* - Meese and Rogoff (1983)
   - *Fama puzzle* the failure of UIP - Fama (1984)
   - Predictability for horizons < 1 year is scarce - Rossi (2013)
2. Rationality of forecasts
   - Strategic information release - Lehar and Randl (2006)
   - predictable biases $\rightarrow$ we can extract $\mathbb{E}[R]$ - Kothari (2016)
   - forecasts are biased, but can generate profits
     Elliott and Ito (1999) and Ince and Molodtsova (2017)
3. Survey Expectations of Returns
   - Survey expectations correlated (+) with lagged returns, leads to portfolios shown previously - Koijen et al. (2015)
   - Expectations are negatively related to future realized returns in the US stock market - Greenwood and Shleifer (2014)

Motivation

This paper

- forecasting performance, rationality and economic value of analyst forecasts
- comparison to a random walk and forward rates
- analysis of portfolios built on forecasts and forecast dispersion
- The World Economic Survey by the ifo institute was discontinued - do analyst forecasts lead to the same results as survey expectations in Koijen et al. (2015)?

Summary of Results

Analyst forecasts:

- biased
- do not lead to significant returns on a per currency basis for most countries (contrary to previous results)

Portfolios built from analyst forecasts:

- spanned by established factors (cross-section and time-series)
- still the worst performing among all others

→ Results on survey expectations on equities, bonds and currencies do not carry over to analyst forecasts using a broader currency sample.

Data

- spot and forward exchange rates on 30 currencies (10 DM & 20 EM) 2006-06/2020-06 (Bloomberg)
- 48,397 individual forecasts from 134 different institutions (Bloomberg)
- CPI inflation from 2001 to 2020 (GFD)

Testing for Unbiasedness

Regression of actual changes on expected changes:

$$s_{t+h} - s_t = \beta_0 + \beta_1(s^e_{t,t+h} - s_t) + u_{t+h} \tag{1}$$

s_t ... log spot exchange rate at time t
$s^e_{t,t+h}$ ... median analyst forecast for s_t in $t+h$ at time t

$\rightarrow H_0 : \beta_0 = 0$ and $\beta_1 = 1$

Testing for Unbiasedness - Results

H_0 is rejected in 26/30 countries at least at the 10% level.

Country	β_0	β_1	F-test
A. Developed Countries			
Australia	−0.000	0.151	0.012**
Canada	0.002	0.586***	0.115
Denmark	0.004	−0.118	0.001***
Euro Area	0.003	−0.033	0.000***
Japan	−0.001	−0.030	0.000***
New Zealand	0.001	−0.096	0.000***
Norway	0.007	−0.058	0.001***
Sweden	0.007	−0.373	0.000***
Switzerland	−0.008	0.214	0.000***
United Kingdom	0.008	−0.242	0.000***

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Unbiasedness regressions. The column F-test contains p-values for an F-test with $H_0 : \beta_0 = 0; \beta_1 = 1$.

Results of Unbiasedness and Rationality Tests

- null hypothesis of unbiasedness is rejected at least at the 10% level for 26/30 countries (9/10 in the DM sample)
- null of orthogonality (rationality) is rejected for 12/30 countries (5/10 in the DM sample) ▸ Rationality tests

$\rightarrow$ strong evidence for a bias, forecasts are not completely rational.

An Economic Evaluation of Forecasts (I/III)

For evaluating forecasts 2 things are important:

1. right direction
2. magnitude of the change

Directional Value (DV) statistic by Blaskowitz and Herwartz (2011)

$$DV = \frac{\sum_{t=T-P+1}^{T} |s^e_{t,t+h} - s_t| . DA_{t,t+h}}{\sum_{t=T-P+1}^{T} |s_{t,t+h} - s_t|}$$

DA ... directional accuracy (equal to 1 if the direction is correct, zero otherwise)
P ... number of forecasts

An Economic Evaluation of Forecasts (II/III)

In contrast to Ince and Molodtsova (2017) I use forward rates to compute excess returns instead of just changes in the spot exchange rate, as their approach does not represent an investable strategy for a currency investor, since future spot rates are not traded. Instead, I use forward rates to compute log excess returns as:

$$rx_{t+h} = f_{t,t+h} - s_{t+h}$$

An Economic Evaluation of Forecasts (III/III)

