Equity Premium Prediction

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Choice of Paper

- Chosen for importance of findings,
  - ...not for innovativeness or cleverness,
  - ...and not sure if this is *a* paper or *a* dictionary.
- Not *a* good JMP.

Background

- Goyal-Welch (2008) investigated 17 variables claiming successful equity timing
  - offered clever way to display performance
  - no variable really held up out of sample
  - disproportionate influence of 1974-5 bear market
  - (*useful* disagreements with John Cochrane and John Campbell)
    - PS: This paper is *not* about D/P
    - PS: Cochrane's is an identity, but earlier GW (MS 2003): "sort of mean-reversion". Changes in D/P predicted shorter-term changes in itself. No time to discuss.

Philosophical Disagreement

- We do both IS and OOS, but
- Campbell-Thompson defend IS over OOS test.

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- Under the prior / hypothesis that the model is true, the model offers the best (guidance to a) test of the theory.
- Correct!

- If your priors are strong enough, maybe even feel free to ignore empirical evidence.
  - IS, OOS, whatever.

Who Won the War?

- since then, another 26 papers mostly in top journals
  - 29 variables
- most claim improvement based on "solid theory,"
- and many claim OOS tests.
- many don't have last 10-15 years fully yet
  - interesting sample period: 2000s, 2008, 2018, 2020.
  - valid question about "unusual draws," but
  - history was also used to identify variables in the first place.
  - what is usual and unusual??
  - also, some ignore data from before. (not just OOS)

Does academic finance research really now know how to predict equity premia?

with solid theory?

Are Negative Findings an Indictment?

- Mostly no!
  - not 100% resolved, but pretty good.
- Researchers are never prescient.
- Only tautologies are guaranteed to hold.
  - external validity is *never* assured.
  - someone else needs to look at evidence again later,
  - which is what our paper is going to do.
  - I don't know of a better scientific approach in social science.

- Just *a* little yes.
  - note every empirical paper must make choices. authors choose frequency, overlapping, etc.
  - Professionwide, our incentives make us eager for findings,
  - ...and perhaps *a* little gullible.
  - Who wouldn't want to know how to predict equity premia?

- the evidence tilts one way, but with good priors, you can still believe.

Paper Outline

- Replicate authors' data (two exceptions [vol])
- Extend sample forward, IS and OOS
  - about 10 years on avg forward.
  - ergo, just not screw up badly, and it should still be ok.
- Extend sample backwards, too, if possible
- OOS: Constrain (via Campbell-Thompson) 0-eqprem
- Simple stability test: First half vs. second half

- Original specification and “homologous” tests
  - not overlapping
  - log returns
  - highest (mo) frequency, earliest availability, CRSP, same Rf
  - not multivariate!
- This paper also considers investment performance:
  - (think Fama-MacBeth vs. Fama-French as analogy)
  - Inv strtgy: choose based on when above/below historical.
    - one tilts towards equity, given high average $E(R_m)$ in sample.
  - choose either varying amounts or fixed $1 long/short

- Adding *a* consensus estimator based on past T statistic

How To Present 45 Variables?

- A paper on each one would have been easy.
- A paper on 45 variables is much harder.
  - heck: hard even to remember all variables!

Variable Types

1. Macroeconomic
2. Sentiment
3. Volatility
4. Cross-section

Quick summary finding:

- annual variables tended to predict better

Favorites:

Out of 45 or so:

1. Cochrane's I/K
2. 14 Technical Indicators
3. Short-Stock interest
4. 4th-Quarter Consumption growth.
5. Accruals (though only 2000-2)

- Think 10%.
- Another 10-20% with pluses and minuses.
- 70-80% poof.

