

Internet Appendix for
“Economic Momentum and Currency Returns”

Magnus Dahlquist Henrik Hasseltoft*

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*Dahlquist: Stockholm School of Economics and CEPR; e-mail: magnus.dahlquist@hhs.se. Hasseltoft: Lynx Asset Management; e-mail: hhasseltoft@gmail.com.

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1 Data cleaning description

There are outliers in data on 10/16/2003, when forward exchange rates against the GBP for Canada, Denmark, Japan, Norway, Sweden, and Switzerland more than double in value. We replace these observations by their previous trading day's values. Moreover, we amend the data as follows:

- China: The currency was pegged to USD up to 7/21/2005. We start Chinese data thereafter.
- Indonesia: Forward exchange rates against the GBP have a long series of repeated values between 2/16/2001 and 1/13/2003. We start after that period, on 1/14/2003. Similarly, forward exchange rates against the USD have a long series of repeated values between 2/16/2001 and 6/1/2007. We start after that period, on 6/4/2007.
- Ireland: Forward exchange rates and spot rates against the GBP have long streaks of 1s at the start of the sample period. We replace these with missing values and start the series on 3/30/1979.
- Lithuania: The consumer price index has an initial observation in January 1990 and then a series of missing values. We start the series after those missing values in December 1990.
- Turkey: Forward exchange rates against the GBP have a long series of repeated values between 2/20/2001 to 12/21/2001. We start after that period, on 12/24/2001.

A number of countries in the sample either joined the EUR or pegged their currency against the EUR during the sample period. These currencies are not active in the trend strategies after that particular date, as follows:

- 1/1/1999: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, and Portugal joined the EUR while Denmark pegged its currency to the EUR.
- 6/19/2000: The Greek currency was pegged against the EUR.
- 6/28/2004: The Slovenian currency was pegged against the EUR.
- 5/2/2005: The Latvian currency was pegged against the EUR.
- 11/28/2005: The Slovak currency was pegged against the EUR.

IA Table 1: Currency classifications and sample periods

	G10	Developed	Emerging	Begin	End
Australia	Yes	Yes		12/31/1996	3/31/2017
Austria		Yes		1/30/1976	12/31/1998
Belgium		Yes		1/30/1976	12/31/1998
Brazil			Yes	3/31/2004	3/31/2017
Canada	Yes	Yes		1/30/1976	3/31/2017
Chile			Yes	3/31/2004	3/31/2017
China			Yes	7/29/2005	3/31/2017
Colombia			Yes	3/31/2004	3/31/2017
Czech Republic			Yes	12/31/1996	3/31/2017
Denmark		Yes		1/30/1976	12/31/1998
Eurozone / Germany	Yes	Yes		1/30/1976	3/31/2017
Finland		Yes		12/31/1996	12/31/1998
France		Yes		1/30/1976	12/31/1998
Greece			Yes	12/31/1996	5/31/2000
Hungary			Yes	10/31/1997	3/31/2017
Iceland			Yes	3/31/2004	3/31/2017
India			Yes	10/31/1997	3/31/2017
Indonesia			Yes	1/31/2003	3/31/2017
Ireland		Yes		3/30/1979	12/31/1998
Israel		Yes		3/31/2004	3/31/2017
Italy		Yes		1/30/1976	12/31/1998
Japan	Yes	Yes		6/30/1978	3/31/2017
Latvia			Yes	3/31/2004	4/29/2005
Mexico			Yes	12/31/1996	3/31/2017
Netherlands		Yes		1/30/1976	12/31/1998
New Zealand	Yes	Yes		12/31/1996	3/31/2017
Norway	Yes	Yes		1/30/1976	3/31/2017
Poland			Yes	2/28/2002	3/31/2017
Portugal		Yes		1/30/1976	12/31/1998
Russia			Yes	3/31/2004	3/31/2017
Slovak Republic			Yes	2/28/2002	10/31/2005
South Africa			Yes	12/31/1996	3/31/2017
South Korea			Yes	2/28/2002	3/31/2017
Spain		Yes		1/30/1976	12/31/1998
Sweden	Yes	Yes		1/30/1976	3/31/2017
Switzerland	Yes	Yes		1/30/1976	3/31/2017
Turkey			Yes	12/31/2001	3/31/2017
United Kingdom	Yes	Yes		1/30/1976	3/31/2017
United States	Yes	Yes		1/30/1976	3/31/2017

The table presents the classification of countries into G10, developed markets, and emerging markets currencies. The classification for developed and emerging markets follows the MSCI classification. The beginning and ending dates reflect availability of financial and macro data to form the trend combo. Currencies now in the Eurozone are used in developed markets until December 31, 1998, after which the Euro is used. Before January 1, 1999, Germany is used in G10 and developed markets.