	DV	returns	Sharpe	t-stat
Australia	0.304	−3.684	−0.281	−1.052
Canada	0.313	−3.154	−0.362	−1.355
Denmark	0.273	3.008	0.326	1.218
Euro Area	0.265	2.170	0.233	0.872
Japan	0.224	0.179	0.016	0.061
New Zealand	0.286	0.793	0.064	0.239
Norway	0.228	2.538	0.181	0.676
Sweden	0.256	2.839	0.254	0.952
Switzerland	0.329	−1.522	−0.181	−0.679
United Kingdom	0.165	−0.991	−0.099	−0.371
Argentina	0.595	6.926	0.399	1.492*
Brazil	0.210	4.919	0.282	1.055
Chile	0.227	0.796	0.065	0.242
Colombia	0.271	1.720	0.117	0.436
Czech Republic	0.284	0.306	0.023	0.087
Hungary	0.274	0.624	0.040	0.151
India	0.278	0.398	0.051	0.192
Indonesia	0.285	0.541	0.050	0.186
Israel	0.274	−1.924	−0.233	−0.872
Malaysia	0.277	3.836	0.497	1.861**
Mexico	0.249	0.511	0.040	0.148
Philippines	0.299	1.499	0.252	0.943
Poland	0.254	−2.910	−0.192	−0.720
Russia	0.260	−1.894	−0.108	−0.405
Singapore	0.305	1.455	0.248	0.930
South Africa	0.307	−1.920	−0.125	−0.469
South Korea	0.368	−0.806	−0.086	−0.324
Taiwan	0.354	0.915	0.164	0.613
Thailand	0.267	−3.262	−0.471	−1.761
Turkey	0.266	4.048	0.264	0.987

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Directional Value, annualized returns (in %) to the exchange rate forecasts per currency and annualized Sharpe ratios. The last column contains t-statistics and p-values for a one-sided t-test with a null hypothesis of zero excess returns for the portfolio based on analyst forecasts.

Forecast Dispersion and Currency Returns

$$disp_t = \frac{\sigma(S^e_{t,t+h})}{S_t}$$

which is the standard deviation of all available analyst forecasts for a currency normalized by the last available spot rate in month t.

$$rx_{t+1} = \beta_0 + \beta_1 disp_t + \beta_2 \frac{f_t}{s_t} + u_t$$

regression of excess returns to a long position in a currency on dispersion and carry

Forecast Dispersion and Currency Returns - Results

Country	Model (1) β_0	Model (1) β_1 dispersion	Model (2) β_0	Model (2) β_1 carry	Model (3) β_0	Model (3) β_1 dispersion	Model (3) β_2 carry
A. Developed Countries							
Australia	0.076	0.020	−0.001	1.028	0.154	0.038	−2.333
Canada	0.132**	0.038**	−0.003	−2.466	0.133**	0.038**	−2.558
Denmark	0.011	0.005	−0.008	−1.673	0.071	0.025	−4.639
Euro Area	0.019	0.008	−0.008	−1.960	0.084	0.033	−5.633
Japan	0.044	0.014	−0.013	−2.735	0.059	0.022	−3.072
New Zealand	0.046	0.010	0.016	−1.802	0.199	0.044	−4.191
Norway	0.252***	0.082***	−0.008	0.908**	0.205**	0.067**	0.772
Sweden	0.143*	0.047*	−0.006	−0.167	0.179**	0.059**	−2.504
Switzerland	0.051	0.015	−0.003	−0.981	0.083	0.027	−2.945
United Kingdom	−0.012	−0.002	−0.008	−3.016	0.013	0.008	−3.570

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Regressions of future returns on dispersion, carry, and both.

Portfolio Construction following Asness et al. (2013)

Cross-sectional portfolios:

$$w_{i,t}^{XS}(k) = c_t \left(\text{rank}(x_{i,t-k+1} - N_t^{-1} \sum_{i=1}^{N} \text{rank}(x_{i,t-k+1}) \right)$$

Time-series portfolios:

$$w_{i,t}^{TS} = \begin{cases} N_t^{-1}, & \text{if } x_{i,t-k+1} > 0 \\ -N_t^{-1}, & \text{if } x_{i,t-k+1} \leq 0 \end{cases}$$

c_t ... scalar that makes sure the portfolio is 1\$ long and 1\$ short
$x_i, t-k+1$ ... investment signal for currency i in month t with an implementation lag k
N_t ... number of currencies in the sample in month t