List of Papers

1	Atanasov, Møller, Priestley (JF 2021),	*» Consumption Fluctuations and Expected Returns*
pce	aggregate consumption to its trend (1953:q1 – 2020:q4)	
2	Bakshi, Panayotov, Skoulakis (JFE 2011),	*» Improving the predictability of real economic activity and ass*
impvar	forward implied variances (1996:01 – 2021:12)	
3	Bekaert, Hoerova (JE 2021),	*» The VIX, the variance premium and stock market volatility* .
vp	The VIX squared minus the implied volatility. See also BTZ. (1990:01 – 2010:09)	
4	Belo and Yu (JME 2013),	*» Household & government investment and the stock market* .
govik	public-sector investment (1947:q1 – 2021:q4)	
5	Bollerslev, Tauchen, Zhou (RFS 2009),	*» Expected Stock Returns and Variance Risk Premia*
vrp	variance risk premium (1990:01 – 2021:12)	
6	Chen, Eaton, Paye (JFE 2018),	*» Micro(structure) before macro? The predictive power of aggregate illiq*
lzrt	9 illiquidity measures (1926:01 – 2021:12)	

7 Colacito, Ghysels, Meng, Siwasarit (RFS 2016), *» Skewness in Expected Macro Fundamentals and the P*

skew skewness of GDP growth forecasts (1951:q2 – 2019:q2)

8 Chava, Gallmeyer, Park (JME 2015), *» Credit conditions and stock return predictability*

crdstd loan officer credit standards (1990:q2 – 2021:q4)

9 Cooper and Priestley (RFS 2009), *» Time-Varying Risk Premiums and the Output Gap*

ogap output gap of industrial production (1926:01 – 2021:12)

10 Driesprong, Jacobsen, Maat (JFE 2008), *» Striking oil: Another puzzle?*

wtexas oil price changes (1926:01 – 2021:12)

11 Hirshleifer, Hou, Teoh (JFE 2008), *» Accruals, cash flows, and aggregate stock returns*

accrul, cfacc aggregate accruals and cash flows (1965 – 2021)

12 Huang, Jiang, Tu, Zhou (RFS 2015), *» Investor Sentiment Aligned: A Powerful Predictor of Stock Retur*

sntm optimized investor sentiment index (1965:07 – 2018:12)

13 Jones and Tuzel (RFS 2013), *» New Orders and Asset Prices*

ndrbl new orders to shipments of durable goods (1958:02 – 2021:12)

14 Jondeau, Zhang, Zhu (JFE 2019), *» Average Skewness Matters*

skvw average stock skewness (1926:07 – 2021:12)

15 Kelly and Jiang (RFS 2014), *» Tail Risk and Asset Prices* .

tail tail risk from cross-section (1926:07 – 2021:12)

16 Kelly and Pruitt (JF 2013), *» Market Expectations in the Cross-Section of Present Values* .

fbm single factor from B/M cross-section (1926:06 – 2021:12)

17 Li and Yu (JFE 2012), *» Investor attention, psychological anchors, and stock return predictabilit*.

dtoy,dtoat nearness to Dow 52-week high (1926:01 – 2021:12)

18 Maio (RF 2013), *» The Fed Model and the Predictability of Stock Returns* .

ygap stock-bond yield gap (1953:04 – 2021:12)

19 Maio (JFM 2016), *» Cross-sectional return dispersion and the equity premium* .

rdsp stock-return dispersion (1926:09 – 2021:12)

20 Mrtn (QJE 2017), *» Expected Return on the market* .

rsvix scaled risk-neutral vix (1996:01 – 2021:12)

21 Møller and Rangvid (JFE 2015), *» End-of-the-year economic growth and time-varying expected returns*

gpce, gip year-end economic growth (1947/26 – 2021)

22 Neely, Rapach, Tu, Zhou (MS 2014), *» Forecasting the Equity Risk Premium: The Role of Technical Indi*

tchi 14 technical indicators (1951:02 – 2021:12)

23 Piazzesi, Schneider, Tuzel (JFE 2007), *» Housing, consumption, and asset pricing.*

house share of housing in consumption (1929 – 2021)

24 Pollett and Wilson (JFE 2010), *» Average correlation and stock market returns*

avgcor average correlation of daily stock returns (1926:03 – 2021:12)

25 Rapach, Ringgenberg, Zhou (JFE 2016), *» Short interest and aggregate stock returns*

shtint short stock interest (1973:01 – 2021:12)

26 Yu (JFE 2011), *» Disagreement and return predictability of stock portfolios* .

disag analyst forecast disagreements (1981:12 – 2021:12)

Monthly Variables and Predictions

- T2= replication
- T3= homologous: log equity premium, non-overlapping
- joint significance on IS, OOS based on simul