IA Table 2: Datastream mnemonics for spot and forward exchange rates

	Currency	Spot (GBP)	Forward (GBP)	Forward (USD)
Australia	AUD	AUSTDOL	UKAUD1F	USAUD1F
Austria	ATS	AUSTSCH	AUSTS1F	USATS1F
Belgium	BEF	BELGLUX	BELXF1F	USBEF1F
Brazil	BRL	BRACRUZ	UKBRL1F	USBRL1F
Canada	CAD	CNDOLLR	CNDOL1F	USCAD1F
Chile	CLP	CHILPES	UKCLP1F	USCLP1F
China	CNY	CHIYUAN	UKCNY1F	USCNY1F
Colombia	COP	COLUPES	UKCOP1F	USCOP1F
Czech Republic	CZK	CZECHCM	UKCZK1F	USCZK1F
Denmark	DKK	DANISHK	DANIS1F	USDKK1F
Eurozone	EUR	EURSTER	UKEUR1F	USEUR1F
Finland	FIM	FINMARK	UKFIM1F	USFIM1F
France	FRF	FRENFRA	FRENF1F	USFRF1F
Germany	DEM	DMARKER	DMARK1F	USDEM1F
Greece	GRD	GREDRAC	UKGRD1F	USGRD1F
Hungary	HUF	HUNFORT	UKHUF1F	USHUF1F
Iceland	ISK	ICEKRON	UKISK1F	USISK1F
India	INR	INDRUPE	UKINR1F	USINR1F
Indonesia	IDR	INDORUP	UKIDR1F	USIDR1F
Ireland	IEP	IPUNTER	IPUNT1F	USIEP1F
Israel	ILS	IRSHEK	UKILS1F	USILS1F
Italy	ITL	ITALIRE	ITALY1F	USITL1F
Japan	JPY	JAPAYEN	JAPYN1F	USJPY1F
Latvia	LVL	LATVLAT	UKLVL1F	USLVL1F
Mexico	MXN	MEXPESO	UKMXN1F	USMXN1F
Netherlands	NLG	GUILDER	GUILD1F	USNLG1F
New Zealand	NZD	NZDOLLR	UKNZD1F	USNZD1F
Norway	NOK	NORKRON	NORKN1F	USNOK1F
Poland	PLN	POLZLOT	UKPLN1F	USPLN1F
Portugal	PTE	PORTESC	PORTS1F	USPTE1F
Russia	RUB	CISRUBM	UKRUB1F	USRUB1F
Slovak Republic	SKK	SLOVKOR	UKSKK1F	USSKK1F
South Africa	ZAR	COMRAND	UKZAR1F	USZAR1F
South Korea	KRW	KORSWON	UKKRW1F	USKRW1F
Spain	ESP	SPANPES	SPANP1F	USESP1F
Sweden	SEK	SWEKRON	SWEDK1F	USSEK1F
Switzerland	CHF	SWISSFR	SWISF1F	USCHF1F
Turkey	TRY	TURKLIR	UKTRY1F	USTRY1F
United Kingdom	GBP			USGBP1F
United States	USD	USDOLLR	USDOL1F	

The table presents the currency swift codes and Datastream mnemonics for spot exchange rates versus the GBP, and one-month forward exchange rates versus the GBP and the USD. We use forward rates against the British pound up to February 1, 2007, as they provide the longest available history, after which we use forward rates against the USD.

IA Table 3: Relationship between fundamentals and industrial production

	Retail sales	Unemployment	CPI	PPI
Industrial production	0.215 (0.031)	1.100 (0.116)	0.055 (0.037)	0.165 (0.041)
Adjusted R^2 (%)	10.17	18.40	0.59	5.13
Number of observations	8962	7314	9682	5796

The table presents results from panel regressions where 12-month log changes in fundamental variables (retail sales, inverse of unemployment, and consumer and producer prices) are regressed on the contemporaneous 12-month log change of industrial production. Point estimates are reported with standard errors, clustered by currency, in parentheses. Adjusted within R^2 values and the number of observations are also reported. The regressions include currency fixed effects, but they are not reported. The sample period is January 1976 to March 2017.

IA Table 4: Return correlations between trend strategies

	Economic activity	Inflation	Short term	Medium term	Long term
Economic activity	1.000				
Inflation	0.206	1.000			
Short term			1.000		
Medium term			0.812	1.000	
Long term			0.640	0.870	1.000

The table presents correlation coefficients between monthly returns on the trend strategies. The sample period is January 1976 to March 2017.

IA Table 5: Return correlations between trend and benchmark strategies

	Economic activity	Inflation	Combo	Carry	Momentum	Value
Economic activity	1.000	0.206	0.766	0.214	0.066	-0.007
Inflation		1.000	0.774	0.578	0.001	-0.042
Combo			1.000	0.502	0.062	-0.035
Carry				1.000	0.142	-0.057
Momentum					1.000	-0.445
Value						1.000

The table presents correlation coefficients between monthly returns on the trend and benchmark strategies. The sample period is January 1976 to March 2017, but due to the long lookback period for the value benchmark all returns start in February 1981.