Portfolios

- Dollar factor: return to investing in all currencies with equal weights

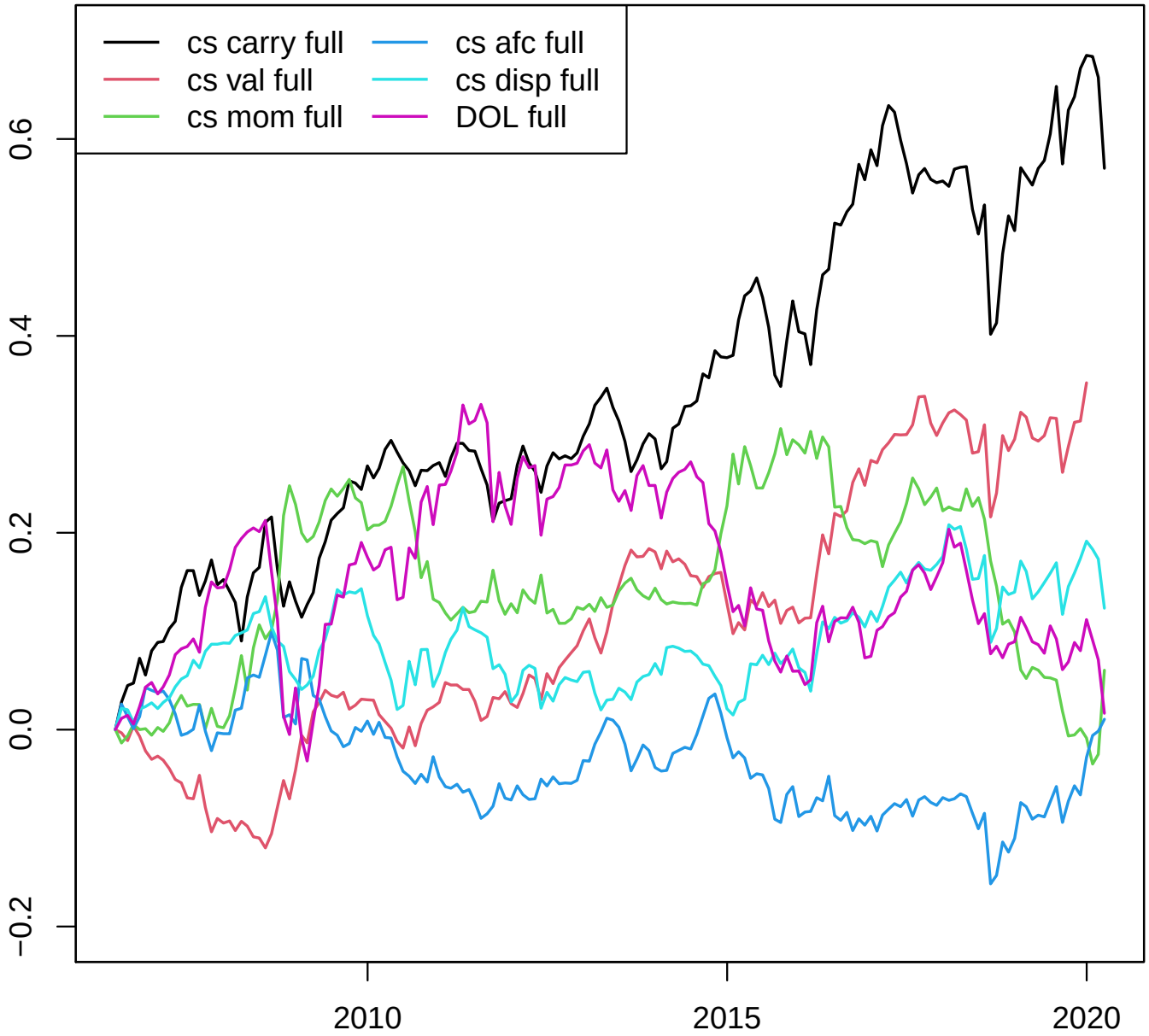
Cross-sectional and time-series versions of:

- value
- carry
- momentum
- analyst forecasts
- dispersion

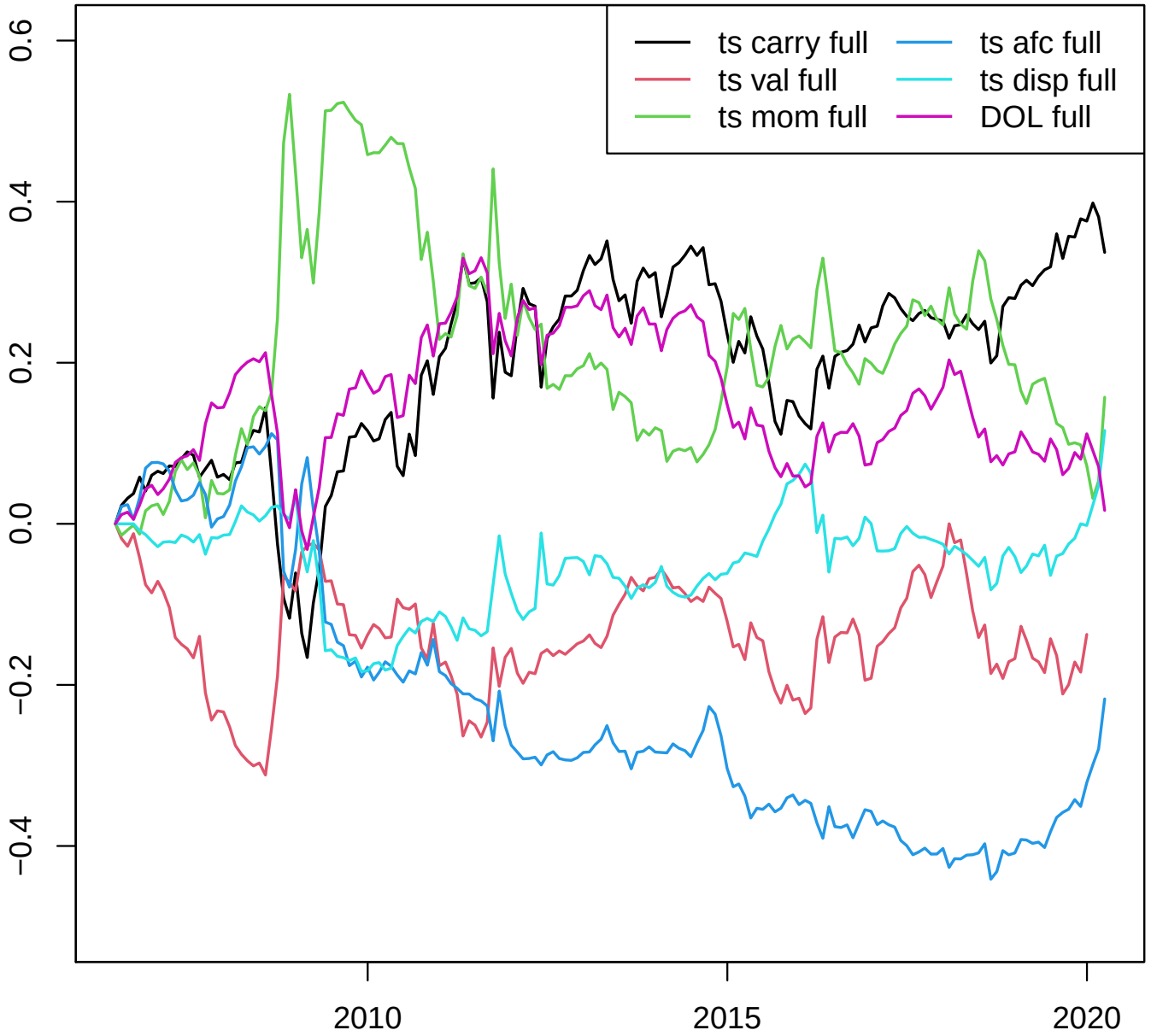
Investment universes:

- G10
- extended universe: 20 emerging markets
- full universe: 30 currencies

Performance - Cross-sectional Portfolios



Performance - Time Series Portfolios



Cross-Sectional Spanning Regressions

	dep. variable: cs-afc		
	full	developed	developing
(Intercept)	−0.002	0.000	−0.001
	(0.001)	(0.001)	(0.001)
cs-val	0.209	0.011	0.136
	(0.135)	(0.036)	(0.086)
cs-carry	0.431***	−0.048	0.230***
	(0.098)	(0.039)	(0.077)
cs-mom	−0.228	−0.084**	−0.186**
	(0.138)	(0.042)	(0.090)
dollar	−0.151*	−0.304***	0.269***
	(0.090)	(0.033)	(0.071)
R^2	0.296	0.566	0.506
Adj. R^2	0.278	0.555	0.493
Num. obs.	162	162	162
RMSE	0.016	0.007	0.012

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Spanning regressions of the cross-sectional analyst forecast portfolio on cross-sectional value, carry and momentum factors and the dollar factor from July 2006 to December 2019.