- following is *not* the only viable interpretation:

✔ predicts, usually statistically signif
✗ fails to predict (underperform on investment)
· not a problem
☒ lost money in absolute terms, too

		IS Performance					Other Performance		
Table 1		Table 2			Table 3	Tbl A1	Tbl 3		Tbl 4
Ppr	Var	Same	Forw	F/B	F/B	Halves	OOSCT	IS&OOSCT	InvZLE
BH	vp	✔	✔	✔	✗	· ·	✗	✗	☒✗✗✗
BPS	impvar	✔	✗	✗	✗	· ·	✗	✗	☒☒✗✗
BTZ	vrp	✔	✗	✗	✗	· ✗	·	✗	✗✗✗✗
CEP	lzrt	✔	✗	✗	✗	· ✗	·	·	☒☒✗✗
CP	ogap	✔	✔	†✗	†✗	· ·	†✗	†✗	✗✗✗✗
DJM	wtexas	✔	✗	✗	✗	· ·	✔	·	✗✗✗✗
HJTZ	sntm	✔	✔	✔	✗	· ·	✗	✗	✗✗✗✗
JT	ndrbl	✔	✔	✔	✗	· ·	✗	✗	✗✗☒☒
JZZ	skvw	✔	✗	✗	✗	· ✗	✗	✗	☒☒✗✗
KJ	tail	✔	✔	†✗	†✗	· ✗	†✗	†✗	✗✗✗✗
KP	fbm	✔	✔	✔	✗	· ·	✗	✗	✗✗✗✗

		IS Performance					Other Performance		
Table 1		Table 2			Table 3	Tbl A1	Tbl 3		Tbl 4
Ppr	Var	Same	Forw	F/B	F/B	Halves	OOSCT	IS&OOSCT	InvZLE
LY	dtoy	✔	✗	✗	✗	✗·	✗	✗	☒✗☒☒
LY	dtoat	✔	✔	✔	✗	··	✗	✗	☒☒☒☒
Maio$_{(13)}$	ygap	✔	✗	✗	✗	··	✗	✗	☒☒✗✗
Maio$_{(16)}$	rdsp	✔	✗	✗	✗	·✗	✗	✗	☒☒☒✗
Mrtn	rsvix	✔	✔	✔	✗	·✗	✗	✗	✗✗✗✗
NRTZ	tchi	✔	✔	✔	✗	··	✔	✔	✗☒··
PW	avgcor	✔	✔	†✗	†✗	··	†✗	†✗	✗✗✗✗
RRZ	shtint	✔	✔	✔	✗	··	✔	✔	✗·✗·
YU	disag	✔	✗	✗	✗	·✗	✗	✗	✗···

		IS Performance					Other Performance		
Table 1		Table 2			Table 3	Tbl A1	Tbl 3		Tbl 4
Ppr	Var	Same	Forw	F/B	F/B	Halves	OOSCT	IS&OOSCT	InvZLE
BMRR	ntis	n/a	n/a	n/a	✗	n/a ·	✗	✗	✗✗✗✗
Cmpl	tby	n/a	n/a	n/a	✔	n/a ·	✔	✔	✗✗✗✗
CSa	d/p	n/a	n/a	n/a	✗	n/a ·	✗	✗	✗✗✗✗
CSb	d/y	n/a	n/a	n/a	✗	n/a ·	✗	✗	✗✗✗✗
CSc	e/p	n/a	n/a	n/a	✗	n/a ·	✗	✗	✗✗✗✗
CSd	d/e	n/a	n/a	n/a	✗	n/a ✗	✗	✗	✗✗✗✗
CSe	svar	n/a	n/a	n/a	✗	n/a ✗	✗	✗	✗✗✗✗
FFa	lty	n/a	n/a	n/a	✗	n/a ·	✔	✔	✗✗✗✗
FFb	ltr	n/a	n/a	n/a	✗	n/a ·	✗	✗	✗ · ✗ ·
FFc	tms	n/a	n/a	n/a	✗	n/a ·	·	✔	✗✗✗ ·
FFd	dfy	n/a	n/a	n/a	✗	n/a ·	✗	✗	✗✗✗✗
FFe	dfr	n/a	n/a	n/a	✗	n/a ·	✗	✗	✗✗✗✗
FS	infl	n/a	n/a	n/a	✗	n/a ·	✔	·	✗ · ✗✗
KS	b/m	n/a	n/a	n/a	✗	n/a ✗	✗	✗	✗✗✗✗