IA Table 6: Predicting currency returns (January 1976–July 1996)

	Currency returns					
	I	II	III	IV	V	VI
Carry	0.112 (0.020)				0.073 (0.031)	0.057 (0.030)
Momentum		0.101 (0.037)			0.085 (0.046)	0.075 (0.046)
Value			0.071 (0.027)		0.081 (0.035)	0.077 (0.031)
Trend combo				0.117 (0.027)		0.062 (0.028)
Adjusted R^2 (%)	0.41	0.33	0.16	0.46	0.63	0.73
Number of observations	3869	3677	2938	3813	2938	2938

The table presents the results of panel regressions in which next month's currency returns are predicted using the current month's portfolio weights: $R_{c,t+1} = a_t + b\tilde{w}_{c,t} + \epsilon_{c,t+1}$, where $R_{c,t+1}$ denotes the monthly excess return for currency c at time $t + 1$ and $\tilde{w}_{c,t}$ denotes the standardized portfolio weight of currency c at time t . Weights of the trend combo are constructed by weighting all sub-strategies by the inverses of their respective past volatilities, scaling the weights such that they sum to one. Weights are cross-sectionally standardized in each month. Point estimates are reported with standard errors, clustered by currency, in parentheses. Adjusted within R^2 values and the number of observations are also reported. The regressions include time fixed effects, though they are not reported. The sample period is January 1976 to July 1996, but returns start at different dates due to differences in lookback periods.

IA Table 7: Predicting currency returns (August 1996–March 2017)

	Currency returns					
	I	II	III	IV	V	VI
Carry	0.123 (0.039)				0.113 (0.048)	0.064 (0.053)
Momentum		0.036 (0.044)			0.052 (0.051)	0.035 (0.046)
Value			0.125 (0.041)		0.146 (0.041)	0.160 (0.039)
Trend combo				0.148 (0.030)		0.138 (0.035)
Adjusted R^2 (%)	0.31	-0.01	0.32	0.47	0.63	0.96
Number of observations	2663	2603	2603	2659	2555	2555

The table presents the results of panel regressions in which next month's currency returns are predicted using the current month's portfolio weights: $R_{c,t+1} = a_t + b\tilde{w}_{c,t} + \epsilon_{c,t+1}$, where $R_{c,t+1}$ denotes the monthly excess return for currency c at time $t + 1$ and $\tilde{w}_{c,t}$ denotes the standardized portfolio weight of currency c at time t . Weights of the trend combo are constructed by weighting all sub-strategies by the inverses of their respective past volatilities, scaling the weights such that they sum to one. Weights are cross-sectionally standardized in each month. Point estimates are reported with standard errors, clustered by currency, in parentheses. Adjusted within R^2 values and the number of observations are also reported. The regressions include time fixed effects, though they are not reported. The sample period is August 1996 to March 2017, but returns start at different dates due to differences in lookback periods.

**IA Table 8: Predicting currency returns over various forecasting horizons
(January 1976–July 1996)**

	Cumulative currency returns			
	1 month	3 months	6 months	12 months
Carry	0.057 (0.030)	0.015 (0.032)	0.006 (0.037)	−0.010 (0.046)
Momentum	0.075 (0.046)	0.008 (0.036)	−0.021 (0.022)	−0.033 (0.017)
Value	0.077 (0.031)	0.093 (0.034)	0.090 (0.034)	0.084 (0.037)
Trend combo	0.061 (0.028)	0.093 (0.029)	0.102 (0.029)	0.118 (0.030)
Adjusted R^2 (%)	0.73	1.86	3.79	8.05
Number of observations	2938	2890	2842	2746

The table presents the results of panel regressions in which future cumulative currency returns over one-, three-, six-, and 12-month horizons are predicted along with current portfolio weights of three benchmark strategies (i.e., carry, momentum, and value) and the trend combo. The cumulative returns are scaled to a monthly basis to facilitate the comparison of the coefficients. Point estimates are reported with standard errors, clustered by currency, in parentheses. Adjusted within R^2 values and the number of observations are also reported. The regressions include time fixed effects, though they are not reported. The sample period is January 1976 to July 1996, but returns start at different dates due to differences in lookback periods.

