

Massey Thaler 2013 Notes: Improving the NFL Draft Trade "chart"

① Value of a draft pick as implied by Draft Trades (the Market)

$$\sum_{i=1}^m v(t_i^H) = \sum_{j=1}^n v(t_j^L)$$

ex $v(1) = v(7) + v(11)$

$$v(t_i^r) = e^{-\lambda(t_i^r-1)^\beta}$$

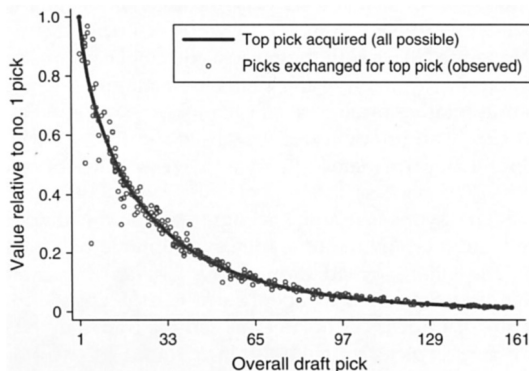
Weibull distribution. note $v(1) = 1$.
Should be nonparametric v , not Weibull...

$$\Rightarrow t_1^H = \left[\frac{1}{\lambda} \log \left(\sum_{j=1}^n e^{-\lambda(t_j^L-1)^\beta} - \sum_{i=2}^m e^{-\lambda(t_i^H-1)^\beta} \right) \right]^{\frac{1}{\beta}} + 1$$

Nonlinear Regression to find $(\hat{\lambda}, \hat{\beta})$

\rightarrow value of draft pick t is $\hat{v}(t) = e^{-\hat{\lambda}(t-1)^{\hat{\beta}}}$

Figure 1 Estimated Trade Value of Draft Picks



② Market value (compensation) as a function of performance

$$\log(\text{comp}_{i,t}) =$$

$$\alpha + \sum_n \mathbb{1}_{\left\{ \begin{array}{l} \text{player } i \text{ in year } t \\ \text{is in category } n \end{array} \right\}} \cdot \sum_{r=1}^5 B_{n,j} e^{-\eta(r-1)}$$

memory decay weight
for player performance
r years in the past

$$+ \sum_j \pi_j \mathbb{1}_{\left\{ \begin{array}{l} \text{player } i \text{ in year } t \\ \text{plays position } j \end{array} \right\}}$$

$$+ \sum_{j=6,7,8} k_j \mathbb{1}_{\left\{ \begin{array}{l} \text{player } i \text{ in year } t \\ \text{is in year } j, \\ \text{so } t=j \end{array} \right\}}$$

$$+ \delta V_i \quad (\text{optional term})$$

$V_i = \exp(-t)$ is a function
of a player's original draft pick.
Including this barely impacts
the regression.

$$+ \varepsilon_{i,t}$$

performance category $n \in \left\{ \begin{array}{l} \text{pro} \geq 14, \text{ bench, not in} \\ \text{in years } 6-8 \text{ bowl, stars, starts, player, the league} \end{array} \right\}$

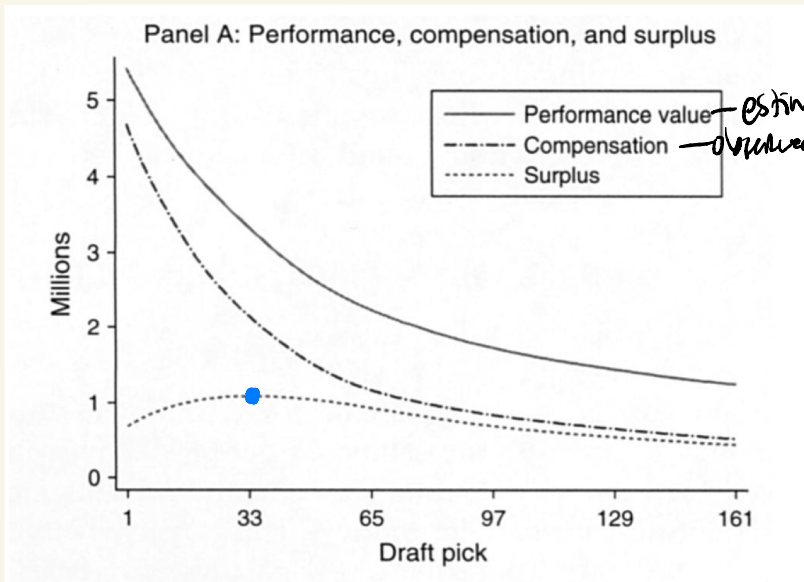
$$\Rightarrow \widehat{\text{compensation}}_{i,t} = \hat{f}(\text{performance})$$

③ Surplus Value of player i in season t

$$\hat{S}_{it} = \hat{P}_{it} - C_{it}$$

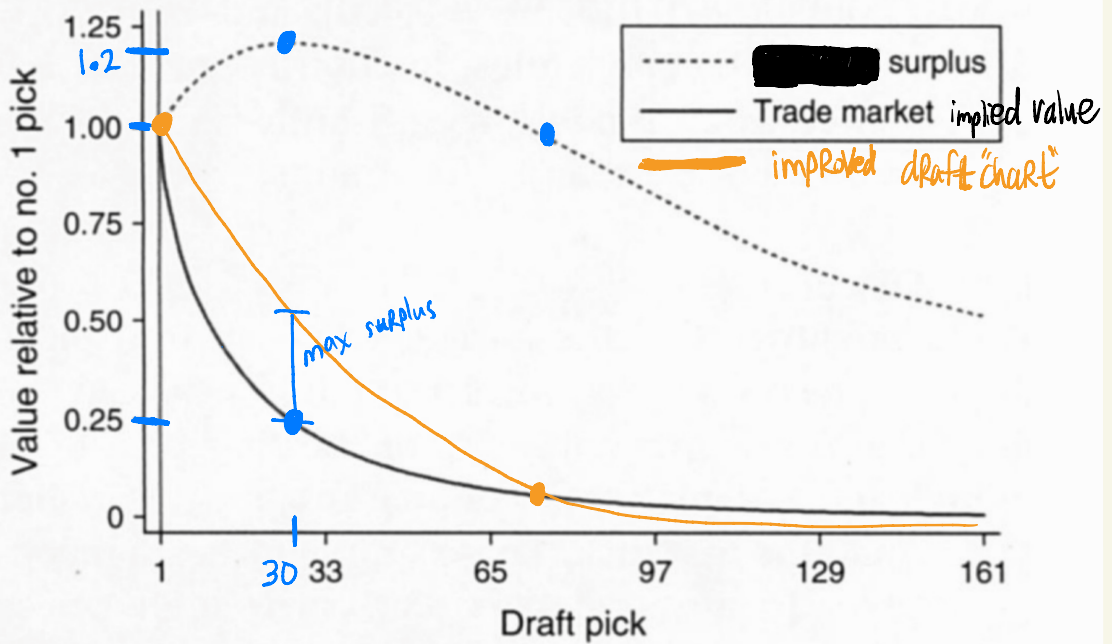
predicted performance value, or estimated compensation, from yrs 1-5 performance

actual compensation costs of player i in year t



Use surplus, not performance itself, since it applies to players across ALL positions.
If just WR, can use performance (e.g. Rec. yards) directly

Panel B: Surplus vs. trade value



In expectation, late 1st Round and all 2nd Round picks are undervalued in the current draft trade market!