Predicting NBA Scoring Performances

By: Nate DiRenzo

Since 2018, legalized sports betting has exploded in the United States.

In 2021 alone, more than $52 Billion dollars were wagered.

Can we reliably predict NBA scoring performances, and inform a long-term betting strategy with linear regression?

The Data

RK	PLAYER	OPP	STAT	O/U LINE	PROJECTION	DIFF	PICK	RESULT
1	LaMarc... Aldridge BKN - C	vs. DEN	Points	12.50 (-120)	16.90	4.40	o 12.5 -120	18 (over)
2	Ja Morant MEM - G	@ SAS	Points	29.50 (-141)	25.60	-3.90	u 29.5 -141	41 (over)
3	Devin Vassell SAS - G	vs. MEM	Points	9.50 (-130)	13.40	3.90	o 9.5 -130	20 (over)
4	Terrence Ross ORL - G	vs. LAC	Points	8.50 (-105)	4.70	-3.80	u 8.5 -105	7 (under)
5	Dean Wade CLE - F	vs. MIL	Points	7.50 (-125)	3.80	-3.70	u 7.5 -125	10 (over)
6	Nikola Vucevic CHI - C	vs. TOR	Points	18.50 (-125)	15.40	-3.10	u 18.5 -125	17 (under)
7	DeAndre' Bembry BKN - G	vs. DEN	Points	6.50 (-149)	9.60	3.10	o 6.5 -149	14 (over)
8	Richaun Holmes SAC - F	@ ATL	Points	10.50 (-124)	13.60	3.10	o 10.5 -124	12 (over)
9	Bojan Bogda... UTH - F	vs. PHO	Points	21.50 (-125)	18.40	-3.10	u 21.5 -125	7 (under)
10	Max Strus MIA - G	vs. NYK	Points	9.50 (-115)	12.54	3.04	o 9.5 -115	0 (under)
11	Steven Adams MEM - C	@ SAS	Points	6.50 (-122)	9.50	3.00	o 6.5 -122	4 (under)
12	DeMar DeRozan CHI - G	vs. TOR	Points	25.50 (-135)	22.60	-2.90	u 25.5 -135	29 (over)
13	Nikola Jokic DEN - C	@ BKN	Points	24.50 (-115)	27.40	2.90	o 24.5 -115	26 (under)
14	Jaren Jackso... MEM - F	@ SAS	Points	16.50 (-110)	19.40	2.90	o 16.5 -110	22 (over)
15	Harrison Barnes SAC - F	@ ATL	Points	14.50 (-113)	17.30	2.80	o 14.5 -113	28 (over)