Quarterly Variables and Prediction

		IS Performance					Other Performance		
Table 1		Table 2			Table 3	Tbl A1	Tbl 3		Tbl 4
Ppr	Var	Same	Forw	F/B	F/B	Halves	OOSCT	IS&OOSCT	InvZLE
AMP	pce	✔	✔	✔	✔	· ·	✗	✔	✗✗✗
BY	govik	✔	·	✗	✗	✗✗	·	·	✗✗✗
CGP	crdstd	✔	·	✗	✗	· ·	✔	✔	✗ · ✗ ·
Crn	i/k	n/a	n/a	n/a	✔	n/a ·	✔	✔	✗✗✗
LL	cay	n/a	n/a	n/a	✗	n/a✗	✗	✗	✗✗✗

Annual Variables and Prediction

		IS Performance					Other Performance		
Table 1		Table 2			Table 3	Tbl A1	Tbl 3		Tbl 4
Ppr	Var	Same	Forw	F/B	F/B	Halves	OOSCT	IS&OOSCT	InvZLE
CGMS	skew	✗	✗	✗	✗	✗✗	✗	✗	✗✗✗✗
HHT	accrul	✔	✔	✔	✔	· ·	✔	✔	✗ · ✗ ·
HHT	cfacc	✔	✔	✔	✔	· ·	✔	✔	✗ · · ·
MR	gpce	✔	✔	✔	✔	· ·	✔	✔	✗ · ☒ ·
MR	gip	✔	✔	✗	✗	· ✗	✗	✗	✗✗☒✔
PST	house	✔	✔	✗	✗	✗✗	✔	✗	☒☒✗☒
BW	eqis	n/a	n/a	n/a	✔	n/a ·	✔	✔	✗✗ · ·

		IS Performance					Other Performance		
Table 1		Table 2			Table 3	Tbl A1	Tbl 3		Tbl 4
Ppr	Var	Same	Forw	F/B	F/B	Halves	OOSCT	IS&OOSCT	InvZLE
CGMS	skew	✗	✗	✗	✗	✗·	✗	✗	·✗·✗
HHT	accrul	✔	✔	✔	✔	··	✔	✔	✗·✗✔
HHT	cfacc	✗	✗	✗	✗	··	✔	✔	✗✗·✗
MR	gpce	✔	✔	✔	✔	··	✔	✔	···✔
MR	gip	✗	✔	✔	✗	··	✗	✗	✗✗✗✗
PST	house	✔	✗	✗	✗	✗✗	✗	✗	✗✗✗✗
BW	eqis	n/a	n/a	n/a	✗	n/a✗	✗	✔	✗✗✗✗

Noteworthy: Bekaert-Heroeva (2014)

- alphabetically, first
- overlaps monthly returns into quarterly
- and updates historical data over time
  - (posted $\neq$ historical)
- some inv strtgs earn negative returns
  - (better: choose opposite of vp?)
- ... many other undiscussed variables sort of like this

Noteworthy: Martin QJE (2017)

