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NHL draft: What does it cost to trade up?

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What does it cost for a team to trade up in the NHL draft? Lots of studies have been done, but let's try and nail it down.

A lot of work has been done on estimating the value of a draft pick. (For example, link, link, and link to links.) On Wednesday someone used this one (based on this one based on this one -- seriously, there's been a *lot* of work on this) to argue that Columbus could package a couple of picks and move way up in the draft.

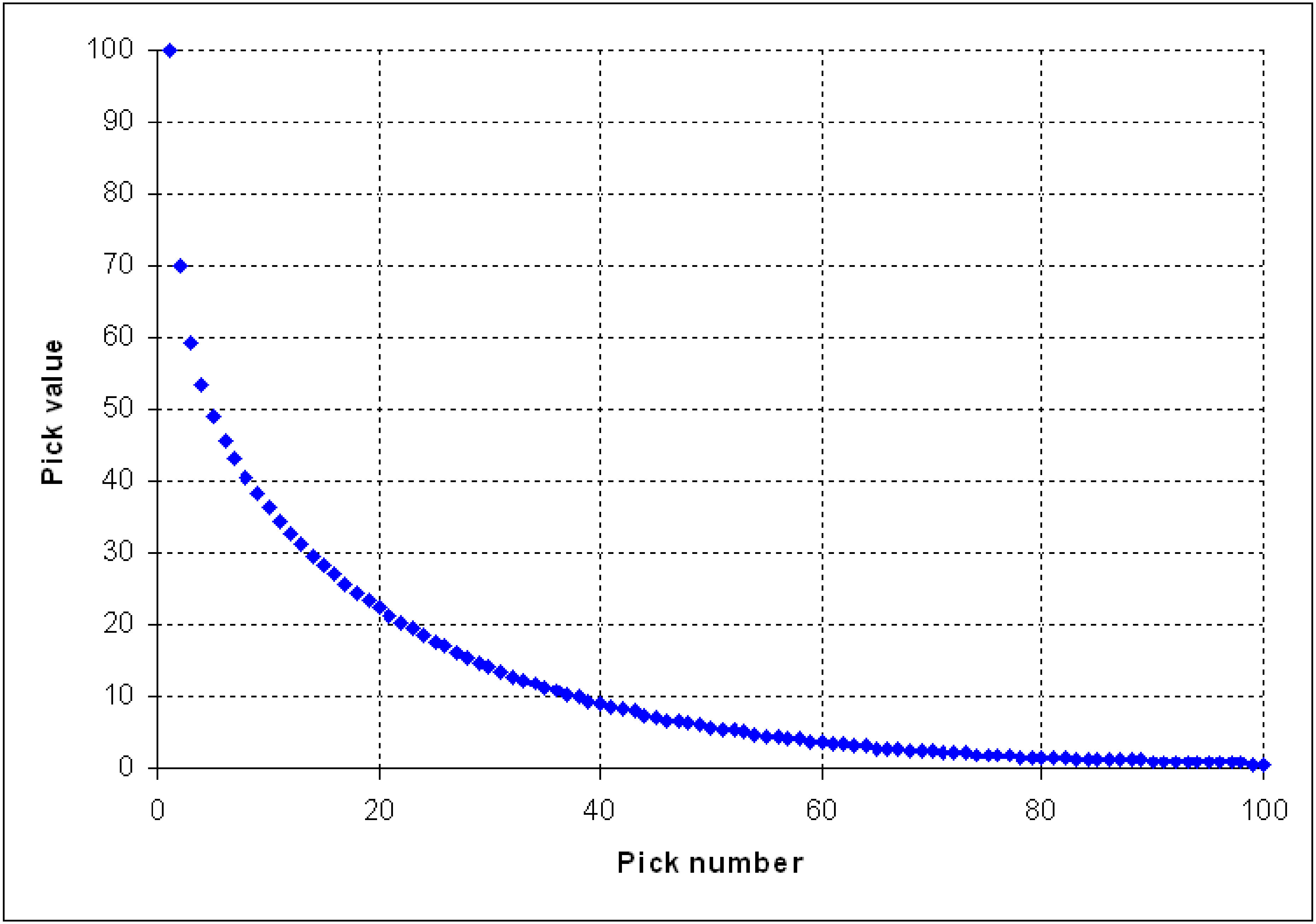
This didn't ring true to me; when I looked at this before, I remember the price for moving up being awfully steep. And when I looked closer at the model in their study, it said that the 2nd pick plus the 210th pick was worth more than the 1st pick, which doesn't seem remotely true.