Rk	Player	Age	Pos	Tm	Opp	Date	GS	MP	FG	FGA	FG%	2P	2PA	2P%	3P	3P%	FT	FTA	FT%	TS%	ORB	DRB	TRB	AST	STL	BLK	TOV	PF	PTS	GmSc	BPM
15001	Delon Wright	29-272	G	ATL	@ CHO	2022-01-23	0	20	2	6	.333	1	1	.500	1	.250	1	2	.500	.436	0	4	4	4	4	0	2	3	6	7.0	4.5
15002	McKinley Wright IV	23-090	G	BRK	W	MIN	2022-01-23	0	1	0	0		0	0		0		0	0			0	0	0	1	0	0	0	0	0	0.7	14.0
15003	Trae Young	23-126	G	ATL	@ CHO	2022-01-23	1	35	9	20	.450	1	5	.200	8	15	.533	4	5	.800	.676	0	4	4	9	2	0	3	30	21.4	9.3
15004	Ivica Zubac	24-311	C	LAC	@ NYK	2022-01-23	1	29	5	8	.625	5	8	.625	0		7	11	.636	.662	4	10	14	2	1	2	1	14	14.9	-1.2
15005	Nickeil Alexander-Walker	23-144	G	NOP	IND	2022-01-24	0	34	4	13	.308	4	8	.500	0	.000	6	6	1.000	.448	2	1	3	6	1	2	1	14	11.7	-2.1
15006	Jose Alvarado	23-287	G	NOP	IND	2022-01-24	0	12	1	4	.250	1	2	.500	0	.000	1	1	1.000	.338	0	0	0	1	1	0	0	2	1.5	-8.8
15007	Udoka Azubuike	22-129	C	UTA	@ PHO	2022-01-24	0	3	0	1	.000	1		.000	0		0	0		.000	0	0	0	0	0	0	0	0	0	-0.7	-23.6
15008	RJ Barrett	21-224	G-F	NYK	CLE	2022-01-24	1	38	8	12	.667	1	4	.250	5	10	.500	.588	1	4	5	2	0	1	0	24	20.1	9.9
15009	Darius Bazley	21-226	F	OKC	CHI	2022-01-24	0	20	2	7	.286	1	4	.250	1	.333	0	0		.357	0	8	8	1	0	1	0	5	3.0	-9.1
15010	Goga Bitadze	22-188	C	IND	@ NOP	2022-01-24	1	22	4	7	.571	4	6	.667	1	.000	4	6	.667	.622	3	5	8	3	0	1	2	12	7.5	2.2
15011	Bismack Biyombo	25-086	C	PHO	UTA	2022-01-24	0	31	7	10	.700	7	10	.700	0		2	6	.333	.633	4	9	13	1	0	1	0	16	15.9	2.2
15012	Devin Booker	25-086	G	PHO	UTA	2022-01-24	1	38	14	35	.400	11	22	.500	3	13	.231	2	3	.667	.454	1	5	6	2	2	3	4	33	17.5	0.2
15013	Tony Bradley	24-016	F-C	CHI	@ OKC	2022-01-24	0	2	0	0		0			0		0	0			0	1	1	0	0	1	1	0	-0.4	-23.7
15014	Mikal Bridges	25-147	G	PHO	UTA	2022-01-24	1	35	2	8	.250	2	6	.333	0	2	.000	0	0		.250	1	3	4	6	2	0	1	6	6.6	-1.9
15015	Oshae Brissett	23-218	F	IND	@ NOP	2022-01-24	0	15	1	5	.200	0	1	.000	1	4	.250	3	5	.600	.417	1	8	9	0	1	0	0	6	3.6	-6.0
15016	Troy Brown Jr.	22-180	G-F	CHI	@ OKC	2022-01-24	1	31	4	9	.444	2	5	.400	2	4	.500	0	0		.556	0	3	3	2	1	1	4	10	6.7	-4.3
15017	Alec Burks	30-188	G	NYK	CLE	2022-01-24	0	18	0	4	.000	0	2	.000	0	2	.000	0	0		.000	1	2	3	4	0	0	3	0	0.1	-17.0
15018	Jared Butler	21-152	G	UTA	@ PHO	2022-01-24	0	13	5	9	.556	2	5	.400	3	4	.750	0	1		.722	0	1	1	2	0	1	2	13	12.6	18.6
15019	Gary Clark	27-069	F	NOP	IND	2022-01-24	0	12	0	3	.000	0	1	.000	0	2	.000	0	0		.000	2	0	2	0	0	0	4	0	-1.5	-17.0
15020	Jordan Clarkson	29-231	G	UTA	@ PHO	2022-01-24	1	34	9	20	.450	5	9	.556	4	11	.364	0	1	.000	.538	2	4	6	4	2	0	4	22	13.9	-0.1