Time-Series Spanning Regressions

	dep. variable: ts-afc		
	full	developed	developing
(Intercept)	−0.001	−0.001	−0.001
	(0.002)	(0.001)	(0.001)
ts-val	−0.110	−0.094**	−0.056
	(0.105)	(0.040)	(0.065)
ts-carry	−0.061	−0.096*	−0.024
	(0.196)	(0.053)	(0.141)
ts-mom	−0.448***	−0.113***	−0.277***
	(0.111)	(0.034)	(0.071)
dollar	−0.049	−0.209***	0.184
	(0.227)	(0.045)	(0.190)
R^2	0.289	0.380	0.312
Adj. R^2	0.271	0.365	0.294
Num. obs.	162	162	162
RMSE	0.024	0.009	0.016

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Spanning regressions of the time-series analyst forecast portfolio on cross-sectional value, carry and momentum factors and the dollar factor from July 2006 to December 2019.

Conclusions

Analyst forecasts:

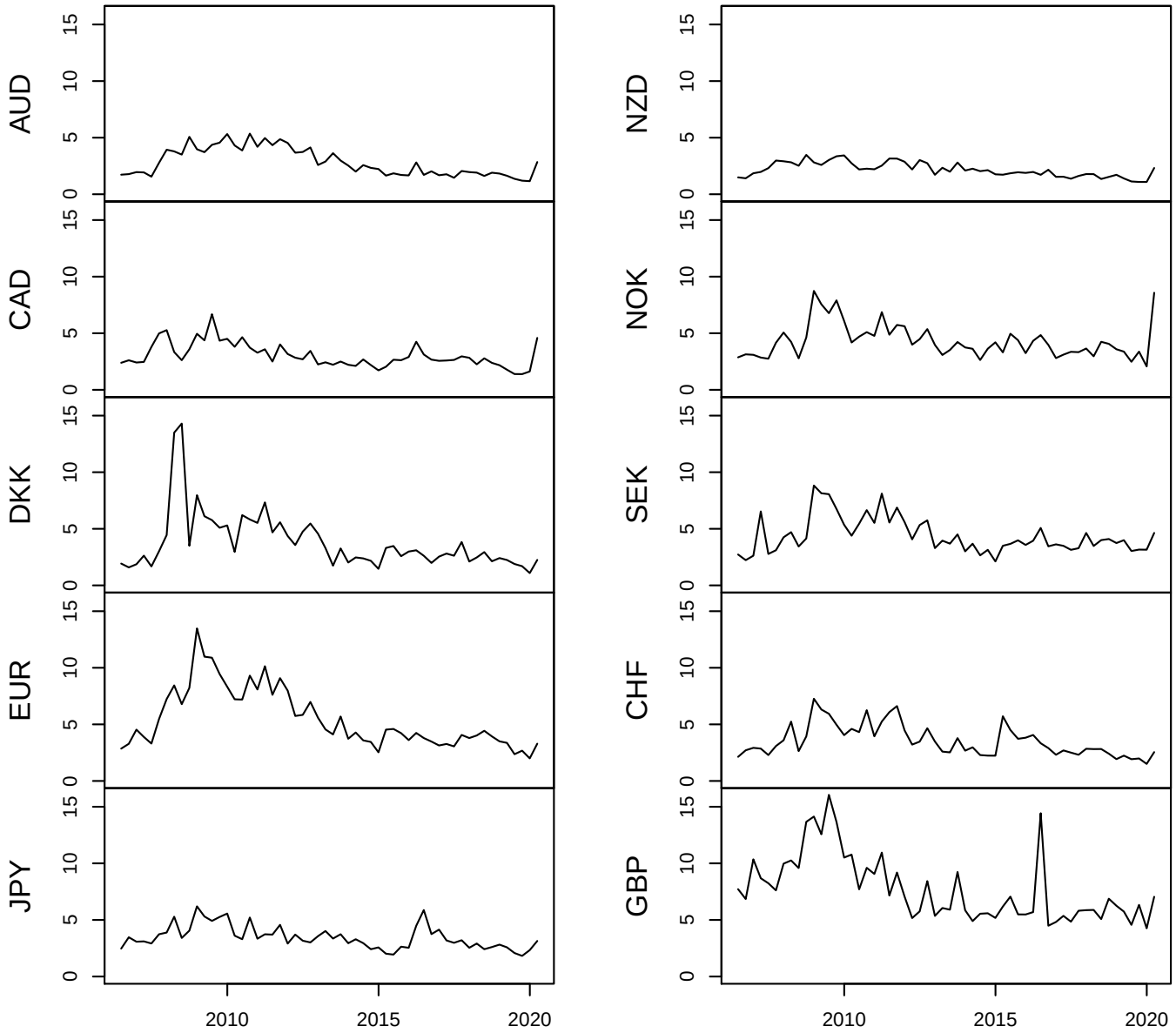
- biased
- mostly not rational
- do not lead to significant returns in 28/30 currencies