That's when it occurred to me: a lot of people have tried to figure out what teams *should* pay when they trade picks, but I haven't seen anything trying to estimate what they *actually* pay. That is, instead of looking at what the fair price is by looking at how likely a pick is to turn into something useful, I wanted to look at what the market price is by looking at what teams have actually had to give up.

So to do that, I pulled a list of trades from '06 to '12 which met these criteria:

- The trade involved only picks, not players (since I don't want to have to estimate how valuable those player are to get a sense for the market opinion about picks)
- The exact position of every pick was known at the time of the trade (i.e. no trades that include a future 2nd round pick, since I don't want to have to estimate how likely that pick was to be 31st or 60th)

This gave me 46 trades to work with -- 46 samplings of the underlying market exchange rate in the cap era. Now all I had to do was work out the conversion factors that explained those trades to get an estimate of how much value GMs put on each pick. I'll describe how I did that fitting in an appendix that you can (and probably will) skip, but without further ado let's get to the NHL trade market value chart:



Or in table form:

Pick	Value
1	100
2	69.9
3	59.4
4	53.4
5	49.2
6	45.9
7	43.1
8	40.6
9	38.5
10	36.5
12	32.9
14	29.8
16	27.1
18	24.6
20	22.4
23	19.5
26	17.0
30	14.2
35	11.3
40	9.0
45	7.2
50	5.8
55	4.7
60	3.8
70	2.5
80	1.6

90	1.1
105	0.64
120	0.40
135	0.27
150	0.19
165	0.15
180	0.13
195	0.11
210	0.10

The way to read this table is that if you want to trade up for the 10th pick (value of 36.5 points), you should expect to have to put together a package of picks with comparable value -- maybe the 16th (27.1) and the 40th (9.0), or something similar.

By this approximation, three out of every four trades were roughly fair, meaning that the two teams' packages were within 20 percent of each other in estimated value. Moreover, almost all of the ones that were off by more were very minor moves, where being off by 30 or 40 percent still isn't very much in absolute value. Two 6th round picks are probably worth a lot more than a 5th, but I doubt the Flames are losing sleep that they might have given up too much when they made that trade in 2007.

If we cut our 46-trade sample in half by focusing just on the bigger trades for a minute, 21 of 23 were fair to within 20 percent, which is pretty reasonable for a model that doesn't take into account things like the depth of a given draft. The biggest apparent overpayment relative to market value in recent years was when the Kings traded the No. 17 and No. 28 picks in 2008 for the No. 12 pick. The picks they gave up were worth 41.4 points, which should normally be enough to land the No. 8 pick. Only getting No. 12 for that package meant they were shortchanged by about 8.4 points -- equivalent to a mid-second-round pick.

I should point out that over this timespan, there were no trades at the very top of the draft for my model to examine. The highest value trade considered here was when the Predators traded pick No. 9 and pick No. 40 for pick No. 7 in 2008. Since this trade is one where the values on the trade chart line up quite well (within about 10 percent), it seems reasonable to assume that our fit is good at least up to that part of the draft. However, the value estimates for the top five picks are still an untested extrapolation and should probably come with a grain of salt.

Obviously in any given year, the depth of the draft pool and specific team needs will affect the market a little. But this chart provides a reasonable guideline of roughly what you might expect a team to have to pay if they want to move up in the draft.

Appendix: modeling details

To create the value function, I wrote out the 46 trades as 46 separate equations. When a team trades the No. 14 pick for the No. 21 + No. 42 picks, that means f(14) = f(21) + f(42). When someone trades the No. 119 pick for No. 133 + No. 194 pick, that means f(119) = f(133) + f(194). Now all I have to do is find the function that makes all of those equations true, or as close to true as we can get with a simple function.

I started off by trying an exponential fit. The best exponential made the two sides of the equation reasonably close to equal, but it consistently said that the team trading up won the deal, which doesn't seem right.

So then I switched to a power law fit. Again, the fit was reasonably close, but this time it was consistently saying that the team trading down won the deal.

I fiddled around with a variety of functions, and in the end I went with the sum of an exponential and a power law. This doesn't have a whole heck of a lot of physical meaning (i.e. it makes the scientist in me cry), but it doesn't have to really -- for our purposes here, it just has to be a reasonable fit to the data. It matches the observed results pretty well, and it doesn't show much bias towards either side of the deal.

Finally, since my function was arbitrarily complex, I did a little checking to make sure it wasn't overfit. But fits on random subsets of the data came out basically the same as the fit on the whole dataset, so I feel OK with it.