Rk		Team					Team												Opponent									
Rk	Tm	Date	Opp		Result	MP	FG	FGA	FG%	2P	2PA	2P%	3P	3PA	3P%	FT	FTA	FT%	PTS	FG	FGA	FG%	2P	2PA	2P%	3P	3PA	3P%	FT	FTA	FT%	PTS
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1301	LAL	2022-01-17	UTA		W 101-95	240	38	86	.442	27	49	.551	11	37	.297	14	23	.609	101	31	83	.373	19	49	.551	11	37	.297	24	.875	95
1302	UTA	2022-01-17	@ LAL		L 95-101	240	31	83	.373	19	37	.514	12	46	.261	21	24	.875	95	38	86	.442	19	49	.551	11	37	.297	14	.609	101
1303	CHI	2022-01-17	MEM		L 106-119	240	41	87	.435	27	61	.443	13	31	.419	13	15	.867	106	47	92	.511	37	52	.711	10	25	.419	15	.750	119
1304	MEM	2022-01-17	@ CHI		W 119-106	240	47	92	.511	37	52	.552	10	25	.400	15	20	.750	119	41	92	.435	27	61	.443	13	31	.419	13	.867	106
1305	MIA	2022-01-17	TOR		W 104-99	240	38	83	.458	29	59	.492	9	24	.375	19	22	.864	104	38	93	.458	29	59	.492	9	24	.375	19	.864	104
1306	TOR	2022-01-17	@ MIA		L 99-104	240	37	90	.411	24	54	.444	13	36	.361	12	17	.706	99	38	83	.458	29	59	.492	9	24	.375	19	.864	104
1307	CHO	2022-01-17	@ NYK		W 97-87	240	36	86	.419	22	47	.468	14	39	.359	11	17	.647	97	32	80	.400	20	49	.435	12	34	.353	11	.524	87
1308	NYK	2022-01-17	CHO		L 87-97	240	32	80	.400	20	46	.435	12	34	.353	11	21	.524	87	36	86	.419	22	47	.468	14	39	.359	11	.647	97
1309	POR	2022-01-17	ORL		L 88-98	240	34	90	.378	26	58	.448	8	32	.250	12	20	.600	88	37	90	.411	30	56	.536	7	34	.206	17	.944	98
1310	ORL	2022-01-17	@ POR		W 98-88	240	37	90	.411	30	56	.536	7	34	.206	17	18	.944	98	34	90	.378	26	58	.448	8	32	.250	12	.600	88
1311	PHO	2022-01-17	SAS		W 121-107	240	45	87	.516	40	63	.635	9	24	.375	22	24	.700	121	41	92	.446	32	62	.516	9	30	.300	16	.727	107
1312	SAS	2022-01-17	@ PHO		L 107-121	240	41	92	.446	32	62	.516	9	30	.300	16	22	.727	107	45	87	.516	40	63	.635	9	24	.375	22	.700	121
1313	PHI	2022-01-17	@ WAS		L 98-117	240	35	86	.407	28	60	.467	7	26	.269	21	28	.840	98	45	87	.483	33	57	.579	9	30	.300	24	.750	117
1314	WAS	2022-01-17	PHI		W 117-98	240	42	87	.483	33	57	.579	9	30	.300	24	32	.750	117	35	86	.407	28	60	.467	7	26	.269	21	.840	98
1315	DET	2022-01-18	@ GSW		L 86-102	240	30	85	.353	21	51	.412	9	34	.265	17	24	.708	86	34	83	.410	20	41	.488	14	42	.333	20	.741	102
1316	GSW	2022-01-18	DET		W 102-86	240	34	83	.410	20	41	.488	14	42	.333	20	27	.741	102	30	85	.353	21	51	.412	9	34	.265	17	.708	86
1317	MIN	2022-01-18	@ NYK		W 112-110	240	35	81	.432	22	40	.550	13	41	.317	29	38	.763	112	37	80	.463	25	42	.595	12	38	.316	18	.727	110
1318	NYK	2022-01-18	MIN		L 110-112	240	37	80	.463	25	42	.595	12	38	.316	24	33	.727	110	35	81	.432	22	40	.550	13	41	.317	29	.763	112
1319	ATL	2022-01-19	MIN		W 134-122	240	45	86	.523	30	48	.625	15	38	.395	29	33	.879	134	42	95	.433	25	66	.523	30	48	.625	14	.370	25
1320	MIN	2022-01-19	@ ATL		L 122-134	240	42	95	.433	25	51	.490	17	46	.370	21	29	.724	122	45	86	.523	30	48	.625	15	38	.395	29	.879	134

