Navigating Through Fear and Greed

The Experience-Driven Disposition Effect

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The investor's worst enemy

"The investor's chief problem – and even his worst enemy – is likely to be himself."

– Benjamin Graham

The disposition effect.

Investors hold losers too long and sell winners too soon – documented across countries, asset classes, periods, and institutional investors. Shefrin & Statman 1985; Odean 1998

Why care?

- The stocks investors *sell* outperform the ones they *hold* by about 3.4 percentage points per year Odean 1998 – the "it'll bounce back" rationale isn't in the data.
- The decision hinges on the investor's own purchase price – not on where the stock is going. Tax planning prescribes the opposite: sell losers, hold winners Constantinides 1984.

Open question.

Does *experience* attenuate it – and if so, do gains and losses teach the same lesson?

The experience puzzle

One view: experience teaches rationality.

Field markets and lab studies show behavioral biases shrink with trading activity.

> List (2003, 2004); Seru, Shumway & Stoffman (2010); Dhar & Zhu (2006).

Another view: experience amplifies bias.

Bad experiences – market crashes, big losses – can entrench or even worsen biases.

> Malmendier & Nagel (2011); Choi et al. (2007); Kuhnen (2015).

The tension.

Existing studies measure experience as cumulative trade count – agnostic about *what was learned*.

But realized gains and realized losses are emotionally and informationally different.

Sample selection.

Many prior datasets cover bull-only periods – so they over-sample winners and under-sample losers.

A boom $\rightarrow$ bust window is needed to identify the asymmetry.

Goal of this paper:

separate *winning* from *losing* experiences and ask whether they shape the disposition effect symmetrically.

This paper

- Data. Account-level transactions for **189,530 Chinese retail investors**, **40M+ orders**, **Jul 2013 – Feb 2016**; covers the full boom (SSE: 2,000 $\rightarrow$ 5,000) and bust (5,000 $\rightarrow$ 2,700).
- Empirical result – the asymmetry. Past trading experiences reshape the disposition effect, but **valence matters**:
  - **greed**: sequences of salient *gains* attenuate the disposition effect.
  - **fear**: sequences of salient *losses* amplify it.
- Mechanism. A disciplined **memory-based cued-recall model** (Howard & Kahana 2002; Kahana et al. 2025) – combines temporal context with stock-return skewness to generate the baseline disposition effect *and* its asymmetric experience response from a single mechanism.
- Why it matters. Static utility-based accounts (prospect theory, realization utility) predict a **fixed** DE per investor – and lack a principled reason for the **sign-flip** (gains $\downarrow$ DE, losses $\uparrow$ DE). Memory dynamics deliver it from one channel.

Roadmap

1. **Data and measurement: Chinese boom–bust, experience counts**
2. The asymmetric experience-driven disposition effect
3. Robustness: thresholds, holding period, mechanical bias
4. Mechanism: cued-recall memory model
5. Heterogeneity, wide framing, and takeaways

Setting: a full boom–bust cycle

Why this window?

Most prior disposition-effect papers use *bull-only* samples. We span bull, crash, and recovery – so investors accumulate *both* salient wins and salient losses.

SSE Composite Index. Green shading: our sample window (Jul 2013 – Feb 2016). Grey: 2015 crash.

Data and sample

Source.

A major Chinese brokerage – complete records from account opening: every buy, every sell, prices, volumes, account demographics, and a survey-based risk-tolerance score.

Coverage.

- 189,530 retail investors
- ∼4,000 listed A-share stocks
- 40,000,000+ transactions
- 43,407,019 investor-stock-day observations
- Average tenure: 340 days

Investor characteristics (means).

Male	55%
Age	38 years
Risk-taking (1–5)	3.05
Education (1–7)	4.11
Stocks per portfolio	7.6
Portfolio value (median)	RMB 63,472
Losing experiences (>5%)	6.45
Winning experiences (>5%)	5.66
Losing experiences (>30%)	0.68
Winning experiences (>30%)	0.28

Bottom line.

A large, granular, demographically diverse field sample spanning a full cycle.

Measuring experience and the disposition effect

Key innovation.

We *separate* past wins from past losses – and let each have its own slope.

Position & trading episode.

A *position* starts at the first purchase of a stock; ends at the first sale (partial sales start a new episode).

Significant experiences.