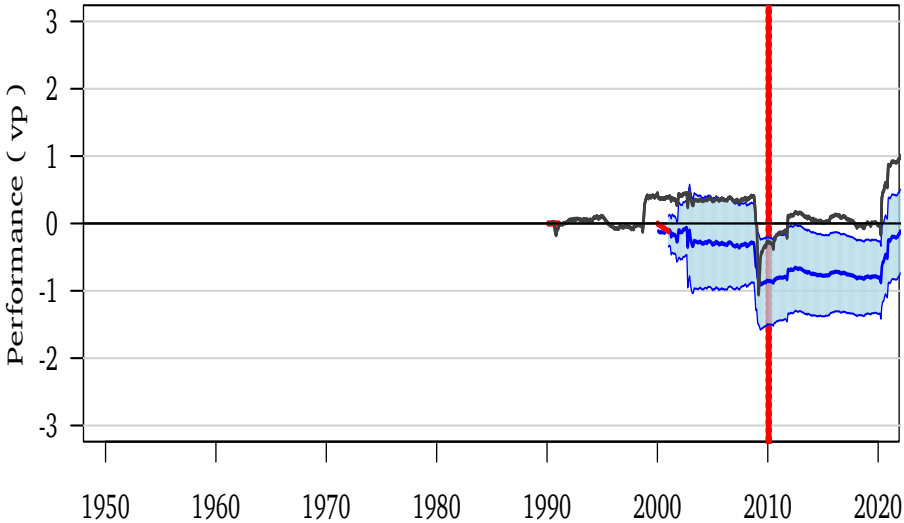
- Very appealing hypothesis intuitively.
- rsvix: 99.5% correlation with VIX^2 (on monthly)
- See specific appendix.
- Does not outpredict, even IS, at statistically sig levels.
- Switch of Hypothesis:
  - asks not to reject "no prediction" with 95% assurance,
  - but to reject "prediction is ok" with 95% assurance,
  - (and even has difficulties here on some frequencies!!)

Noteworthy: Kelly Pruitt (2013)

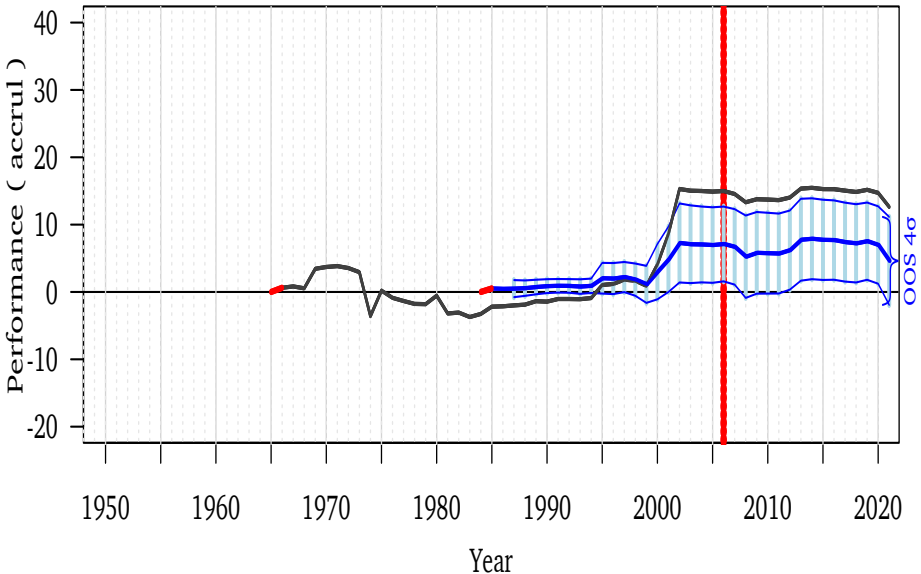
- (PLS: IS T is meaningless **and** worse than random.)
  - resample, rerun for PLS T
- Predicts stock returns, not equity premia.
  - Disappears predicting stock returns minus inflation.
  - also disappears when predicting OOS earlier or later

Noteworthy: Bollerslev, Tauchen, Zhou (2009)

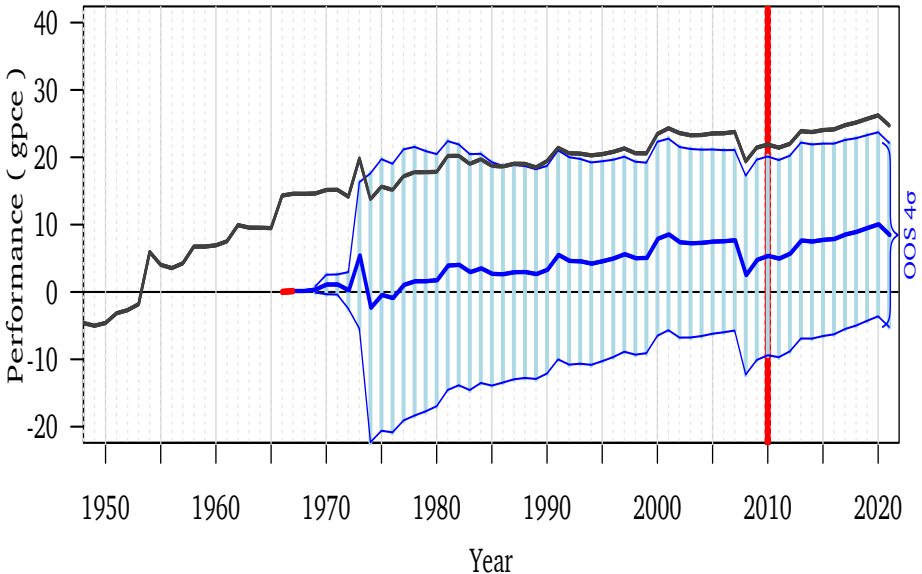
- Most cited.