The Data
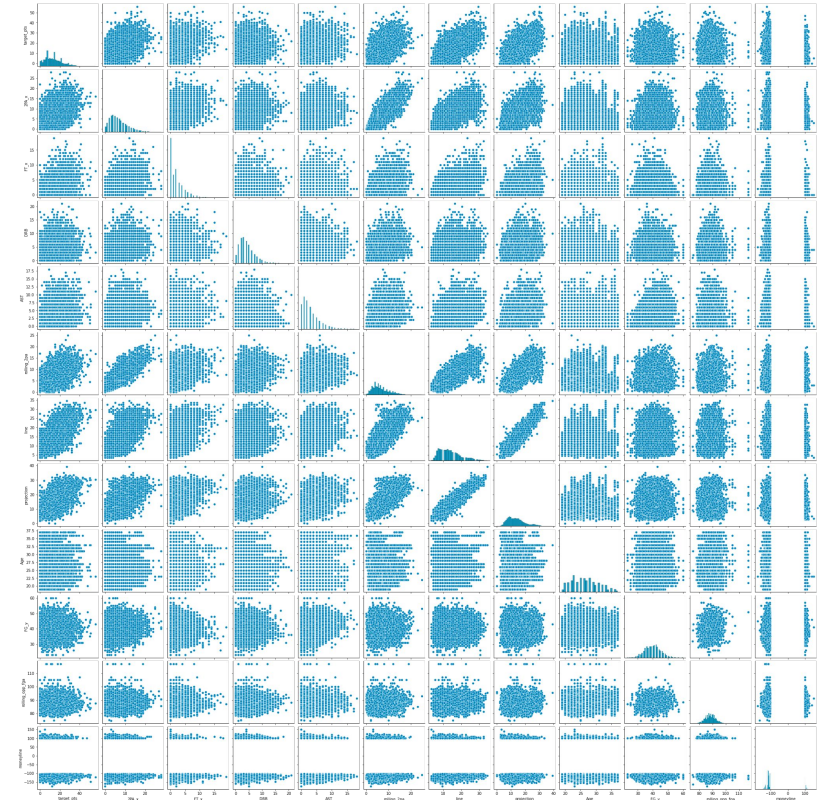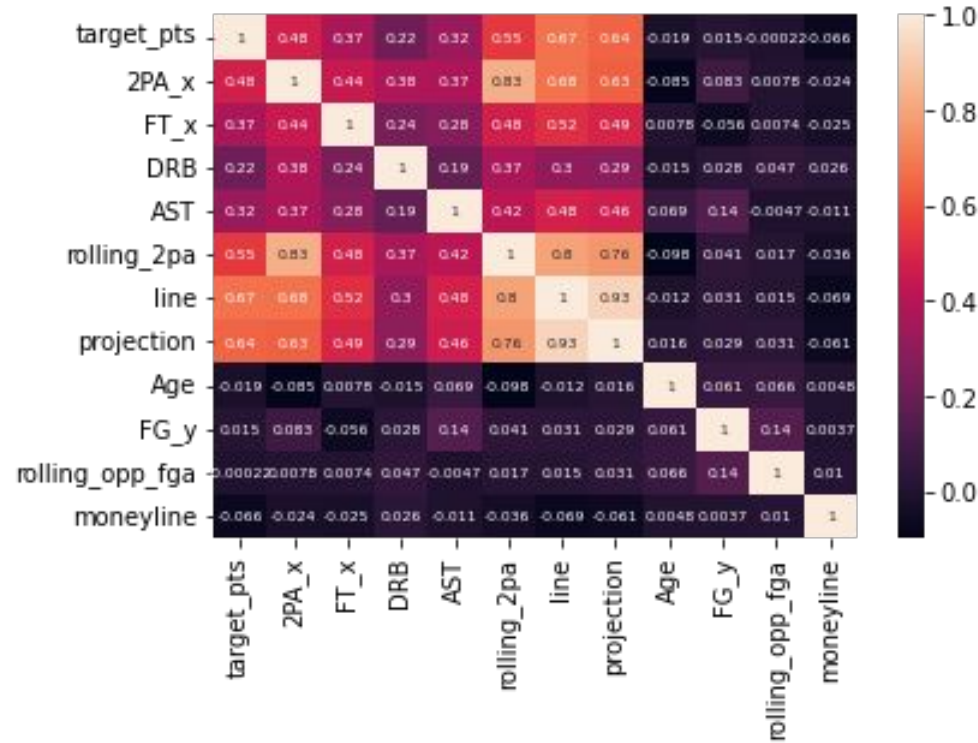
The Models:

Linear Regression Testing:
- Train/Val R2: .46
- **Test R2: .45**
- **Test MAE: 4.72**
- **Test RMSE: 6.04**

LassoCV Feature Selection:
1. Line (+)
2. Projection (+)
3. Previous Game Loss (-)
4. Previous Game FTA (+)
5. 5 Game Rolling 2PA (+)
6. 5 Game Rolling Opponent FGA (-)

LassoCV:
- Train R2: .46
- Val R2: .488
- MAE: 4.85
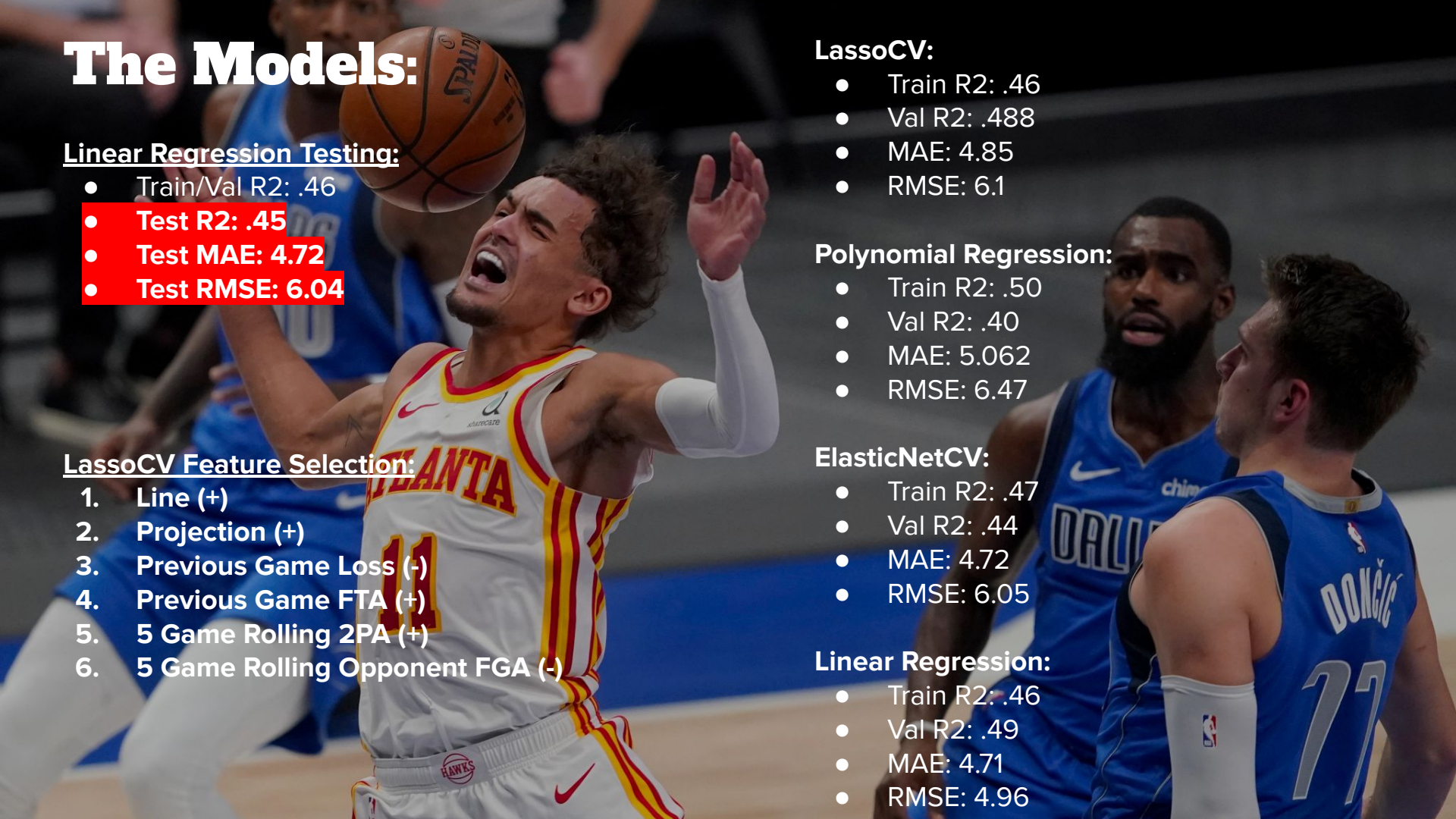- RMSE: 6.1