**IA Table 9: Predicting currency returns over various forecasting horizons
(August 1996–March 2017)**

	Cumulative currency returns			
	1 month	3 months	6 months	12 months
Carry	0.064 (0.053)	0.039 (0.054)	0.041 (0.055)	0.047 (0.056)
Momentum	0.035 (0.046)	0.040 (0.040)	0.031 (0.033)	−0.001 (0.030)
Value	0.160 (0.039)	0.170 (0.040)	0.165 (0.042)	0.149 (0.037)
Trend combo	0.138 (0.035)	0.148 (0.030)	0.148 (0.036)	0.165 (0.039)
Adjusted R^2 (%)	0.96	3.51	7.11	15.50
Number of observations	2555	2540	2525	2495

The table presents the results of panel regressions in which future cumulative currency returns over one-, three-, six-, and 12-month horizons are predicted along with current portfolio weights of three benchmark strategies (i.e., carry, momentum, and value) and the trend combo. The cumulative returns are scaled to a monthly basis to facilitate the comparison of the coefficients. Point estimates are reported with standard errors, clustered by currency, in parentheses. Adjusted within R^2 values and the number of observations are also reported. The regressions include time fixed effects, though they are not reported. The sample period is August 1996 to March 2017, but returns start at different dates due to differences in lookback periods.

IA Table 10: Predicting dollar depreciation over various forecasting horizons

	Cumulative currency returns			
	1 month	3 months	6 months	12 months
Carry	-0.040 (0.026)	-0.056 (0.027)	-0.056 (0.030)	-0.056 (0.033)
Momentum	0.023 (0.043)	-0.002 (0.028)	-0.019 (0.022)	-0.042 (0.023)
Value	0.108 (0.032)	0.122 (0.032)	0.119 (0.034)	0.108 (0.034)
Trend combo	-0.031 (0.041)	-0.018 (0.040)	-0.015 (0.040)	-0.002 (0.041)
Adjusted R^2 (%)	0.30	1.44	2.91	5.80
Number of observations	5493	5430	5367	5241

The table presents the results of panel regressions in which future cumulative dollar depreciations over one-, three-, six-, and 12-month horizons are predicted along with current portfolio weights of three benchmark strategies (i.e., carry, momentum, and value) and the trend combo. The cumulative returns are scaled to a monthly basis to facilitate the comparison of the coefficients. Point estimates are reported with standard errors, clustered by currency, in parentheses. Adjusted within R^2 values and the number of observations are also reported. The regressions include time fixed effects, though they are not reported. The sample period is January 1976 to March 2017, but returns start at different dates due to differences in lookback periods.

**IA Table 11: Predicting dollar depreciation over various forecasting horizons
(January 1976–July 1996)**

	Cumulative currency returns			
	1 month	3 months	6 months	12 months
Carry	−0.063 (0.036)	−0.078 (0.040)	−0.080 (0.042)	−0.091 (0.047)
Momentum	0.030 (0.058)	−0.025 (0.047)	−0.049 (0.035)	−0.061 (0.031)
Value	0.080 (0.039)	0.090 (0.042)	0.084 (0.044)	0.078 (0.045)
Trend combo	−0.129 (0.047)	−0.111 (0.048)	−0.107 (0.047)	−0.098 (0.047)
Adjusted R^2 (%)	0.84	2.81	5.60	10.64
Number of observations	2938	2890	2842	2746

The table presents the results of panel regressions in which future cumulative dollar depreciations over one-, three-, six-, and 12-month horizons are predicted along with current portfolio weights of three benchmark strategies (i.e., carry, momentum, and value) and the trend combo. The cumulative returns are scaled to a monthly basis to facilitate the comparison of the coefficients. Point estimates are reported with standard errors, clustered by currency, in parentheses. Adjusted within R^2 values and the number of observations are also reported. The regressions include time fixed effects, though they are not reported. The sample period is January 1976 to July 1996, but returns start at different dates due to differences in lookback periods.

**IA Table 12: Predicting dollar depreciation over various forecasting horizons
(August 1996–March 2017)**

	Cumulative currency returns			
	1 month	3 months	6 months	12 months
Carry	−0.017 (0.049)	−0.037 (0.046)	−0.032 (0.045)	−0.023 (0.048)
Momentum	0.013 (0.045)	0.015 (0.039)	0.004 (0.032)	−0.030 (0.028)
Value	0.177 (0.042)	0.186 (0.046)	0.179 (0.047)	0.159 (0.040)
Trend combo	0.094 (0.044)	0.098 (0.034)	0.095 (0.035)	0.105 (0.039)
Adjusted R^2 (%)	0.60	2.54	5.07	10.75
Number of observations	2555	2540	2525	2495

The table presents the results of panel regressions in which future cumulative dollar depreciations over one-, three-, six-, and 12-month horizons are predicted along with current portfolio weights of three benchmark strategies (i.e., carry, momentum, and value) and the trend combo. The cumulative returns are scaled to a monthly basis to facilitate the comparison of the coefficients. Point estimates are reported with standard errors, clustered by currency, in parentheses. Adjusted within R^2 values and the number of observations are also reported. The regressions include time fixed effects, though they are not reported. The sample period is August 1996 to March 2017, but returns start at different dates due to differences in lookback periods.