For threshold $X \in \{5\%, 10\%, \ldots, 30\%\}$:

$$\text{LossExp}_{i,t} = \sum_{T<t} \mathbf{1}\{r_{i,T} < -X\}$$

$$\text{WinExp}_{i,t} = \sum_{T<t} \mathbf{1}\{r_{i,T} > +X\}$$

Salience cutoff captures outcomes large enough to be *encoded in memory* (and net of trading costs).

Disposition effect.

$$\text{PGR} = \frac{\text{realized gains}}{\text{realized gains} + \text{paper gains}}$$

$$\text{PLR} = \frac{\text{realized losses}}{\text{realized losses} + \text{paper losses}}$$

$$\text{DE} = \text{PGR} - \text{PLR} > 0 \Rightarrow \text{bias.}$$

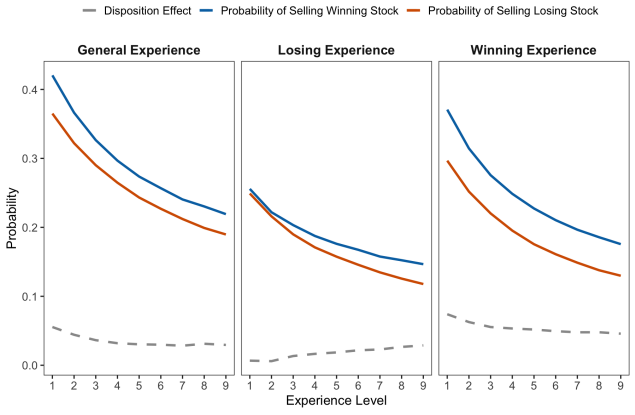
In our sample.

12.4% of gains realized; 8.3% of losses realized;
$\Rightarrow$ DE ≈ 4.1 p.p. Right in line with Odean (1998), Seru et al. (2010).

A first look: experience reshapes selling, asymmetrically

The dashed line tells the story:

DE *shrinks* along the winning-experience axis; *rises* along the losing-experience axis.



x-axis: count of prior trading episodes of each type. Solid: P(sell|winner) and P(sell||loser). Dashed: DE = gap.

Baseline: trading experience attenuates DE

$$\text{Sale}_{i,j,t} \;=\; \alpha + \beta_1\,\text{Gain}_{i,j,t} + \beta_2\,\text{Exp}_{i,t} + \beta_3\,(\text{Gain}_{i,j,t} \times \text{Exp}_{i,t}) + \alpha_i + \lambda_j + \tau_t + \varepsilon.$$

Dep. var.: Sale $\times 100$	(1) No FE	(2) +Inv&Stock FE	(3) +Time FE
Gain	4.49^{***}	4.10^{***}	2.75^{***}
Experience (all trades)	-0.010^{***}	-0.018^{***}	0.003^{**}
Gain $\times$ Exp	-0.0043^{**}	-0.0046^{***}	$\mathbf{-0.0020^{**}}$
Observations		$43{,}388{,}866$	

Read. The Gain coefficient (≈ 2.75) is the disposition effect. The negative interaction means: *the more you've traded, the smaller your DE* – consistent with Seru, Shumway & Stoffman (2010).

So far, just learning. But this measure doesn't say *what* was learned.

Main result: fear amplifies, greed attenuates

Split experience by valence at the $|X| > 5\%$ threshold:

$$\text{Sale}_{i,j,t} \;=\; \alpha + \beta_1 \text{Gain} + \beta_2 \text{LossExp} + \beta_3 \text{WinExp} + \boldsymbol{\beta_4}\, \text{Gain}\times\text{LossExp} + \boldsymbol{\beta_5}\, \text{Gain}\times\text{WinExp} + \text{FE} + \varepsilon.$$

Dep. var.: Sale $\times 100$	(1) Loss only	(2) Win only	(3) Joint, $\lvert X\rvert > 5\%$	(4) Joint, $\lvert X\rvert > 30\%$
Gain	2.67^{***}	2.66^{***}	2.67^{***}	2.43^{***}
Loss experience	0.016^{***}		0.003	0.066
Win experience		0.010	0.003	0.015
Gain × LossExp **fear**	0.0007		$\mathbf{+0.0100^{***}}$	$\mathbf{+0.0907^{***}}$
Gain × WinExp **greed**		-0.0068^{***}	$\mathbf{-0.0103^{***}}$	$\mathbf{-0.0634^{*}}$
Observations			$43{,}388{,}866$	
R^2	0.138	0.138	0.139	0.139