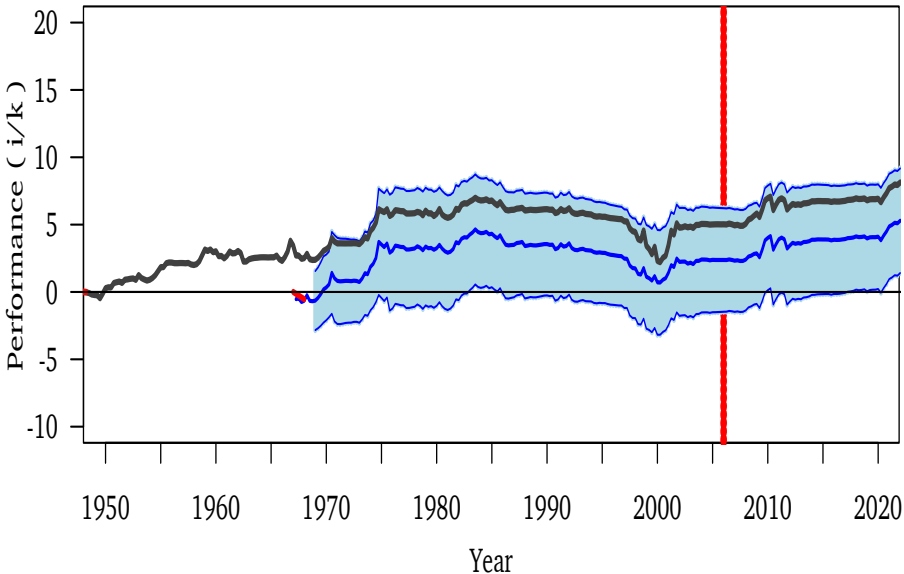
Noteworthy: HHT Accruals



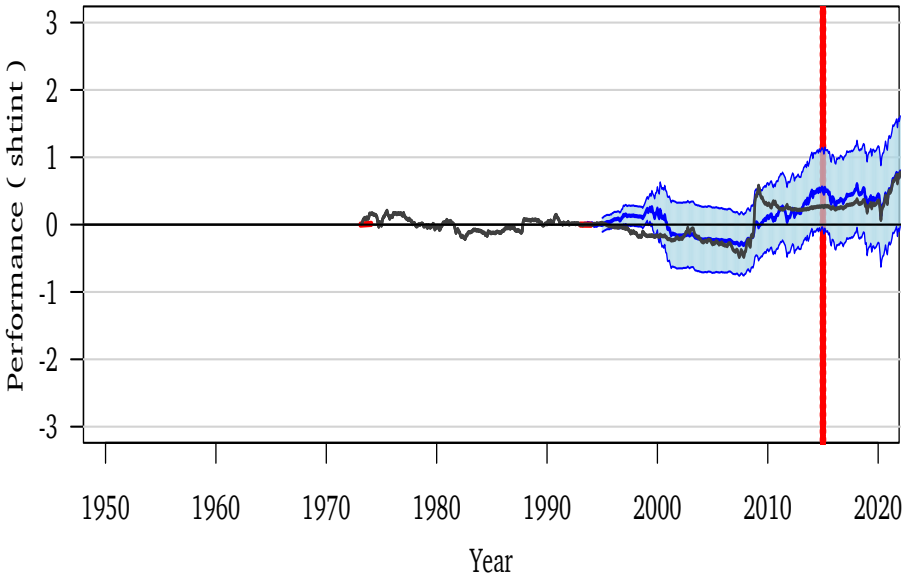
Noteworthy: GPCE (Fourth Quarter)