IA Table 13: Weight analysis for the momentum strategy and the trend combo

	Momentum		Trend combo		Different signs
	Below median	Above median	Below median	Above median	
Australia	0.398	0.602	0.131	0.869	0.390
Austria	0.618	0.382	0.622	0.378	0.488
Belgium	0.458	0.542	0.696	0.304	0.571
Canada	0.515	0.485	0.462	0.538	0.508
Denmark	0.430	0.570	0.474	0.526	0.510
Eurozone	0.596	0.404	0.727	0.273	0.436
Finland	1.000	0.000	0.750	0.250	0.545
France	0.508	0.492	0.801	0.199	0.546
Germany	0.728	0.272	0.919	0.081	0.272
Ireland	0.460	0.540	0.304	0.696	0.576
Israel	0.366	0.634	0.038	0.962	0.366
Italy	0.326	0.674	0.236	0.764	0.421
Japan	0.594	0.406	0.865	0.135	0.422
Netherlands	0.669	0.331	0.867	0.133	0.404
New Zealand	0.332	0.668	0.541	0.459	0.453
Norway	0.499	0.501	0.336	0.664	0.450
Portugal	0.270	0.730	0.026	0.974	0.270
Spain	0.354	0.646	0.059	0.941	0.346
Sweden	0.516	0.484	0.559	0.441	0.491
Switzerland	0.610	0.390	0.802	0.198	0.388
United Kingdom	0.492	0.508	0.290	0.710	0.445
Average					0.443

The table presents an analysis of the portfolio weights for the momentum benchmark and the trend combo. The first two columns report the fraction of months each currency weight is below or above the monthly median weight for the momentum strategy. By construction, the two columns sum to one. The next two columns report the corresponding fractions for the trend combo. The final column reports the fraction of months the momentum and combo weights for a particular currency have different signs. The last row in that column reports the average fraction across the currencies. The sample period is January 1976 to March 2017.

IA Table 14: Weight analysis for the value strategy and the trend combo

	Value		Trend combo		Different signs
	Below median	Above median	Below median	Above median	
Australia	0.717	0.283	0.131	0.869	0.627
Austria	0.707	0.293	0.622	0.378	0.505
Belgium	0.507	0.493	0.696	0.304	0.521
Canada	0.455	0.545	0.462	0.538	0.306
Denmark	0.524	0.476	0.474	0.526	0.467
Eurozone	0.569	0.431	0.727	0.273	0.500
Finland	0.625	0.375	0.750	0.250	0.625
France	0.332	0.668	0.801	0.199	0.707
Germany	0.430	0.570	0.919	0.081	0.593
Ireland	0.330	0.670	0.304	0.696	0.420
Israel	0.637	0.363	0.038	0.962	0.675
Italy	0.693	0.307	0.236	0.764	0.419
Japan	0.551	0.449	0.865	0.135	0.350
Netherlands	0.319	0.681	0.867	0.133	0.705
New Zealand	0.656	0.344	0.541	0.459	0.492
Norway	0.394	0.606	0.336	0.664	0.502
Portugal	0.615	0.385	0.026	0.974	0.606
Spain	0.470	0.530	0.059	0.941	0.470
Sweden	0.271	0.729	0.559	0.441	0.552
Switzerland	0.643	0.357	0.802	0.198	0.411
United Kingdom	0.411	0.589	0.290	0.710	0.559
Average					0.524

The table presents an analysis of the portfolio weights for the value benchmark and the trend combo. The first two columns report the fraction of months each currency weight is below or above the monthly median weight for the value strategy. By construction, the two columns sum to one. The next two columns report the corresponding fractions for the trend combo. The final column reports the fraction of months the value and combo weights for a particular currency have different signs. The last row in that column reports the average fraction across the currencies. The sample period is January 1976 to March 2017.

IA Table 15: Volatility timing for the trend strategies

Returns on combos with volatility timing						
	Economic activity	Economic activity	Inflation	Inflation	Trend combo	Trend combo
Constant	-0.076 (0.378)	-0.601 (0.390)	1.340 (0.569)	1.095 (0.460)	0.613 (0.494)	0.186 (0.477)
Carry		0.027 (0.026)		-0.059 (0.041)		-0.004 (0.036)
Momentum		0.034 (0.023)		0.143 (0.057)		0.073 (0.040)
Value		0.085 (0.023)		0.090 (0.053)		0.059 (0.047)
Economic activity	1.268 (0.059)	1.265 (0.058)				
Inflation			1.045 (0.088)	1.072 (0.083)		
Trend combo					1.524 (0.095)	1.542 (0.097)
Adjusted R^2 (%)	83.93	84.60	80.00	79.18	80.39	80.87
Number of observations	490	434	490	434	490	434

The table presents a contemporaneous regression of the monthly returns of the combos (economic activity, inflation, and trend) with volatility timing on respective combos without volatility timing and the carry, momentum, and value benchmarks. Constants are annualized alphas. Point estimates are reported with Newey and West (1987) standard errors, accounting for conditional heteroscedasticity and serial correlation up to three lags, in parentheses. Adjusted R^2 values and the number of observations are also reported. The sample period is January 1976 to March 2017, but returns start at different dates due to differences in lookback periods.