Polynomial Regression:
- Train R2: .50
- Val R2: .40
- MAE: 5.062
- RMSE: 6.47

ElasticNetCV:
- Train R2: .47
- Val R2: .44
- MAE: 4.72
- RMSE: 6.05

Linear Regression:
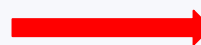- Train R2: .46
- Val R2: .49
- MAE: 4.71
- RMSE: 4.96

How often was the model right?

54.4%

All Matchups ⌄   All Stats ⌄   All Players ⌄   Consensus ⌄

Last 7 days Top 15 All Bets Accuracy: 47-58 (45%)
Season-to-date Top 15 All Bets Accuracy: 760-676 (53%)

RK	PLAYER	OPP	STAT	O/U LINE	PROJECTION	DIFF	PICK	RESULT
1	Joel Embiid PHI - C	vs. LAL	Points	SH 35.50 (-127)	30.60	-4.90	u 35.5 -127	0 (push)
2	Stephen Curry GSW - G	vs. MIN	Points	24.50 (-111)	28.30	3.80	o 24.5 -111	0 (push)
3	Andrew Wiggins GSW - F	vs. MIN	Points	PB 16.50 (-115)	19.50	3.00	o 16.5 -115	0 (push)
4	Anthony Davis LAL - F	@ PHI	Points	18.50 (-120)	21.30	2.80	o 18.5 -120	0 (push)
5	Carmelo Anthony LAL - F	@ PHI	Points	11.50 (EVEN)	14.30	2.80	o 11.5 100	0 (push)

Practical Application of the Model

	Name	target_pts	line	Model Predictions	model_successful_pick	game_date	bet_date
159	Alec Burks	10.0	13.5	14.249471	0	2022-01-20	2022-01-23
240	Amir Coffey	2.0	10.5	10.109590	1	2022-01-21	2022-01-23
350	Anfernee Simons	19.0	18.5	18.823894	1	2022-01-21	2022-01-23
809	CJ McCollum	19.0	21.5	21.792792	0	2022-01-21	2022-01-23
1951	Dejounte Murray	19.0	19.5	18.320755	1	2022-01-21	2022-01-23
2128	Derrick White	10.0	16.5	15.534763	1	2022-01-21	2022-01-23
2239	Devin Vassell	15.0	9.5	8.880292	0	2022-01-21	2022-01-23
2436	Dorian Finney-Smith	9.0	10.5	10.800433	0	2022-01-20	2022-01-23
2467	Doug McDermott	9.0	10.5	9.652849	1	2022-01-21	2022-01-23
2652	Eric Bledsoe	2.0	7.5	6.874798	1	2022-01-13	2022-01-23
2739	Evan Fournier	14.0	14.5	14.800782	0	2022-01-20	2022-01-23
3087	Gary Trent	13.0	14.5	13.511527	1	2022-01-07	2022-01-23
3432	Immanuel Quickley	8.0	10.5	11.699348	0	2022-01-20	2022-01-23
3561	Ivica Zubac	17.0	7.5	7.634960	1	2022-01-21	2022-01-23
3778	Jakob Poeltl	25.0	12.5	12.156462	0	2022-01-21	2022-01-23

