

### DUAL MARKET THEOREM (VROOMAN'S LAW #1)

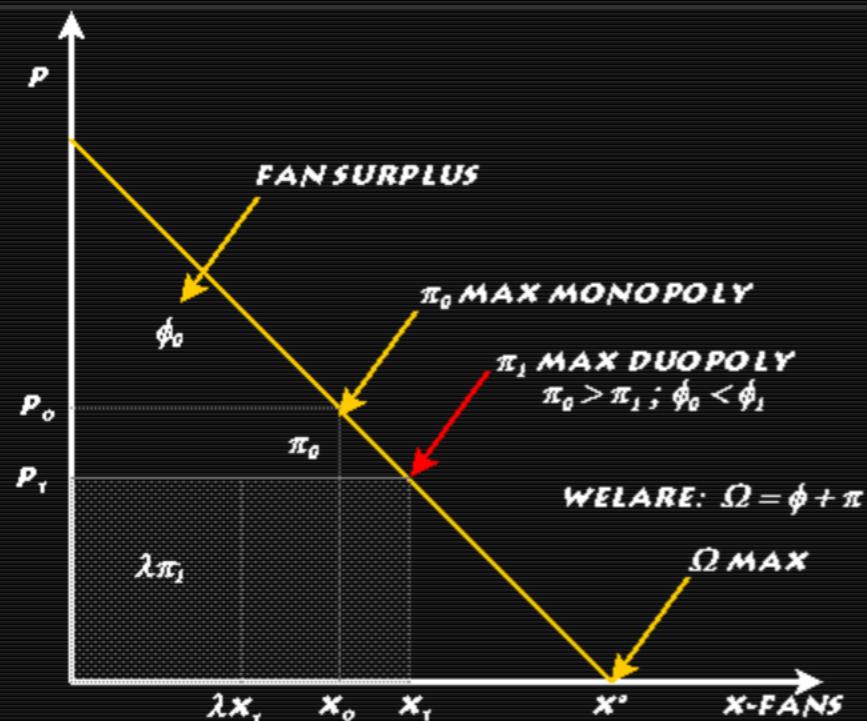
1. In conventional duopoly theory monopoly profit is greater than duopoly profit  $\pi_0 > \pi_1$  and duopoly fan welfare is greater than monopoly fan welfare  $\phi_0 < \phi_1$ . Total welfare is maximized under perfect competition at  $x^*$ .

2. If the original club retains a  $\lambda$ -share of the market then the new club must compensate for damages  $\pi_0 - \lambda\pi_1$ . This requires  $(1-\lambda)\pi_1 > \pi_0 - \lambda\pi_1$  and  $\pi_1 > \pi_0$ , which contradicts 1.

3. If  $\pi_0 > \pi_1$  then the damage to the existing club  $\pi_0 - \lambda\pi_1$  is always greater than the value of the new club  $(1-\lambda)\pi_1$ .

4. Therefore the expansion of a sports league into already occupied markets is always superior in terms of fan and total welfare, but inferior in terms of total league profit.

5. It also follows that the relocation of dual market clubs is league-superior to conventional league expansion.



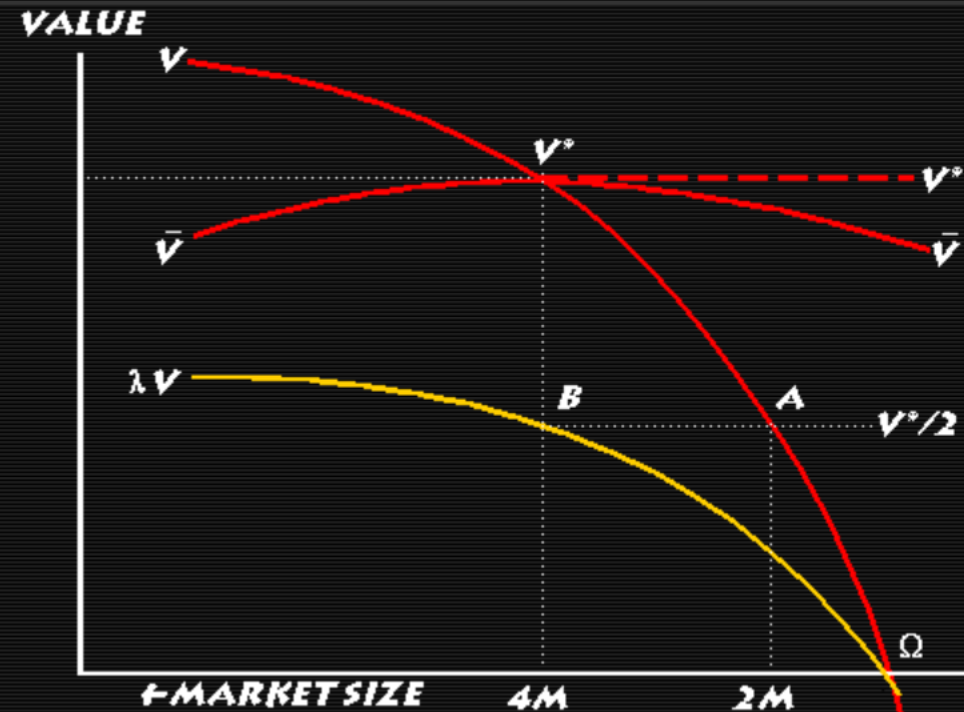
### VROOMAN SPORTS ECONOMICS

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**DUAL MARKET** RIVAL LEAGUE EXTORTION GAME VROOMAN'S LAW VENUE FINANCE