IA Table 16: Volatility timing for the benchmark strategies

Returns on benchmarks with volatility timing						
	Carry	Carry	Momentum	Momentum	Value	Value
Constant	0.792 (0.349)	0.423 (0.360)	1.516 (0.427)	1.272 (0.358)	-0.245 (0.336)	-0.487 (0.328)
Carry	0.914 (0.050)	0.884 (0.053)		0.059 (0.041)		0.037 (0.037)
Momentum		0.092 (0.032)	0.809 (0.058)	0.805 (0.074)		0.055 (0.045)
Value		0.081 (0.025)		0.051 (0.057)	0.852 (0.050)	0.880 (0.047)
Adjusted R^2 (%)	83.81	83.80	81.22	80.17	82.79	83.18
Number of observations	494	434	482	434	434	434

The table presents a contemporaneous regression of the monthly returns of the benchmarks (carry, momentum, and value) with volatility timing on the benchmarks without volatility timing. Constants are annualized alphas. Point estimates are reported with Newey and West (1987) standard errors, accounting for conditional heteroscedasticity and serial correlation up to three lags, in parentheses. Adjusted R^2 values and the number of observations are also reported. The sample period is January 1976 to March 2017, but returns start at different dates due to differences in lookback periods.

IA Table 17: Performance of trend strategies (G10 and emerging markets)

	G10			Emerging markets		
	Economic activity	Inflation	Combo	Economic activity	Inflation	Combo
Mean	1.505	3.424	2.391	1.108	6.308	3.569
Standard deviation	5.133	6.398	4.353	6.058	7.725	4.675
Skewness	-0.035	-0.715	-0.605	-0.370	0.254	-0.118
Excess kurtosis	2.428	3.788	2.481	1.773	2.039	2.394
AR(1)	-0.010	0.127	0.054	0.096	0.136	0.219
Sharpe ratio	0.293	0.535	0.549	0.183	0.817	0.763

The table presents performance measures for sub-combos (economic activity and inflation) and the diversified trend combo for the G10 and emerging market countries. Economic activity combines industrial production, retail sales, and the inverse of unemployment; inflation combines consumer and producer price indices. The strategies use rank-based weights each month, going long currencies with relatively strong trends and shorting currencies with relatively weak trends. Each strategy diversifies across sub-strategies by weighting each sub-strategy by the inverse of its past volatility. The measures are based on monthly returns, but means, standard deviations, and Sharpe ratios are annualized. AR(1) refers to the first-order autocorrelation of returns. The sample period is January 1976 to March 2017 for the G10 and January 1997 to March 2017 for emerging markets.

IA Table 18: Performance of trend strategies (sub samples)

	January 1976–July 1996			August 1996–March 2017		
	Economic activity	Inflation	Combo	Economic activity	Inflation	Combo
Mean	1.411	3.015	2.107	1.629	3.536	2.580
Standard deviation	2.996	4.357	2.877	4.629	5.512	3.721
Skewness	-0.163	-0.688	-0.708	0.359	-0.814	-0.631
Excess kurtosis	1.941	2.654	2.816	0.988	5.957	2.503
AR(1)	-0.024	-0.032	-0.057	-0.046	0.120	0.056
Sharpe ratio	0.471	0.692	0.732	0.352	0.642	0.693

The table presents performance measures for sub-combos (economic activity and inflation) and the diversified trend combo for the sub-periods January 1976 to July 1996 and August 1996 to March 2017. Economic activity combines industrial production, retail sales, and the inverse of unemployment; inflation combines consumer and producer price indices. The strategies use rank-based weights each month, going long currencies with relatively strong trends and shorting currencies with relatively weak trends. Each strategy diversifies across sub-strategies by weighting each sub-strategy by the inverse of its past volatility. The measures are based on monthly returns, but means, standard deviations, and Sharpe ratios are annualized. AR(1) refers to the first-order autocorrelation of returns.

IA Table 19: Performance of time-series trend strategies (G10, developed markets, and emerging markets)

	G10			Developed markets			Emerging markets		
	Economic activity	Inflation	Combo	Economic activity	Inflation	Combo	Economic activity	Inflation	Combo
Mean	0.566	2.561	1.625	0.300	2.642	1.421	3.961	4.120	4.237
Standard deviation	4.907	3.737	2.778	5.012	3.600	2.394	5.884	4.877	3.382
Skewness	-0.185	1.023	0.340	-0.381	1.505	0.085	-1.452	0.353	1.040
Excess kurtosis	4.117	8.300	6.995	4.468	10.113	6.679	8.610	1.575	4.605
AR(1)	0.079	0.100	-0.039	0.088	0.104	-0.011	0.235	0.062	0.264
Sharpe ratio	0.115	0.685	0.585	0.060	0.734	0.594	0.673	0.845	1.253