Portfolios constructed from analyst forecasts are:

- spanned by established factors
- still have the worst performance among all factors during the sample period

→ Result by Koijen et al. (2015) that portfolios built from survey expectations have large (in abs. value) negative Sharpe ratios and are not spanned by standard factors does not carry over to analyst forecasts and a broader currency universe.

Appendix: G10 Forecast Dispersion



Appendix: Testing for Rationality

Rational forecasts imply:

1. (current) forecast error $\perp$ past forecast error
2. (current) forecast error $\perp$ past fx changes

$$s_{t+h} - s^e_{t,t+h} = \beta_0 + \beta_1(s_t - s^e_{t-h,t}) + u_{t+h} \tag{2}$$

$$s_{t+h} - s^e_{t,t+h} = \beta_0 + \beta_1(s_t - s_{t-h}) + u_{t+h} \tag{3}$$

where:
s_t ... log exchange rate at t
$s^e_{t,t+h}$ ... log median analyst forecast for $t+h$ at t

$\rightarrow$ rationality implies $H_0 : \beta_0 = \beta_1 = 0$.

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Appendix: Testing for Rationality - Results

Country	$s_{t+h} - s^e_{t+h,t} \perp s_t - s^e_{t,t-h}$ β_0	β_1	F-test	$s_{t+h} - s^e_{t+h,t} \perp s_t - s_{t-h}$ β_0	β_1	F-test
Australia	−0.007	0.301*	0.091*	−0.010	0.190	0.304
Canada	0.001	0.245*	0.157	0.000	0.245*	0.147
Denmark	−0.008	0.290*	0.007***	−0.012	0.149	0.065*
Euro Area	−0.008	0.252	0.024**	−0.010	0.155	0.068*
Japan	−0.006	0.095	0.649	−0.007	0.123	0.629
New Zealand	−0.012	0.317**	0.013**	−0.018*	0.304*	0.027**
Norway	0.009	0.215	0.333	0.010	0.206	0.373
Sweden	−0.001	0.253	0.181	−0.002	0.208	0.462
Switzerland	−0.018**	0.199	0.000***	−0.022***	0.104	0.001***
United Kingdom	0.002	0.278*	0.143	0.001	0.246	0.381

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Orthogonality tests of forecast errors to lagged forecast errors (left side) and lagged exchange rate changes (right side). The column F-test contains p-values for an F-test with $H_0 : \beta_0 = \beta_1 = 0$.

