

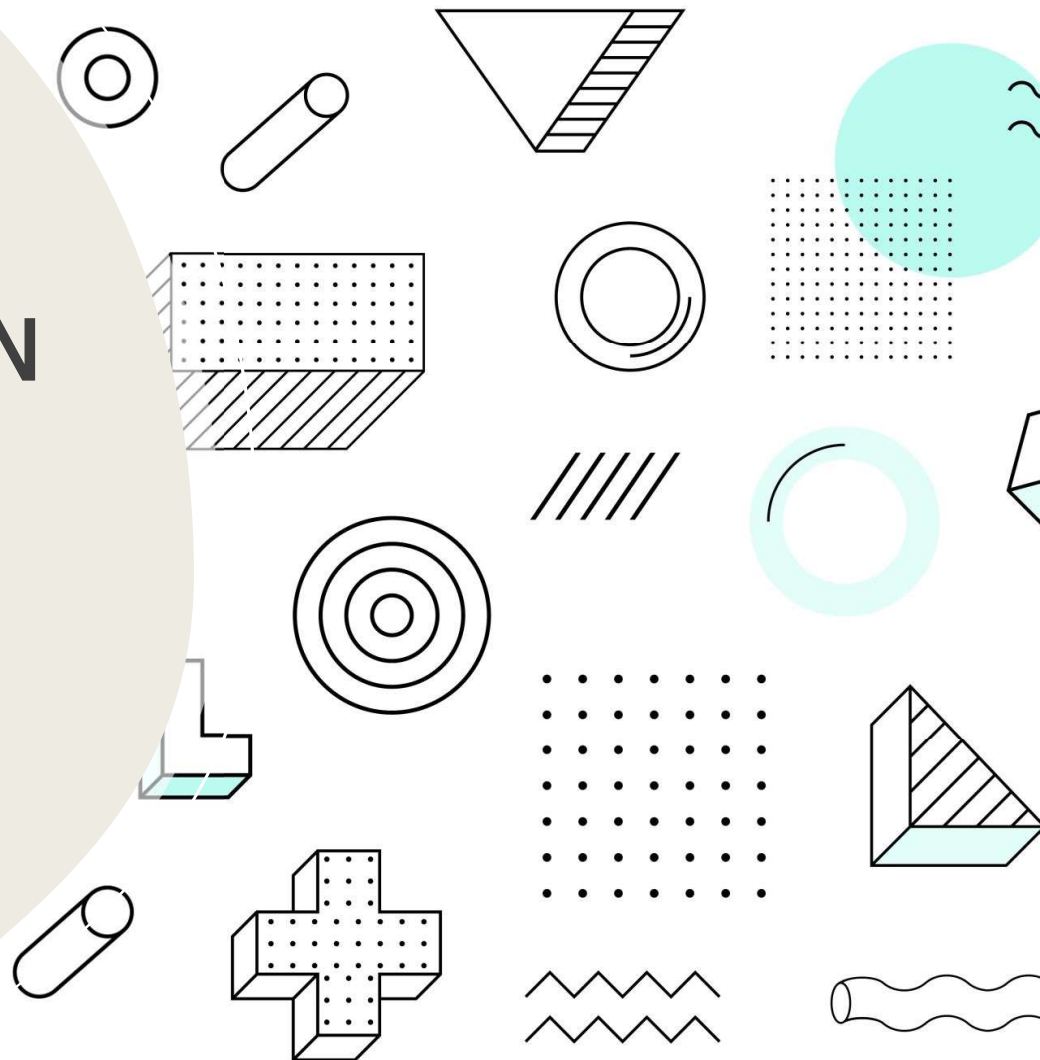


DO WE HAVE A DEAL? EVALUATING TRADES IN THE NHL

- Prashanth Iyer & Dom Luszczyzyn
- Ottawa Hockey Analytics Conference
- March 26th, 2022
-  @iyer_prashanth
-  @domluszczyzyn





Bobby Margarita ✓

@TSNBobMcKenzie



Trade is one for one: Adam Larsson for Taylor Hall.

