Who are Polymarket's Biggest Price Movers?

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1. Introduction

In this report we analyze trader behavior on Polymarket using a dataset of $1,932,773$ traders and their respective orders on the market – the largest of its kind. By grading traders on factors such as aggregate price impact, timing, market diversification, etc., we get deeper insight into characteristics of successful trades and traders on the platform. We define a trade as an individual order fill recorded on-chain.

2. Metrics

We constructed various metrics to study a trade from different dimensions, and then aggregated them by trader to get individual scores for each of the $1,932,773$ traders. Effectively, we graded the traders on five metrics based on their past order fills.

2.1. Volume-Weighted Return (VWR)

For trader i, let p_{ij} denote the price of trade j and let p_{ij}^{+} denote the next observed price in the same market immediately following trade j. The absolute Volume-Weighted Return is:

$$\text{VWR}_i = \frac{\sum_j (p_{ij}^{+} - p_{ij}) \cdot v_{ij}}{\sum_j v_{ij}}$$

where v_{ij} is the `maker_amount` in USDC. The percentage variant normalizes the price change by the entry price:

$$\text{VWR\%}_i = \frac{\sum_j \frac{p_{ij}^+ - p_{ij}}{p_{ij}} \cdot v_{ij}}{\sum_j v_{ij}}$$

VWR captures whether a trader's positions move in the right direction immediately after entry, weighted by the size of their position. **We study trade activity of the 10 traders with the highest aggregate of each these two measures.**

2.2. Win Rate & Edge Over Random

For each order fill j by trader i, a trade is classified as a win if the next price in the market exceeds the entry price, i.e. $p_{ij}^+ > p_{ij}$. Win rate is the fraction of trades that are wins:

$$\text{WR}_i = \frac{1}{n_i} \sum_j \mathbf{1}[p_{ij}^+ > p_{ij}]$$

Edge Over Random Edge_i, computed as $\text{WR}_i - 0.5$ is defined as the deviation from the theoretical baseline of a random trader, which is assumed to be 0.5. The population mean Edge in our dataset is -0.034 and the population mean Win Rate is 0.47, which are approximately consistent with their theoretical values of 0.0 and 0.5 respectively.

2.3. Early Entry Score (EES)

For each trade by trader i in market j, let b denote the block number of the trade, $b_j^{\min}$ the first block observed in market j, and $b_j^{\max}$ the last. The per-trade entry score is:

$$s = 1 - \frac{b - b_j^{\min}}{b_j^{\max} - b_j^{\min}}$$

This equals 1 if the trader enters at the very first block of the market and 0 at the last. EES is the simple average across all trades by trader i: $\text{EES}_i = \frac{1}{n_i} \sum_j s_{ij}$.

2.4. Market Specialization

Given trader i participates in M_i distinct markets, making n_i orders, the Diversification Ratio is given by: $\text{DR}_i = \frac{M_i}{n_i}$ This scores how many different markets each trader participates in.

3. Results & Analysis

3.1. Top Traders are Extreme Outliers

The Top-10 by VWR (absolute) have an 83 times greater VWR than the sample population. Similarly, Top-10 by $VWR\%$ earn 914 times the sample. Both categories also have about 90% fewer trades total trades by number than the population sample. We may attribute this large difference in VWR to a highly significant information advantage and/or discrete skill rather than generalized, long-term ability.

Table 1: Mean Trader Characteristics: Population vs. Top-10 by VWR and VWR%

Metric	**All Traders**	**Top-10 (VWR)**	**Top-10 (VWR%)**
Trading Activity			
Num. Order Fills	209.08	17.50	15.00
Total Volume (USDC)	42,659.52	4,395.61	569.28
Returns			
VWR (absolute)	9.04	754.17	96.63
VWR (%)	0.85	98.04	779.17
Skill			
Win Rate	0.466	0.663	0.797
Edge Over Random	−0.034	0.163	0.297
Market Selection			
Unique Markets	20.38	5.40	1.60
Diversification Ratio	0.288	0.310	0.099
Avg. Volume/Market (USDC)	1,660.46	1,211.79	84.13
Timing			
Early Entry Score	0.263	0.224	0.103

3.2. Trade Frequency and Specialization

As alluded to earlier, top traders make significantly less orders by both number and volume than the average trader. Top-10 traders by VWR (absolute) averaged just 17.5 trades versus 209 orders for the population, a 12 time difference. Top-10 by $VWR\%$ make even fewer trades, 15. Similarly, Top traders participate in fewer markets (5.40 and 1.60 respectively) than the population sample, which participates in 20.38 markets on average. The Top-10 by $VWR\%$ have a significantly lower Diversification Ratio of 0.099 than the population sample, 0.288. These signs strongly show that the most successful traders actually specialize in very few markets than spreading their bets.

3.3. Win Rate and Edge

Roughly consistent with theoretical pricing bias, the average population has an edge of -3.4% over random and a win rate of 46%. The Top-10 by VWR flip this with a win rate of 66.3%, which is an edge of 16.3% over random. The Top-10 by $VWR\%$ are even more skilled with a win rate of 79.7% and a 29.7% edge over random. These traders are, therefore, directionally correct a vast majority of the time by wide margins.