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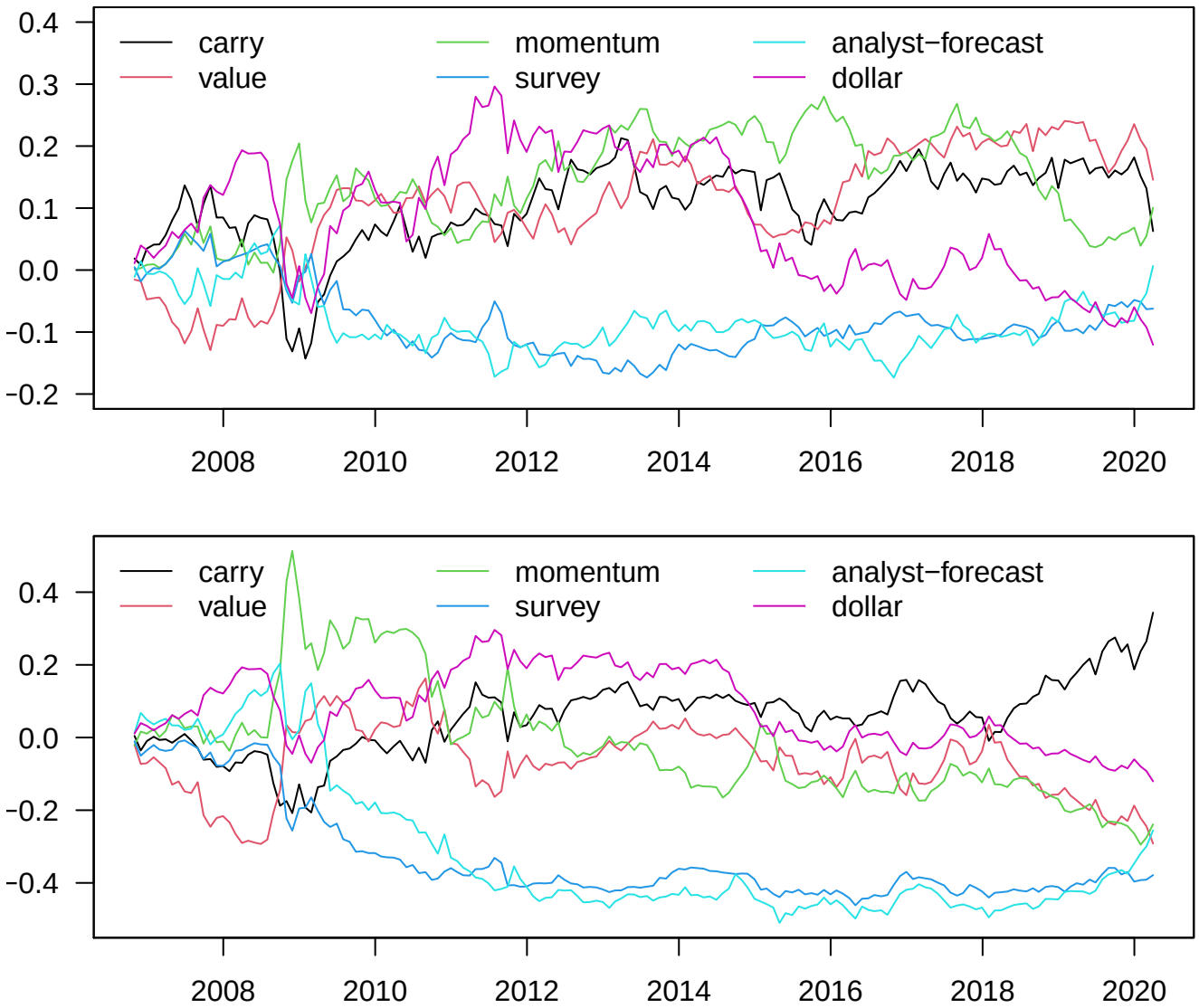
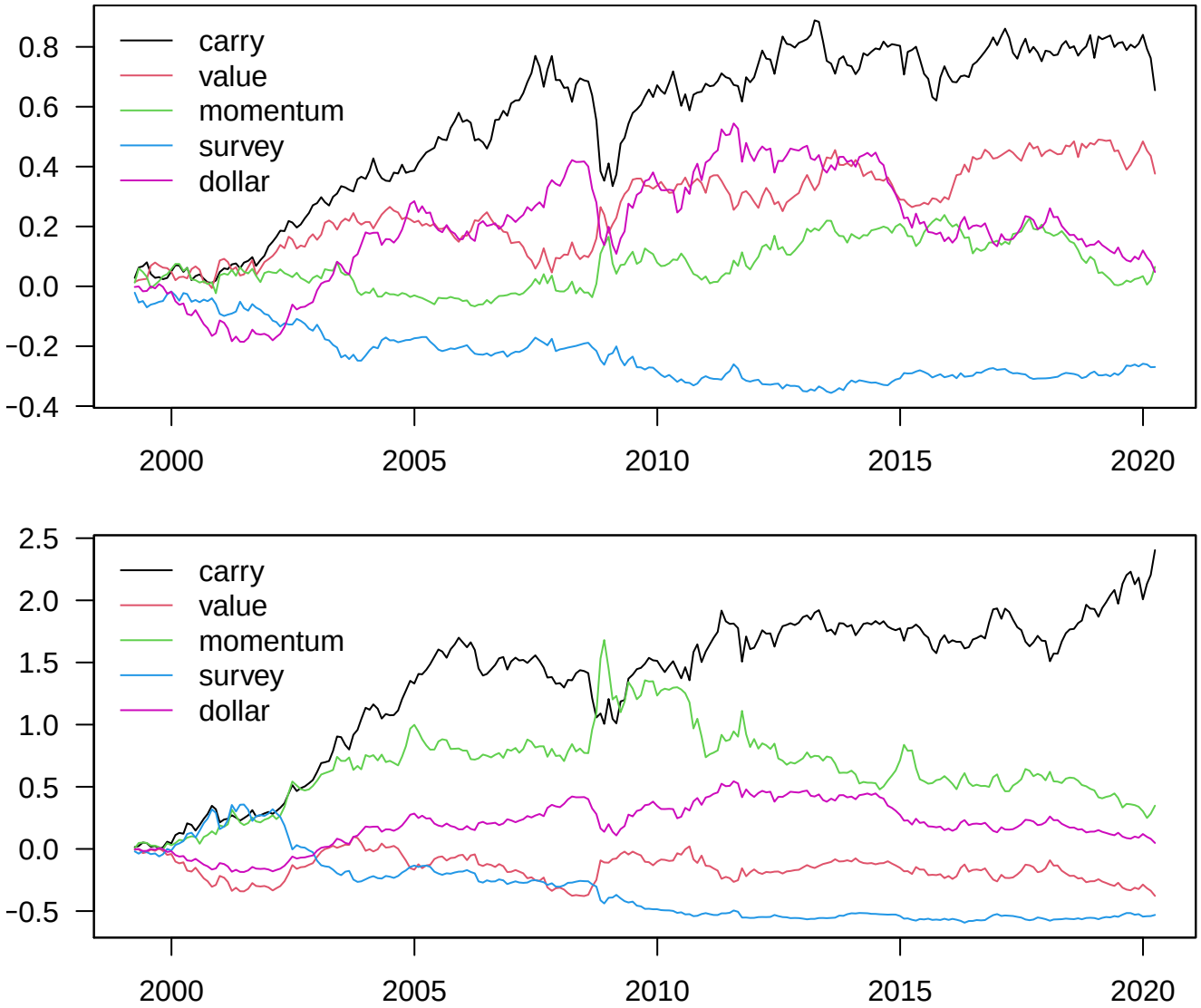
Appendix: Performance vs. Survey Portfolios since 2006