3:34 PM · Jun 29, 2016 · Twitter for iPad

2,836 Retweets **1,558** Quote Tweets **3,627** Likes



CapFriendly  @CapFriendly · Nov 5, 2017



TRADE (3-way):

To [#Sens](#)

M Duchene

To [#Preds](#) 

K Turris

To [#Avs](#)

S Girard

V Kamenev


A Hammond


S Bowers

OTT 2018 1st & 3rd RD

NAS 2018 2nd RD

 75

 1,368

 1,607



How do we evaluate the success of a trade?



How well did the team estimate their trajectory?



How well did a team trade present for future (or vice versa)



How well did a team spend their cap dollars?



What's the probability of success for the future prospects/picks obtained?

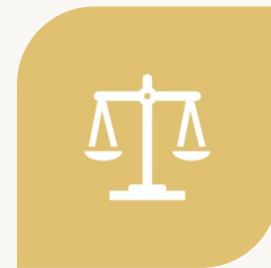
Challenges when evaluating trades



PUTTING EVERYTHING
ON THE SAME SCALE



CONTEXTUALIZING
UNCERTAINTY



PRESENT VS. FUTURE

Prior Work

- [Marc Foster \(2011\)](#) – *“Benchmarcs: Determining the value of unrealized draft picks”*
- [Eric Tulsky \(2013\)](#) – *“NHL Draft: What does it cost to trade up?”*
- [Garret Hohl \(2015\)](#) – *“When the trade market and draft market intersect and how to exploit them”*
- [Stephen Burtch \(2016\)](#) – *“Which teams should be aggressive, which should be cautious?”*
- [Mike Zsolt \(2016\)](#) – *“How to value draft picks vs active players”*

**Putting
everything on the
same scale**



Game Score Value Added (GSVA)

- Three-year weighted, player-level, linear-weight model
- Each component individually weighted by recency and regressed to the mean
- Adjusted for age and usage
- Transformed to wins above replacement
- Complete overview [here](#)

GSVA – Active NHL Players

- Projected GSVA obtained from each team's [player cards](#) for the current season
- Future seasons under contract are projected based on an [age adjustment](#)
- Restricted free agents (RFA's) are projected based on time under team control



Player/Pick	Age	Position	Contract Value	2022 Projected GSVA	Projected GSVA from current year + years remaining	Wins Added On Contract	Current year + years left on contract	2022 AAV
Dylan Larkin	25	F	5.3	2.2	4.2	2	\$6,100,000	

Contract Value Added: 5.3

2022

Wins Added: 2.2

Salary Added: \$6,100,000

Current Contract

Wins Added: 4.2

Salary Added: \$12,200,000



Projected GSVA from
current year + years
under team control

Current year + years
left on contract + years
left under team control

Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
Moritz Seider	20	D	22.2	1.9	15.4	7	\$863,333

Contract Value Added: 22.2

2022

Wins Added: 1.9

Salary Added: \$863,333

Current Contract

Wins Added: 15.4

Salary Added: \$2,589,999

Contract Value

- Estimates how much a win costs under a given salary cap
- Can estimate value added above contract for a given player
- Formula: $(GSVA - \text{Contract in GSVA}) + GSVA$
- Note: Cap is estimated for seasons beyond 2022-2023

How Much Does A Win Cost?			
Wins	Forwards	Defensemen	Goalies
5	\$17.0M	\$18.7M	\$11.2M
4	\$13.8M	\$15.3M	\$9.1M
3	\$10.6M	\$11.8M	\$7.1M
2	\$7.4M	\$8.4M	\$5.1M
1	\$4.2M	\$5.0M	\$3.0M
0	\$1.0M	\$1.6M	\$1.0M

Luszczyszyn D. The price of a win and why it means Connor McDavid won't always be the NHL's highest-paid player. The Athletic.



Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
Ethan Bear	24	D	2.5	0.7	2.0	3	\$2,000,000

Contract Value Added: 2.5

2022

Wins Added: 0.7

Salary Added: \$2,000,000

Current Contract

Wins Added: 2.0

Salary Added: \$2,000,000



Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
Warren Foegele	25	F	1.0	0.5	1.3	3	\$2,750,000

Contract Value Added: 1.0

2022

Wins Added: 0.5

Salary Added: \$2,750,000

Current Contract

Wins Added: 1.3

Salary Added: \$8,250,000

- Wins added on contract for Bear is sum of GSVA for 2022 (under contract), 2023 and 2024 (under team control)
- Contract value is calculated using his GSVA above salary for 2022 + GSVA for 2023 and 2024

- Wins added on contract for Foegele is sum of GSVA for 2022, 2023, and 2024 (under contract)
- Contract value is calculated using his GSVA above salary for 2022, 2023, and 2024

Contextualizing uncertainty

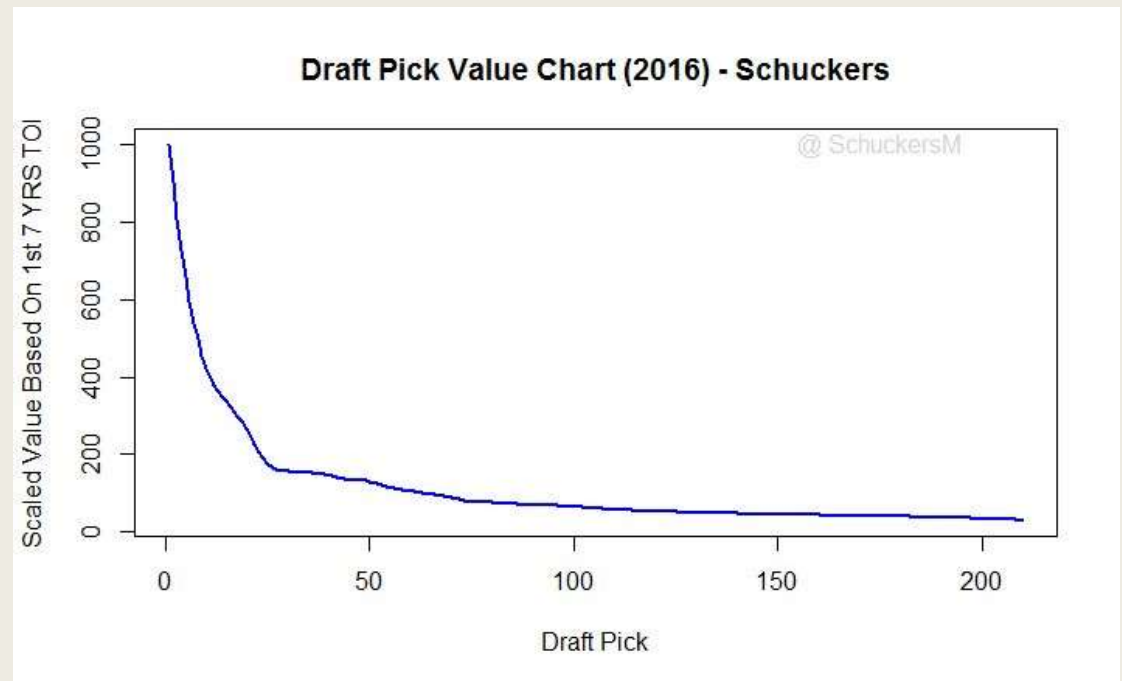


Septicstacheedits. Tumblr post. <https://septicstacheedits.tumblr.com/post/157644061710/i-saw-ze-mention-on-his-tumblr-that-we-would-like>

The value of a draft pick

Historical Work In This Space

- Ice Time
 - [Jibblescribbits \(2011\)](#)
 - [Tango \(2011\)](#)
 - [Chemmy \(2011\)](#)
 - [Cane \(2015\)](#)
 - [Schuckers \(2016\)](#)
- Games Played
 - [Schuckers \(2011\)](#)
 - [Burtch \(2015\)](#)
- Point Shares
 - [Sprigings \(2014\)](#)



Schuckers M. Draft pick value chart 2016. Statistical Sports Consulting.