The table presents performance measures for sub-combos (economic activity and inflation) and the diversified trend combo for the G10, developed, and emerging market countries. The strategies are time-series strategies, allowing for a dollar exposure. Economic activity combines industrial production, retail sales, and the inverse of unemployment; inflation combines consumer and producer price indices. The strategies use time-series weights each month, going long (short) currencies with trends stronger (weaker) than that of the base currency, the USD. Each strategy diversifies across sub-strategies by weighting each sub-strategy by the inverse of its past volatility. The measures are based on monthly returns, but means, standard deviations, and Sharpe ratios are annualized. AR(1) refers to the first-order autocorrelation of returns. The sample period is January 1976 to March 2017 for the G10 and developed markets, and January 1997 to March 2017 for emerging markets.

IA Table 20: Factor regressions for the time-series trend combo

	Returns on trend combo		
	I	II	III
Constant	1.030 (0.372)	2.203 (0.499)	1.087 (0.395)
Carry	0.249 (0.035)		
Momentum	-0.012 (0.024)		
Value	0.084 (0.020)		
Dollar carry	-0.036 (0.025)		
Δ FXVOL		-0.002 (0.003)	
Δ TED		-0.002 (0.001)	
Δ VIX		-0.009 (0.010)	
FMP FXVOL			-0.079 (0.031)
FMP TED			-0.046 (0.012)
FMP VIX			0.002 (0.001)
Adjusted R^2 (%)	23.56	0.19	5.71
Number of observations	434	326	490

The table presents a contemporaneous regression of the monthly returns of the trend combo on benchmark strategies and changes in measures of volatility and funding conditions. The trend combo and benchmark strategies use time-series weights, allowing for a dollar exposure. Specification I uses the carry, momentum, value, and dollar carry benchmarks. Specification II uses changes in foreign exchange volatility (FXVOL), the TED spread, and the VIX volatility index, which are non-traded factors. Specification III uses factor mimicking portfolios, which are constructed from regressions of the non-traded factors on five carry-sorted portfolios as in Menkhoff et al. (2012a) for the longest available sample of factors. The factors are then mimicked on longest sample period possible. Constants in specifications I and III are annualized alphas, whereas the constant in specification II cannot be interpreted as alpha as the factors are non-traded. Point estimates are reported with Newey and West (1987) standard errors, accounting for conditional heteroscedasticity and serial correlation up to three lags, in parentheses. Adjusted R^2 values and the number of observations are also reported. The sample period is January 1976 to March 2017, but returns start at different dates due to differences in lookback periods. Specification II starts in January 1990 due to data availability for the VIX volatility index.

IA Table 21: Performance of time-series benchmark strategies

	Carry	Momentum	Value	Dollar carry
Mean	3.989	3.278	-1.074	5.511
Standard deviation	5.186	7.804	7.583	8.815
Skewness	-0.523	-0.385	0.647	-0.021
Excess kurtosis	4.959	1.896	2.317	0.726
AR(1)	0.072	0.040	0.079	-0.030
Sharpe ratio	0.769	0.420	-0.142	0.625

The table presents performance measures for carry, momentum, value, and dollar carry strategies. The strategies are time-series strategies, allowing for a dollar exposure. The measures are based on monthly returns, but means, standard deviations, and Sharpe ratios are annualized. AR(1) refers to the first-order autocorrelation of returns. The sample period is January 1976 to March 2017, but returns start at different dates due to differences in lookback periods.

IA Table 22: Return correlations between cross-sectional and time-series trend strategies

	Cross-sectional			Time-series		
	Economic activity	Inflation	Combo	Economic activity	Inflation	Combo
<u>Cross-sectional</u>						
Economic activity	1.000	0.206	0.753	0.365	-0.013	0.313
Inflation		1.000	0.789	0.321	0.117	0.439
Combo			1.000	0.435	0.073	0.484
<u>Time-series</u>						
Economic activity				1.000	-0.191	0.682
Inflation					1.000	0.536
Combo						1.000

