

XP Divergence and Standard Deviation Analysis

Exploratory Research Methodology

1. XP: Raw Player Performance

XP measures the raw performance of a player. It is intended to capture the player's underlying statistical performance independently of the Overall Score.

2. Expected XP

Expected XP represents the XP level that a typical player would be expected to have at the player's current Overall Score.

$$\text{Expected XP} = 813.86 + (47.78 \times \text{Overall})$$

This relationship provides a baseline for comparing a player's actual XP with the XP level associated with his Overall Score.

3. Divergence

Divergence measures how far a player's actual XP is above or below the XP expected for his current Overall Score.

$$\text{Divergence} = (\text{XP} - \text{Expected XP}) / \text{Expected XP}$$

Positive divergence means XP is above expectation; negative divergence means XP is below expectation; zero means actual XP equals Expected XP.

4. Standard Deviation

Standard deviation is calculated from the distribution of Divergence values. Divergence is first calculated for every player, followed by the mean Divergence and standard deviation across the sample.

A player's position in standard-deviation units can then be expressed as:

$$z = (\text{Divergence} - \text{Mean Divergence}) / \text{SD of Divergence}$$

5. Standard Deviation (σ) Bands

Players are grouped according to how far their Divergence falls from the sample mean:

- $< -2\sigma$
- -2σ to -1σ
- -1σ to -0.5σ
- -0.5σ to $+0.5\sigma$
- $+0.5\sigma$ to $+1\sigma$
- $+1\sigma$ to $+2\sigma$
- $> +2\sigma$

6. Research Objective

The purpose of this analysis is to test how the XP model behaves at different levels of divergence and whether player outcomes differ across the various standard-deviation bands.

The primary outcomes being examined are:

- Average change in Overall Score
- Identity Change rate
- Number of players represented in each standard-deviation band

Research Question

Does the behavior of the XP model differ depending on how far a player's XP deviates from the XP expected for his current Overall Score?

Interpretation

This is an exploratory analysis. The purpose is not to claim that divergence itself predicts an outcome, but to determine whether the model exhibits different behavior at different levels of divergence.

Future analysis can extend this framework across repeated weekly observations to determine whether divergence and player-state changes show persistent or cyclical patterns over time.