GSVA – The value of a draft pick

- Utilizes Game Score Value Added for seasons since 2007
- Evaluates GSVA added over a player's first seven seasons
- For players with less than seven seasons, the missing seasons were imputed with their projected GSVA
- Exponential and power law fit optimized to minimize the average error

Pick	Value
10	7.6
17	4.5
32	2.7
65	1.0
97	0.5

GSVA – The value of a draft pick

- 2022 1st and 2nd round picks
 - Value calculated based on the expected final standings position for a team combined with the relative odds for each draft slot for lottery picks
- 2022 3-7th round picks
 - Assigned the median value of a pick from that round
- All Future picks
 - Assigned the median value of a pick from that round

Median Draft Pick Value	
Round	GSVA
1	4.7
2	1.7
3	0.7
4	0.4
5	0.2
6	0.2
7	0.2



Player/Pick	Age	Position	Contract Value	2021 GSVA	Wins Added On Contract	Year
Jakub Vrana	25	F	6.2	1.8	5.1	3
Richard Panik	30	F	0.2	0.5	0.9	3
2021 1st (WSH)		Pick	3.5	0	3.5	7
2022 2nd (WSH)		Pick	1.7	0	1.7	7



Contract Value Added: 11.6

2021

Wins Added: 2.3
Salary Added: \$6,100,000

Value based on WSH's expected standings finish at the time of the trade

Current Contract

Wins Added: 11.2
Salary Added: \$11,600,000



Player/Pick	Age	Position	Contract Value	2021 GSVA	Wins Added On Contract	Year
Anthony Mantha	26	F	4.8	1.5	5.3	4

Contract Value Added: 4.8

2021

Wins Added: 1.5
Salary Added: \$5,700,000

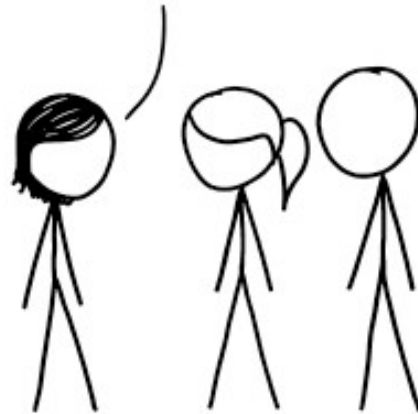
Current Contract

Wins Added: 5.3
Salary Added: \$17,100,000

Prospect Evaluation – Life's Greatest Uncertainty

- GSVA is available for
- For prospects with
 - GSVA projected
 - their draft slot
 - This value is ca
 - Attempts to pe
 - NHL
- For players not in t
 - Assigned the 1
 - Recognizes the
 - percentage of

I'LL BE HONEST: WE PHYSICISTS TALK A BIG GAME ABOUT THE THEORY OF EVERYTHING, BUT THE TRUTH IS, WE DON'T REALLY UNDERSTAND WHY ICE SKATES WORK, HOW SAND FLOWS, OR WHERE THE STATIC CHARGE COMES FROM WHEN YOU RUB YOUR HAIR WITH A BALLOON.



the prior season

a player selected at
of years since draft
er team control
g longer to reach the

their draft

are better than a small

Project the value of a conditional pick



Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
2022 Conditional 2nd (NYR)		Pick	0.7	0.0	0.7	7	\$0
2022/2023 2nd (STL/NYR)		Pick	0.7	0.0	0.7	7	\$0
2023 5th (NYR)		Pick	0.2	0.0	0.2	7	\$0
Morgan Barron	23	F	0.1	0.0	0.1	5	\$925,000