3.4. Trade Timing in Market Life-Cycle

The population mean early entry score is 0.263. The Top-10 by VWR score lower at 0.224, and the Top-10 by $VWR\%$ score even lower at 0.103, less than half the population average. Skilled traders are very selective about the markets they enter, and, when they do, they do so much later in the market's lifetime (about 77% and 90% of its duration respectively). In Fig.1, we see a large discrepancy across entry-timing distributions between the Top-19 group (union of both Top-10 groups) and the cumulative group of all $1,932,773$ traders.

4. Conclusion

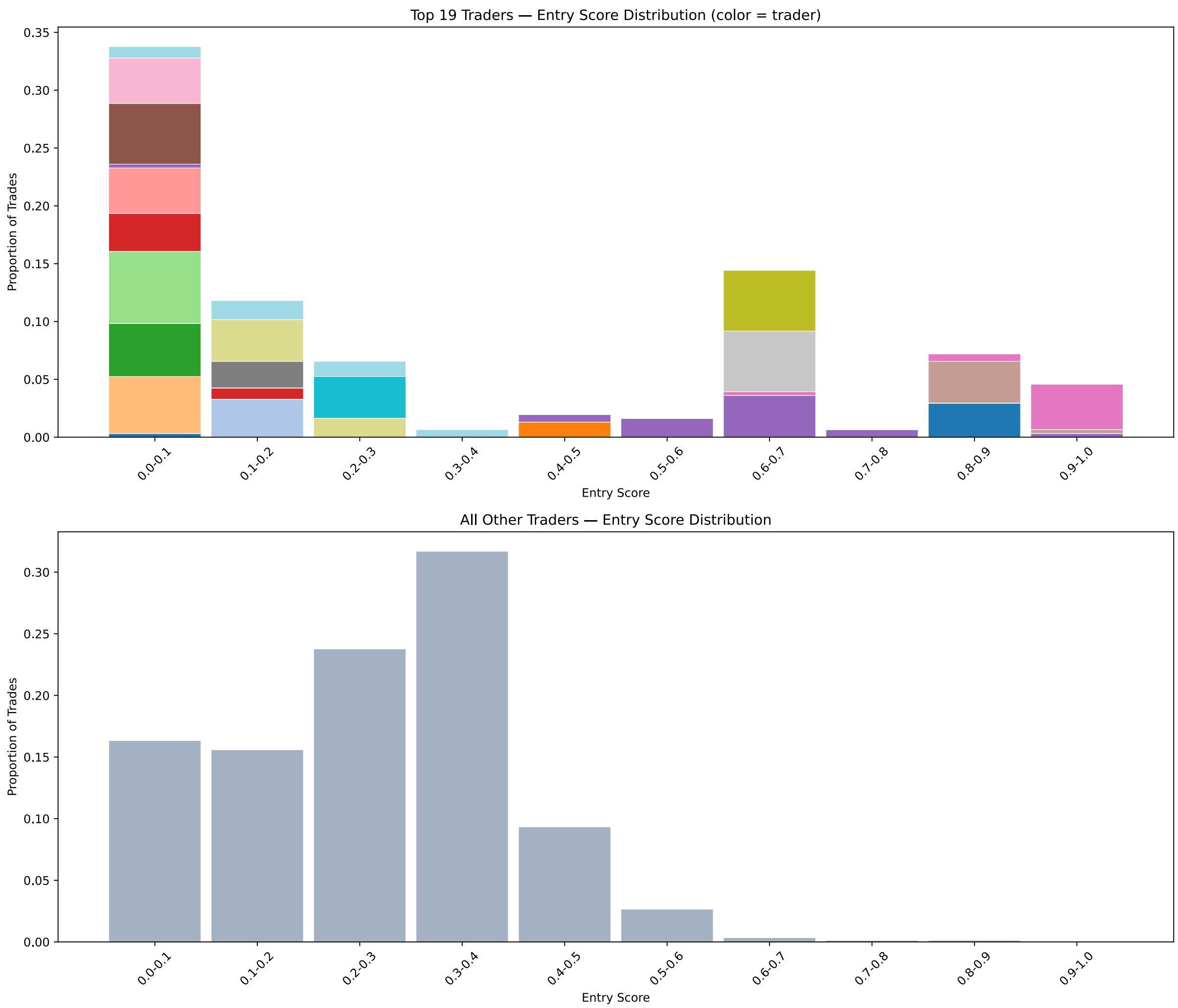

Figure 1: Distribution of Top-19 traders by Early Entry Score versus Distribution of all $1,932,773$ traders by Early Entry Score.

In this report we analyze orders made by $1,932,773$ traders in comparison with Top-10 traders rated by VWR(absolute) and $VWR\%$. We further rate traders on Win Rate, Edge Over Random, Diversification Ratio, and Early Entry Score. We find that broadly, the largest price movers on the platform diversify less, make fewer trades, and invest later in the market life-cycle.