

The Price of Complexity: Parlay Margin Compounding and the Gap Between Quoted Margins and Realized Sportsbook Hold

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ABSTRACT. Two well-publicised numbers about sports betting appear to contradict each other. Measured quoted margins on online fixed-odds markets sit near 5% — my own measurement across 2.7 million cleaned markets puts the two-way head-to-head mean at 4.77% — yet the realized hold of regulated US sportsbooks, reported monthly by state gaming commissions, runs at roughly 10% and has risen for several consecutive years. This paper reconciles the two. The bridge is product mix operating through a simple identity: an n -leg parlay of independent legs each carrying margin m has a built-in hold of $1 - (1+m)^{-n}$, so margins compound multiplicatively rather than add. At the measured average leg margin, a two-leg parlay embeds an 8.9% hold, a five-leg parlay 20.8% and a seven-leg parlay 27.8% — before accounting for the fact that parlay legs are disproportionately player props, whose measured margin is 7.93%; a five-leg parlay of prop-priced legs embeds roughly 31.7%. Realized hold is therefore a stake-weighted average over a product menu whose items range from ~5% to >30%, and its secular rise is arithmetically consistent with the documented growth of parlay and same-game-parlay betting without any change in headline prices. Each additional ordinary leg adds roughly four percentage points of hold. All underlying margin measurements are openly published (CC BY 4.0).

KEYWORDS: sports betting; hold; overround; parlay; same-game parlay; product mix; consumer pricing. **JEL:** L83, G14, D40.

1. Introduction

The expected cost of a fixed-odds bet is set by the bookmaker's margin, and public commentary routinely cites two apparently inconsistent measurements of it. Price studies — including the companion measurement to this paper (Glush, 2026c) — find quoted margins on head-to-head markets of roughly 5%. Industry and regulator data, aggregated from monthly state gaming commission filings, put US operators' realized hold — gross revenue over handle — at roughly 10%, a figure that has risen steadily since single-game wagering expanded from 2018. Commentators frequently treat realized hold as “the price of betting,” and its rise as evidence of price increases. Both readings are incorrect: the quoted margin is the price of the cheapest product on the menu, while realized hold is the till receipt for what bettors actually ordered. This paper supplies the missing arithmetic linking the two.

2. The compounding identity

Consider an n -leg parlay (accumulator) of independent legs. If the fair decimal price of leg i is f_i and the bookmaker quotes $f_i/(1+m)$, carrying margin m on each leg, the parlay pays the product of quoted prices while winning with the product of fair probabilities. The bettor's expected return is $(1+m)^{-n}$ of stake, so the built-in hold of the combined bet is

$$H(n, m) = 1 - (1+m)^{-n}.$$

Margins do not add across legs; they compound. The identity requires only leg independence and uniform per-leg margin, both relaxed below — and both relaxations raise the hold further.

3. Measured inputs

The margin inputs are taken from the companion measurement of 4.27 million odds observations across 52 online bookmakers and 22 competitions over 35 days in mid-2026 (Glush, 2026a, 2026c): mean two-way head-to-head margin 4.77% (454,720 markets), and mean two-sided player-prop margin 7.93% (699,733 markets). Head-to-head is the tightest product bookmakers offer, so ladders built from it are floors on the cost of real parlays.

4. Results

4.1 The parlay hold ladder

Table 1. Built-in hold of an n -leg parlay at measured per-leg margins.

Bet	Legs at 4.77% (head-to-head)	Legs at 7.93% (player props)
Single	4.8%	7.9%
2-leg parlay	8.9%	14.2%
3-leg parlay	13.0%	20.5%
4-leg parlay	17.0%	26.3%
5-leg parlay	20.8%	31.7%
7-leg parlay	27.8%	41.4%

Around the measured margin level, each additional ordinary leg adds roughly four percentage points of built-in hold ($(1+m)^{-n}$ declines near-geometrically). A five-leg parlay of the cheapest legs on the menu costs more than four times the quoted single-bet margin; built from prop-priced legs it costs more than six times.

4.2 The ladder understates same-game parlays

Two conservative assumptions bind in the same direction. First, real parlay legs are disproportionately player props — the market family contemporary advertising promotes and the building block of the same-game parlay — at 7.93% measured margin, not 4.77%. Second, same-game-parlay legs are correlated, and operators reprice correlated combinations in their own favour rather than multiplying quoted leg prices; the repricing wedge is additional margin not captured by the identity. Table 1 is therefore a floor on the built-in hold of the products that dominate recreational betting slips.

4.3 Reconciling quoted margins with realized hold

Realized hold is a stake-weighted average of H over the product mix. A menu whose items range from 4.8% (singles) to over 30% (prop-legged parlays) yields an aggregate near 10% under entirely plausible mixes — for instance, a book taking roughly equal handle in singles and in three- to five-leg parlays. The multi-year rise in US realized hold is then arithmetically consistent with the industry's own attribution: the growth of parlay and same-game-parlay handle. No change in headline prices is required — the operator needs only to shift stakes from the singles column to the parlay column. The secular rise of hold is a composition effect, not a price effect, and analyses that treat hold as a quoted price conflate the two.

5. Limitations

The identity assumes independent legs and uniform per-leg margin; real same-game parlays violate independence in a direction that raises hold, so results are floors rather than estimates. Realized-hold comparisons rely on public state-commission aggregates whose product composition is only partially disclosed; the reconciliation is demonstrative, not a decomposition. Margin inputs come from a 35-day window in one part of the sporting calendar; the underlying panel updates quarterly as the Bet Better Margin Index.

6. Data availability

The margin measurements underlying Table 1 are published as aggregate panels under CC BY 4.0: Zenodo doi:10.5281/zenodo.21755380 (mirrors: OSF doi:10.17605/OSF.IO/Q8XHF; B2SHARE doi:10.23728/b2share.8rwvn-zz892; Harvard Dataverse doi:10.7910/DVN/DPPU80). No individual odds, prices or operator-level observations are redistributed. Companion analyses: betbetter.world/studies/price-vs-hold and betbetter.world/studies/bookmaker-margins. A companion calibration dataset is published separately (Zenodo doi:10.5281/zenodo.21764674).

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Disclosure: the author operates Bet Better, a sports analytics service, and has a commercial interest in the subject matter. The odds data underlying the margin inputs is licensed from a commercial provider whose terms permit publication of derived analysis but not redistribution of prices; all published data are irreversible aggregates. This paper is descriptive and is not betting advice. 18+; most people lose money gambling.