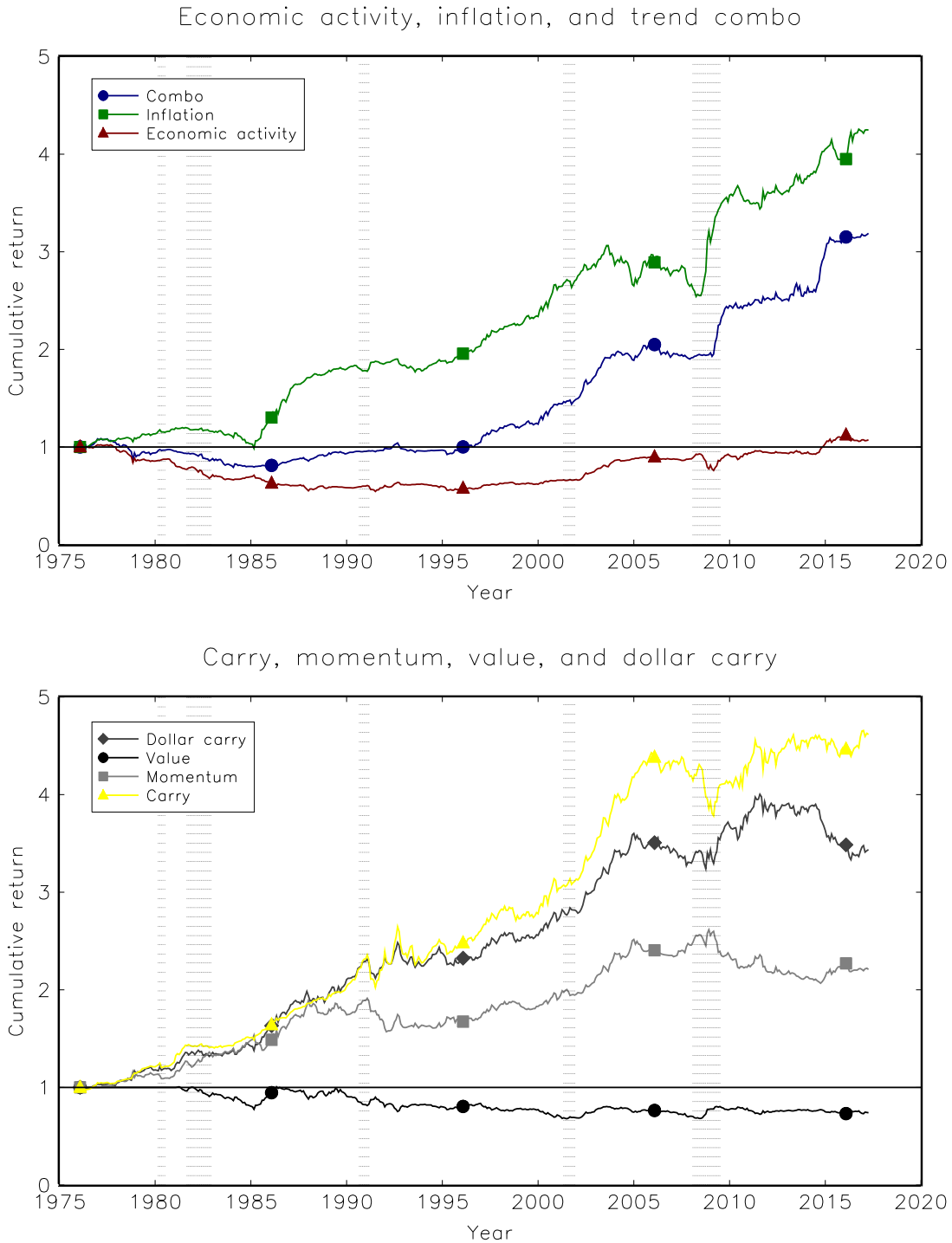
The table presents correlation coefficients between monthly returns on cross-sectional and time-series trend strategies. The sample period is January 1976 to March 2017.

IA Table 23: Relating the cross-sectional and time-series combos

	1976–2017		1976–1996		1996–2017	
	Cross-sectional	Time-series	Cross-sectional	Time-series	Cross-sectional	Time-series
Constant	1.389 (0.497)	0.604 (0.403)	2.065 (0.512)	-0.962 (0.465)	0.834 (0.831)	2.067 (0.575)
Cross-sectional		0.348 (0.045)		0.483 (0.070)		0.266 (0.045)
Time-series	0.673 (0.093)		0.746 (0.170)		0.634 (0.109)	
Adjusted R^2 (%)	23.30	23.30	35.77	35.77	16.53	16.53
Number of observations	490	490	242	242	248	248

The table presents contemporaneous regressions in which monthly returns of the cross-sectional combo is regressed onto the time-series combo and vice versa. Constants are annualized alphas. Point estimates are reported with Newey and West (1987) standard errors, accounting for conditional heteroscedasticity and serial correlation up to three lags, in parentheses. Adjusted R^2 values and the number of observations are also reported. The results are reported for the full sample period January 1976 to March 2017, and the two sub-sample periods January 1976 to July 1996 and August 1996 to March 2017.

IA Figure 1: Cumulative portfolio returns of time-series trend strategies



The figure shows the cumulative returns of time-series strategies based on fundamental variables. All portfolio returns are scaled ex post as to achieve an annualized ex post volatility of 5%. The color and symbol scheme in the top figure is: economic activity (red, triangle), inflation (green, square), and trend combo (blue, circle); the color scheme in the bottom figure is: carry (yellow, triangle), momentum (gray, square), value (black, circle), and dollar carry (dark grey, diamond). The shaded areas indicate US contractions (peak to trough) as dated by the NBER. The sample period is January 1976 to March 2017 but cumulative returns start at different dates due to differences in lookback periods.