Cross-sectional (top) and time-series (bottom) portfolios from 2006 to 2020 including the survey portfolios as in Koijen et al. (2015).

Appendix: Performance of Survey Portfolios since 2000



Cross-sectional (top) and time-series (bottom) portfolios from 2000 to 2020 including the survey portfolios as in Koijen et al. (2015).

Appendix: CS-Spanning Regressions - Dispersion

	dep. variable: cs-disp		
	full	developed	developing
(Intercept)	-0.001	-0.002^{**}	0.000
	(0.001)	(0.001)	(0.001)
cs-val	0.396^{***}	0.114	0.313^{***}
	(0.056)	(0.090)	(0.067)
cs-carry	0.226^{***}	-0.357^{***}	0.312^{***}
	(0.057)	(0.071)	(0.074)
cs-mom	0.092^{*}	-0.147^{*}	0.139^{**}
	(0.054)	(0.084)	(0.065)
dollar	0.342^{***}	0.083	0.547^{***}
	(0.053)	(0.059)	(0.071)
R^2	0.643	0.269	0.735
Adj. R^2	0.633	0.250	0.728
Num. obs.	162	162	162
RMSE	0.010	0.014	0.012

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Spanning regressions of the cross-sectional dispersion portfolio on cross-sectional value, carry and momentum factors and the dollar factor from July 2006 to December 2019.

Appendix: TS-Spanning Regressions - Dispersion

	dep. variable: ts-disp		
	full	developed	developing
(Intercept)	0.000	0.003	−0.001
	(0.002)	(0.003)	(0.002)
ts-val	−0.027	−0.187	0.002
	(0.092)	(0.175)	(0.110)
ts-carry	0.143	−0.148	0.361
	(0.153)	(0.230)	(0.228)
ts-mom	−0.025	−0.027	−0.009
	(0.121)	(0.153)	(0.121)
dollar	−0.354**	−0.162	−0.694***
	(0.140)	(0.218)	(0.258)
R^2	0.048	0.051	0.062
Adj. R^2	0.024	0.026	0.038
Num. obs.	159	159	159
RMSE	0.023	0.033	0.025

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Spanning regressions of the time-series dispersion portfolio on cross-sectional value, carry and momentum factors and the dollar factor from October 2006 to December 2019.