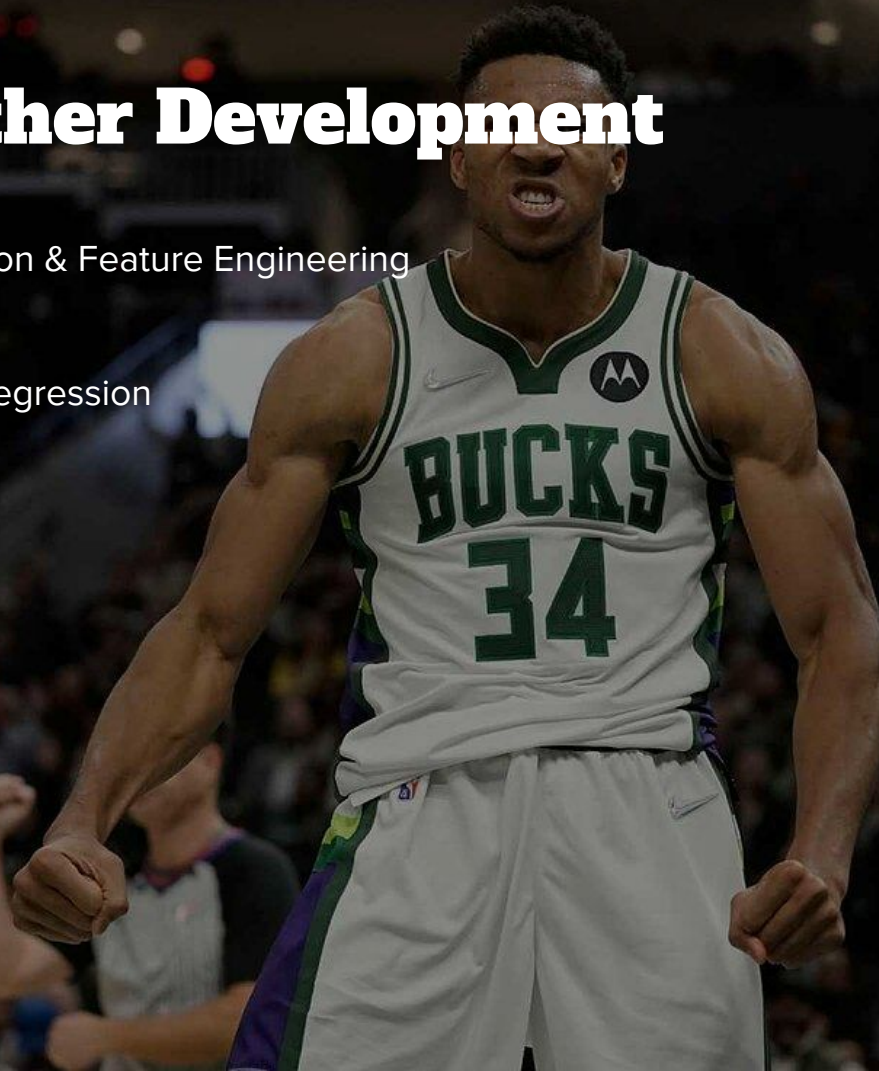| RK	PLAYER	OPP	STAT	O/U LINE	PROJECTION	DIFF	PICK	RESULT
1	Alec Burks NYK - G	vs. LAC	Points	PB 13.50 (-115)	11.00	-2.50	u 13.5 -115	● 10 (under)

Conclusions

- Using LassoCV in conjunction with Linear Regression produced the most robust model