Contract Value Added: 1.7

2022

Wins Added: 0
Salary Added: \$925,000

Current Contract

Wins Added: 1.7
Salary Added: \$1,850,000

Estimate the value of a prospect not yet in the NHL

Project the value of obtained of a current player



Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
Andrew Copp	27	F	1.7	1.2	1.2	1	\$3,640,000
2023 6th (WPG)		Pick	0.2	0	0.2	7	\$0

Contract Value Added: 1.9

2022

Wins Added: 1.2
Salary Added: \$3,640,000

Current Contract

Wins Added: 1.4
Salary Added: \$3,640,000

Estimate the value of a future draft pick



Dom

Prashanth

Present vs. Future Valuation



Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
Calle Jarnkrok	30	F	2.0	1.0	1.0	1	\$1,000,000

Contract Value Added: 2.0

2022

Wins Added: 1.0
Salary Added: \$1,000,000

Current Contract

Wins Added: 1.0
Salary Added: \$1,000,000

Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
2022 2nd (FLA)		Pick	1.3	0	1.3	7	\$0
2023 3rd (CGY)		Pick	0.7	0	0.7	7	\$0
2024 7th (CGY)		Pick	0.2	0	0.2	7	\$0
Retained Salary - 50%		Salary	0.0	0	0	7	\$1,000,000

Contract Value Added: 2.2

2022

Wins Added: 0
Salary Added: -\$1,000,000

Current Contract

Wins Added: 2.2
Salary Added: -\$1,000,000

Trading Future For Present – A Win-Win Situation



Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
2022 2nd (TOR)		Pick	1.3	0	1.3	7	\$0
2023 2nd (TOR)		Pick	1.3	0	1.3	7	\$0
2024 3rd (TOR)		Pick	0.7	0	0.7	7	\$0
Giordano (50% retained)		Salary	-0.5	0	0	1	\$3,375,000

Contract Value Added: 2.8

2022

Wins Added: 0.0
Salary Added: \$0

Current Contract

Wins Added: 3.3
Salary Added: \$0

Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
Mark Giordano	38	D	2.1	1.3	1.3	1	\$3,375,000
Colin Blackwell	28	F	2.0	1.0	1.0	1	\$725,000

Contract Value Added: 4.1

2022

Wins Added: 2.3
Salary Added: \$4,100,000

Current Contract

Wins Added: 2.3
Salary Added: \$4,100,000

Trading Future for Present – Maybe...not so good



Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
Daniel Sprong	25	F	3.9	0.7	1.9	3	\$725,000
2022 4th (WSH)		Pick	0.4	0	0.4	7	\$0
2023 6th (WSH)		Pick	0.2	0	0.2	7	\$0
Johansson (50% retained)		Salary	0.0	0	0	1	\$750,000

Player/Pick	Age	Position	Contract Value	2022 GSVA	Wins Added On Contract	Years	2022 AAV
Marcus Johansson	31	F	1.1	0.5	0.5	1	\$750,000

Contract Value Added: 4.5

2022

Wins Added: 0.7
Salary Added: \$725,000

Current Contract

Wins Added: 2.5
Salary Added: \$2,300,000

Contract Value Added: 1.1

2022

Wins Added: 0.5
Salary Added: \$750,000

Current Contract

Wins Added: 0.5
Salary Added: \$750,000

Limitations

- Contract value may not be accurately forecasted for restricted free agents
- For future draft picks, the value represented is the median value and as such can vary significantly depending on the round
- For prospects not in the NHL, value is relative to their draft position and not post-draft performance and as such, may not reflect significant leaps/regressions
- Contract value calculations for years beyond 2022-2023 are based on an estimated cap escalation



Future Directions

- Optimize blending of present and future value
 - Discounted cash flow
 - Hyperbolic discounting
- Investigate valuation of NMC/NTC
- As possible, adjust estimate for top prospects post-draft
- Provide an estimate of variance for future draft picks to showcase range of possible outcomes
- Make trade machine public...Summer 2022???
 - If you have skills in website hosting/Shiny please message me!

Questions?

- My apologies that I cannot be here in person but please reach out to me!
- Send me a DM on twitter @iyer_prashanth

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