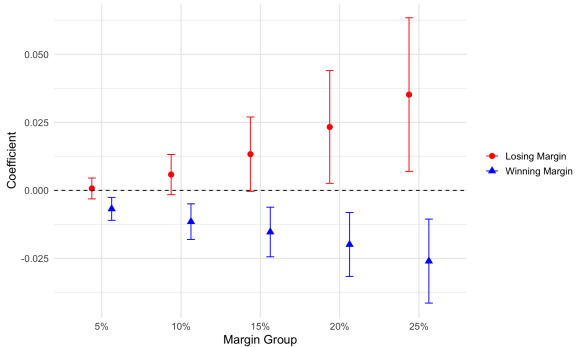
Magnitudes. At the 5% cutoff, a 2-sd rise in salient *losses* raises the DE by $\approx 10\%$; a 2-sd rise in salient *wins* attenuates it by $\approx 10\%$. At 30%, the asymmetry is roughly $9\times$ larger per experience.

The asymmetry only shows up once both terms are entered jointly – because winners and losers come bundled in real portfolios.

Asymmetry strengthens with salience

The wider the cutoff, the larger the gap.

If the asymmetry were a noise artifact, raising the threshold would weaken it. Instead, it sharpens.



$\widehat{\beta}_4$ (red, Gain $\times$ LossExp) and $\widehat{\beta}_5$ (blue, Gain $\times$ WinExp), $\pm$ 90% CI, across $X \in \{5\%, 10\%, 15\%, 20\%, 25\%\}$.

Only *salient* outcomes get encoded; small wins and losses are noise.

It's not portfolio composition or a V-shape

Worry 1. Mechanical portfolio arithmetic.

Selling a loser tilts the rest of the portfolio toward winners $\Rightarrow$ does the next trade just *look* like more DE?

We run 200 Monte Carlo experiments under three null DGPs (random; fixed DE; fixed DE + V-shape). **None** reproduces our $(+0.010,\ -0.010)$ pair – not even directionally.

See MC

Worry 2. Experience share vs. count.

Reframe experience as the *share* of trades that were big losses (wins). Gain $\times$ LossShare $= +\mathbf{32.5}^{***}$; Gain $\times$ WinShare $= -\mathbf{6.8}^{***}$. Asymmetry sharpens.

Worry 3. Holding period / V-shape.

Ben-David & Hirshleifer (2012) show a contemporaneous V-shape in P(sell | paper return). Could our experience gradient just relabel that?

Re-estimate within holding-period bins $(0, 60]$ and $(61, 250]$ days. Selling slope falls with age – but the *experience* interactions retain sign, significance, and magnitude.

Worry 4. Unobserved skill / portfolio gains.

Add Portfolio Gain interactions à la An (JF 2024). Asymmetric experience effect survives at the portfolio level.

The asymmetry is not a portfolio-arithmetic, sample-selection, holding-period, or skill artifact.

What can – and can't – explain the asymmetry

Static preference accounts.

- Prospect theory + reference points.
- Realization utility (Barberis & Xiong).
- Loss-averse CARA / CRRA.

All deliver a baseline DE with fixed parameters – but *learning shifts parameters*, and *why* parameters would shift asymmetrically from gains vs. losses is not pinned down.

Belief / attention accounts.

Can rationalize a uniform attenuation with experience, but again no clean prediction that gains and losses move the DE in *opposite* directions.

This paper's proposal.

The decision to sell is a cued recall task.

The cue is "stocks I own." What pops to mind depends on:

- **frequency** of past {stock, return} co-occurrences;
- **contextual similarity** of past trades to the present decision;
- the underlying **skewness** of returns.

Building blocks.

Temporal-context model of Howard & Kahana (2002); recall-vs-recognition formalisation in Kahana et al. (2025).

A cued-recall model of selling

Primitives. Each episode is a feature–context pair (f_i, x_i) stored as outer products in a memory matrix

$$M_n \;=\; M_{n-1} + x_i f_i^{\top}.$$

Features are basis vectors – e.g., Owned, Sold, Large, Small, Other.

Cued recall. Cue $f_{\text{cue}} =$ "stocks I own." Recover context $x_{\text{cue}} \propto M f_{\text{cue}}$, then recover features $\widetilde{f} \propto M^{\top} x_{\text{cue}}$. A feature pops if it has nonzero weight *and* its context matches the cue.