## RIVAL LEAGUE THEOREM

1. A sports league will not duplicate existing markets and will expand beyond its optimum size  $V^*$  only if it gets a fee equal to marginal expansion cost ( $V^*-V$ ).
2. Prospective clubs will not pay fees higher than the expected value of expansion markets  $V$  beyond  $A$ .
3. This implies a monopoly league will expand beyond  $V^*$  to point  $A$  where  $(V^*-V) = V$  and  $FEE = V = V^*/2$ .
4. A rival league will be comprised of duplicated large markets along  $\lambda V$  to the left of  $B$  and marginal edge cities along  $V$  to the right of  $A$  above  $\Omega$ .
5. Based on dual market and rival league theorems it follows that existing dual markets in sports leagues are the result of mergers of former rival leagues.



## VROOMAN SPORTS ECONOMICS

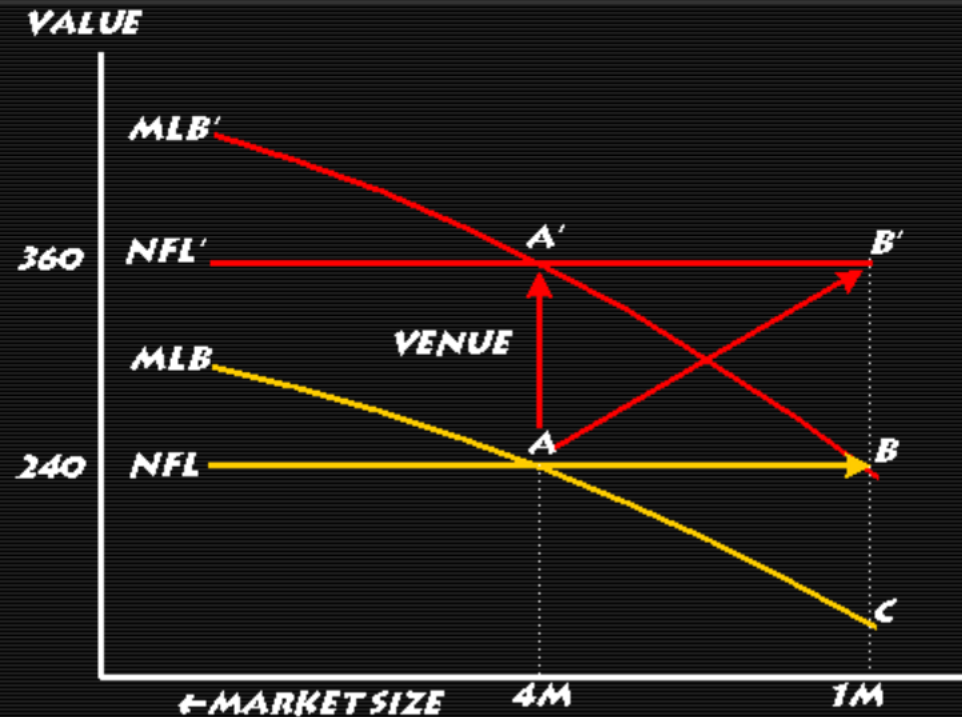
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## VENUE EXTORTION TRIANGLES

1. According to the general league expansion theorem the value of a sports franchise is  $V' = \alpha V + (1-\alpha)V^*$ .
2. This implies  $V' = V^*$  as  $\alpha$  approaches 0,  $V' = .5V + .5V^*$  for  $\alpha = 50\%$  and  $V' = V$  when  $\alpha = 1$ .
3. Let  $\alpha = 0$  for the NFL and  $\alpha = .5$  for MLB in the graph, and assume that a venue increases value of a team by 25%-33% and shifts the curves from yellow to red.
4. This suggests the venue extortion triangle  $A-A'-B'$  in the NFL and  $A-A'-B$  for MLB.
5. In this case the relocation probability of an NFL club is 50-50, because it doesn't matter where a club plays, while the relocation threat of an MLB franchise is not credible because there are no superior alternatives.