- Our model performs in line with publicly-available betting projections

- 2PA, FT, Line, and BettingPros Projection had the most predictive power

- 54% accuracy is insufficient to inform a long-term, profitable betting strategy
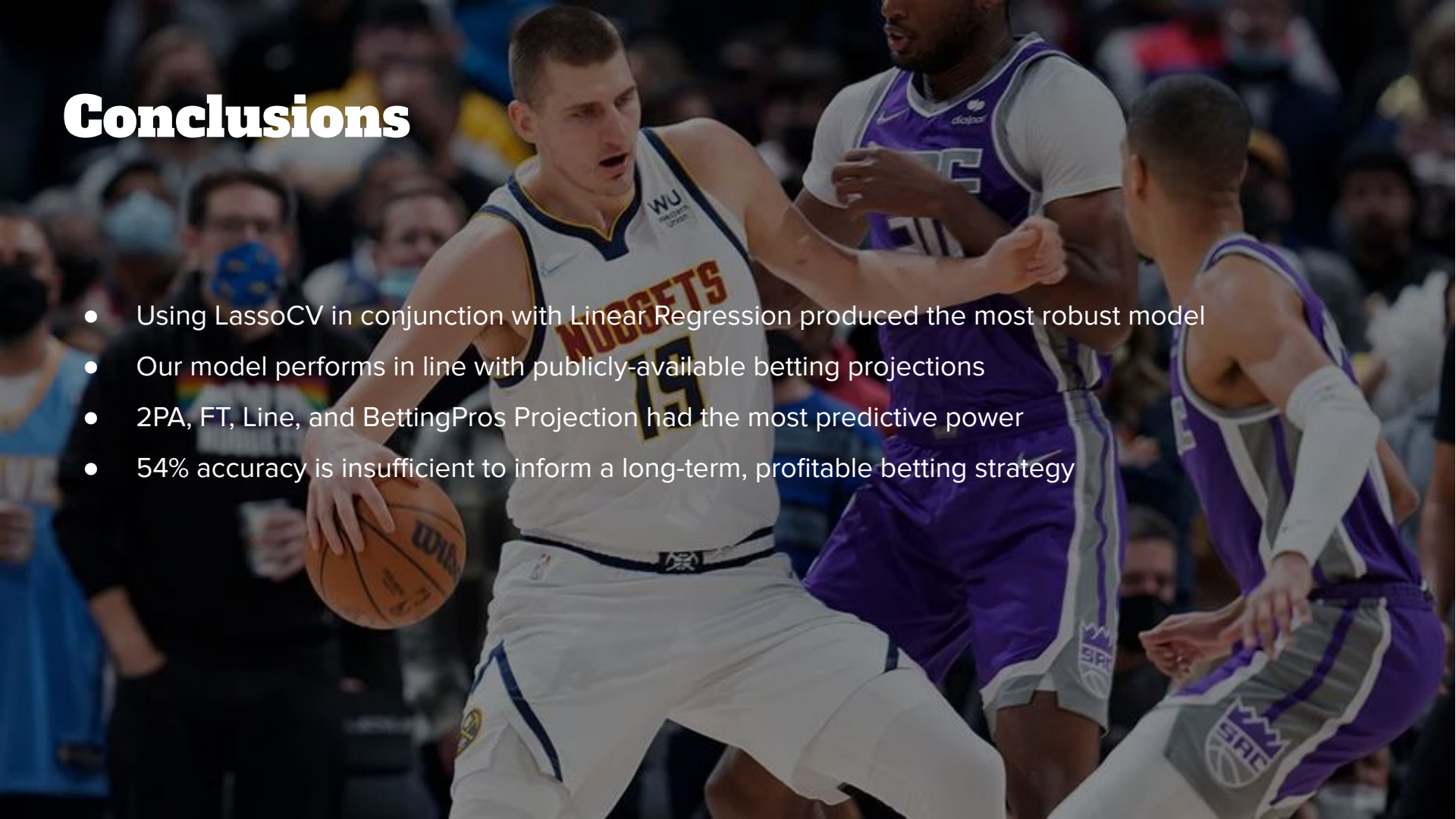
Areas for Further Development

- Additional Data Collection & Feature Engineering

- Day-of predictions

- Classification/Logistic Regression

Thank you!