Recall probability (Kahana et al. 2025):

$$\mathbb{P}(\text{recall Large} \mid \text{Owned}) \;\propto\; \frac{n_{\text{Owned,Large}}}{\sqrt{n_{\text{Owned}}\, n_{\text{Large}}}}.$$

Behavioral rule. The investor *sells the stock whose return pops to mind*.

▸ Math details

Why this delivers the disposition effect

Large returns occur almost exclusively for *stocks*; small movements are everywhere ("other" commodities, prices in shops). Because stock returns are positively skewed (paper-return skewness $= 23.1$ in our sample), *large gains* dominate the recall set, so the cue "stocks I own" pulls up gains $\Rightarrow$ investors sell winners. Where Large = "large return," Small = "small return."

The model reproduces the asymmetric experience effect

Three theorems (informal).

1. **Baseline DE.** With sufficiently many "other" small returns and positive return skewness, $\mathbb{P}(\text{recall Large}) > \mathbb{P}(\text{recall Small})$, so the investor sells winners more than losers.

2. **Winning experiences.** Selling k winners re-tags those gains as Sold rather than Owned:

$$n_{\text{Owned,Large}} \mapsto n_{\text{Owned,Large}} - k, \qquad n_{\text{Sold,Large}} \mapsto n_{\text{Sold,Large}} + k.$$

   $\Rightarrow$ $\mathbb{P}(\text{Large} \mid \text{Owned})$ falls $\Rightarrow$ **greed**: the DE attenuates.

3. **Losing experiences.** Each realised loss shifts that loss out of Owned into Sold. What's left in "Owned" is even more dominated by large gains:

$$\mathbb{P}(\text{Large} \mid \text{Owned}) \uparrow$$

   $\Rightarrow$ **fear**: the DE amplifies. Larger losses are rarer events $\Rightarrow$ bigger marginal updates $\Rightarrow$ stronger reinforcement.

What the model buys us

A *single* representativeness-plus-skewness channel reproduces (i) the baseline DE, (ii) attenuation by wins, and (iii) amplification by losses – without invoking realization utility, sliding reference points, or distinct utility parameters per investor.

Who is most responsive?

The memory channel predicts greater susceptibility for investors who *rely more on prior episodes*: less risk-tolerant, younger, less wealthy. We test all three.

Cut	fear (Gain × LossExp)	greed (Gain × WinExp)
Risk-averse vs. risk-seeking	stronger for risk-averse	stronger for risk-averse
Younger (≤ 36) vs. older	$+0.215^{***}$ vs. $+0.027^{*}$	-0.115^{***} vs. -0.028^{***}
Lower wealth vs. higher	stronger for lower-wealth	stronger for lower-wealth

Reading. The asymmetry is concentrated where memory-based heuristics are most likely to bind: among less-experienced, less-wealthy, less risk-tolerant investors. Risk-seeking investors react to wins but not losses.

Demographic gradient is exactly what a memory account predicts – and what a static-preference account does not.

Wide framing: portfolio-level evidence

Add Portfolio Gain ($= 1$ if account is net positive at the decision) and its interactions:

	Losing-experience block	Winning-experience block
Gain	5.34^{***}	5.30^{***}
Portfolio Gain × Gain	-8.35^{***}	-8.10^{***}
Gain × Exp	-0.0591^{***}	-0.0663^{***}
Portfolio Gain × Exp	-0.1215^{***}	-0.0773^{***}
PfG × Gain × LossExp **fear**	$\mathbf{+0.3057^{***}}$	–
PfG × Gain × WinExp **greed**	–	$\mathbf{+0.1056^{***}}$

Panel B. With Portfolio Gain = Gain = 1: net effect of one additional salient *loss* $\approx +0.125$; one additional salient *win* ≈ -0.038.

Even after fully embedding decisions in their portfolio context, the asymmetry survives.

Taking stock

1. Experience matters – asymmetrically. Salient *wins* attenuate the disposition effect; salient *losses* amplify it.
2. Asymmetry is robust to thresholds, holding periods, portfolio context, mechanical bias, and demographic cuts. It *sharpens* with salience.
3. A cued-recall memory model – featuring temporal context plus return skewness – produces the baseline DE *and* the asymmetric experience response from a single mechanism.
4. Heterogeneity (younger, less-wealthy, more risk-averse investors most responsive) is what the memory account predicts.

What it means

The disposition effect is not a fixed individual trait. It is a state variable shaped by the history of realized outcomes an investor carries into the next decision – through memory, not through shifting preferences.

For investors and advisors: salient losses don't make people more cautious – they sharpen the urge to lock in gains.