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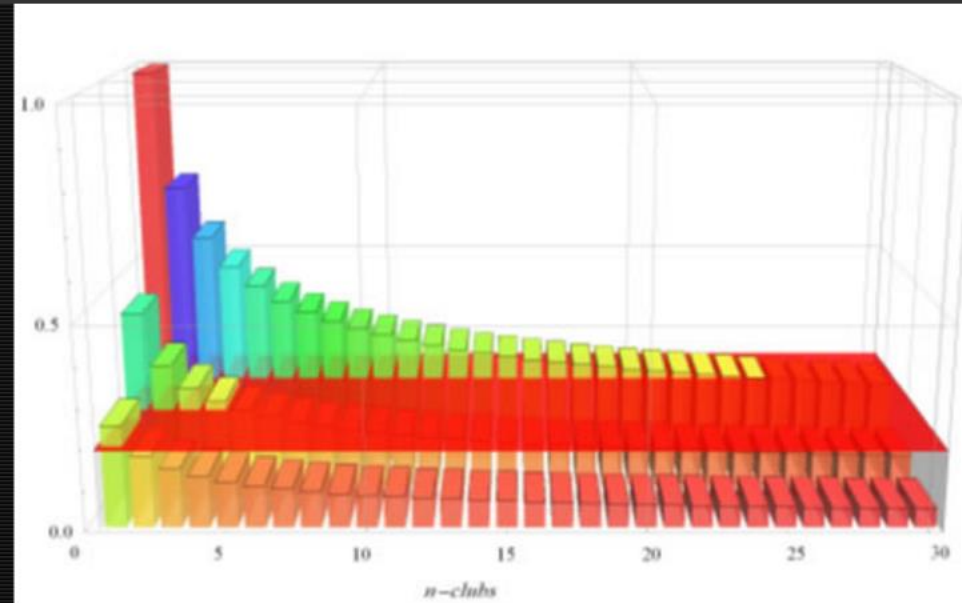
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## VROOMAN'S LAW #2

1. In classic duopoly game theory, total duopoly profit is  $\frac{8}{9}$  monopoly profit, and total profit in a given market with  $k$  clubs declines according to  $V(k) = V(4k/(k+1)^2)$

2. According to Zipf's law market size  $m$  declines according to  $m(n) = M^*/n = M^*n^{-1}$  where  $M^*$  is the size of the largest market and  $n$  is the number of markets.

3. According to Vrooman's law the value of sports markets declines according to  $V(n) = V^*n^{-.5}$ . Combining (1) and (2) yields the market value  $V$  for  $k$  clubs located in each of  $n$  markets where  $V(k,n) = V^*(4n^{-.5})/(k+1)^2$



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## HOW TO BUILD YOUR OWN STADIUM

### VROOMAN PLAN FOR CHARGERS IN LOS ANGELES

Club seats 8200 @ \$3,000 per season

Annual Club seat revenue \$24.6M

Luxury suites 200 @ \$125,000 per season

Annual Luxury suite revenue \$25.0M

Annual venue payment (30 years at 5%) \$49.6M

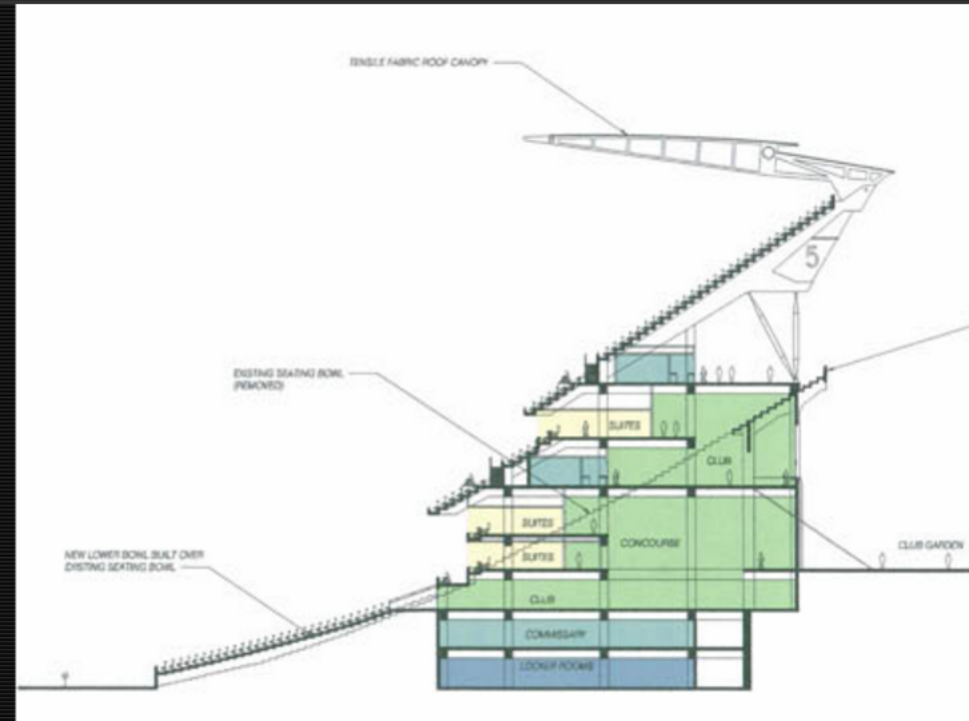
Private Venue Mortgage (.05, 30) \$800 million

NFL G-3 loan: \$100 million repaid by 34% visitor share

Personal Seat Licenses: 20,000 @ \$5000 for \$100 million

**TOTAL PRIVATE STADIUM FUNDS \$1 billion**

**2014 PAYROLL CAP \$133M covered by \$205M TV share**



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