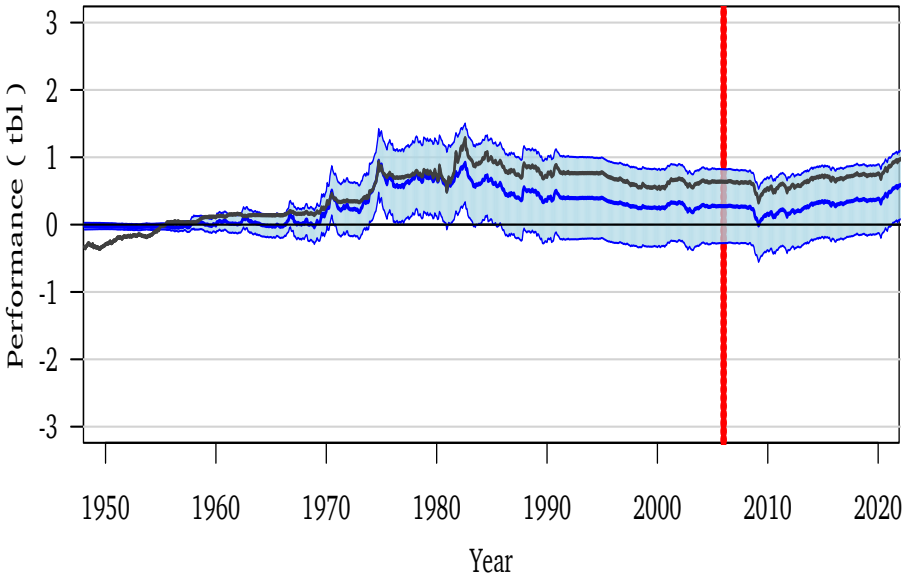
Noteworthy: I/K



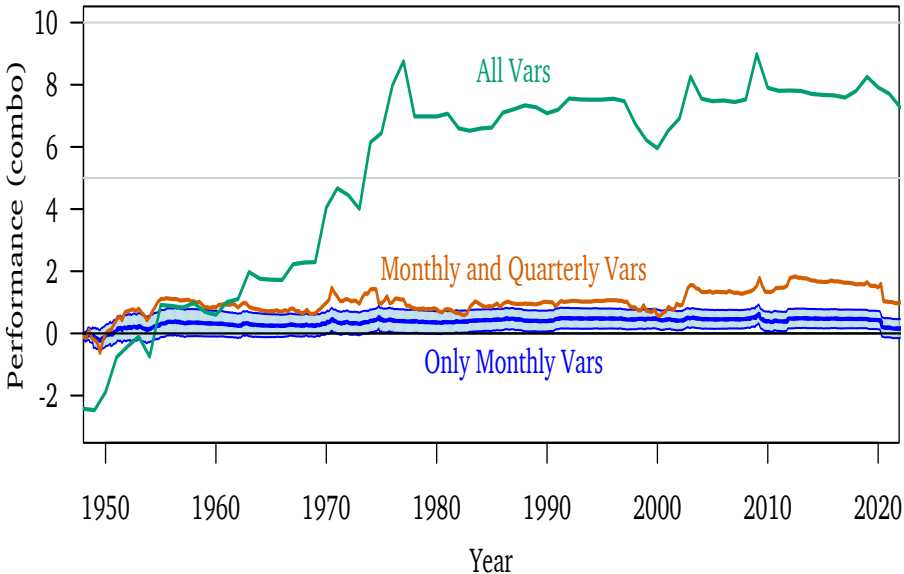
Noteworthy: Short Stock Interest



Noteworthy: Interest Variables (TBY)



Consensus Predictors



Summary

- 10 years later, including same data — not exactly a tough test
- Depending on your theory priors, our evidence is useful or useless.
- YMMV

- Theory is too flexible
  - has not done what we claimed we want it for: to provide meaningful constraints and more stable prediction.
  - behavioral often claims absurd ways to get rich
  - risk ones have not worked much, either
- My theory: how could I "beat" the market??
  - think small amount of your money into timing
  - 2023: I don't know what I can confidently recommend
  - (continue literature, but retest again.)