Thank you

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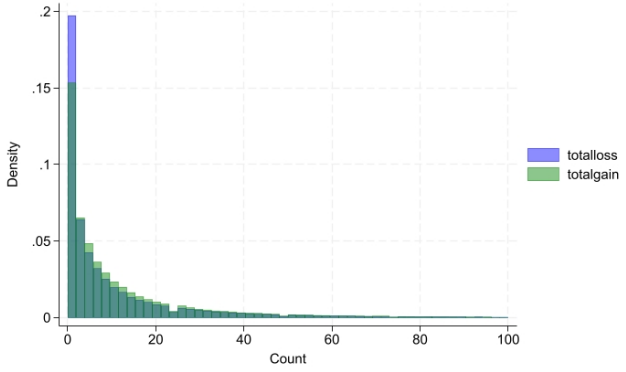
SFS Cavalcade 2026 – comments and suggestions warmly welcome.

Appendix

Appendix | Distribution of trading experience

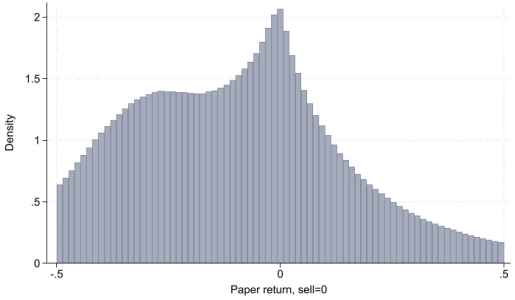


Per-account cumulative count of winning (green) and losing (purple) episodes at end of sample. Both are highly right-skewed.

The mass at “one loss” reflects investors who exit after their first painful trade; beyond that, wins and losses have similar tail shapes.

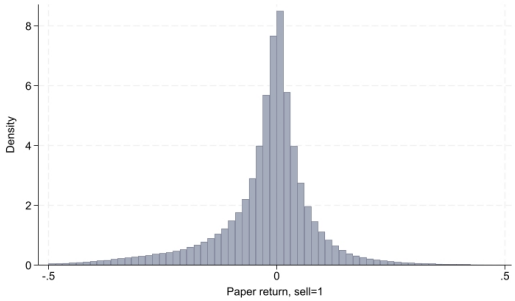
Appendix | Paper vs. realized returns

Paper (unrealized) returns



Heavy right tail; skewness $= 23.1$.

Realized returns



Much closer to symmetric – investors realize their gains.

The skewness gap is the disposition effect, visualised.

Appendix | The 30% threshold: asymmetry magnified

Dep. var.: Sale $\times 100$	(1) Counts only	(2) +Interactions
Gain	2.51^{***}	2.43^{***}
Loss experience	0.091^{*}	0.066
Win experience	-0.004	0.015
Gain $\times$ LossExp **fear**		$\mathbf{+0.091^{***}}$
Gain $\times$ WinExp **greed**		$\mathbf{-0.063^{*}}$
Inv/Stock/Time FE	Yes	Yes
Observations	$43{,}388{,}866$	$43{,}388{,}866$

At 30%, each significant loss raises selling propensity for winners by $\approx 9\times$ more per event than at 5% – and *each* extra big loss adds nearly a full percentage point to the DE on its own.

Salience scales the asymmetry, exactly as the memory account predicts.

Appendix | Mechanical bias: Monte Carlo

Design.

5,000 simulated investors, 35 sells each, 200 reps. Three nulls:

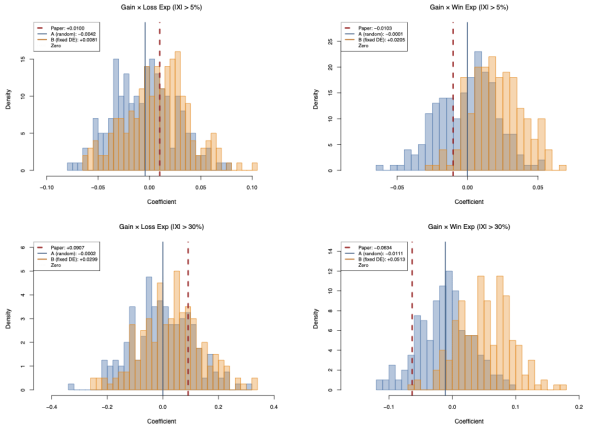
A. Random selling

B. Fixed DE (winners $1.5\times$ losers, independent of experience)

C. B + V-shape (Ben-David & Hirshleifer 2012)

Reading.

Under every null, the average simulated interaction is *statistically zero or pushes against our finding*. Our $(+0.010, -0.010)$ pair is not produced in a single replication.



Dashed red: paper estimate. Blue: random null. Orange: fixed-DE null.

Portfolio arithmetic cannot generate the asymmetry.

Appendix | Memory model – math details

Step 1. Memory matrix. Episodes (f_i, x_i):

$$M_n \;=\; M_0 + \sum_{i=1}^{n} x_i f_i^\top.$$

Step 2. Cued recall. Cue f_{cue} retrieves context, then features:

$$x_{\text{cue}} \;\propto\; M f_{\text{cue}}, \qquad \widetilde{f} \;\propto\; M^\top x_{\text{cue}}.$$

Step 3. Competitive recall (Kahana et al. 2025):

$$\mathbb{P}(\text{recall } f_i) \;\propto\; (x_i \cdot x_{\text{cue}}) \cdot \|f_i \cdot \widetilde{f}\|_0.$$

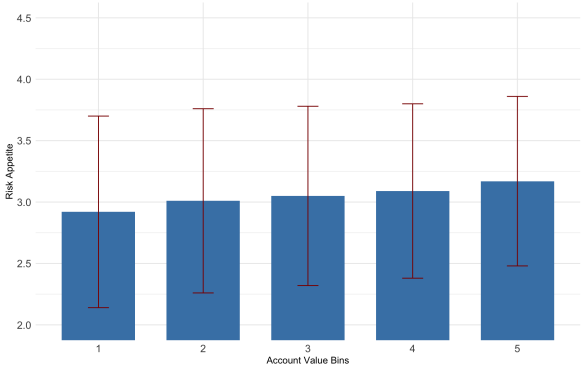
With orthogonal-context evolution and shared-feature suppression of repeats, this reduces to a normalized co-occurrence:

$$\mathbb{P}(\text{Large} \mid \text{Owned}) \;\propto\; \frac{n_{\text{Owned,Large}}}{\sqrt{n_{\text{Owned}}\, n_{\text{Large}}}}.$$

Step 4. Experience updating. A winning experience replaces $n_{\text{Owned,Large}} \mapsto n_{\text{Owned,Large}} - k$ (and adds to Sold), monotonically reducing $\mathbb{P}(\text{Large} \mid \text{Owned})$. A losing experience strips small losses from Owned, raising the relative weight on Large.

One mechanism, one set of primitives – the asymmetric experience effect drops out.

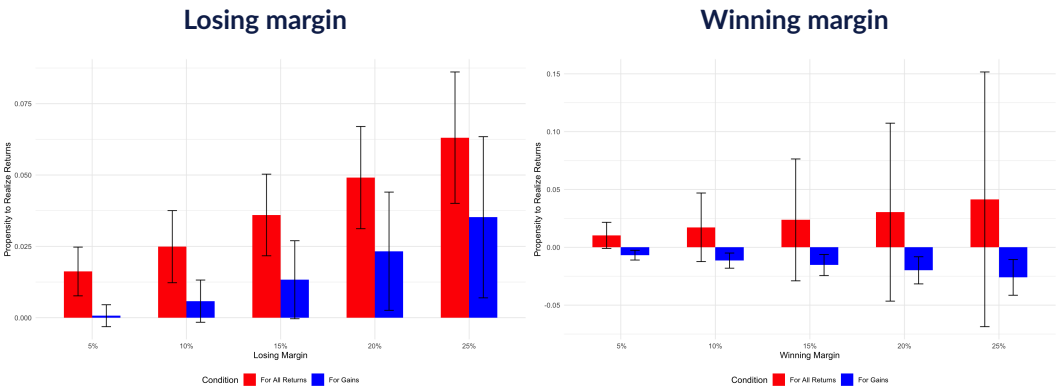
Appendix | Wealth, risk, and the asymmetry



Average self-reported risk appetite (1=most averse, 5=most seeking) by account-value quintile, ±1 SD. Risk and wealth co-move.

Wealth and risk-tolerance jointly buffer the asymmetric experience effect: the risk-seeking, wealthy tail responds to wins but not losses; the risk-averse, lower-wealth tail responds strongly to both, with the loss-amplification pattern intact.

Appendix | Where the fear interaction comes from



Decomposition of P(realize) across margin cutoffs, separately for all returns vs. gains only.

Losses lift the propensity to realize *everything*, but especially gains.