

# Introduction

Friday, December 5, 2025 11:38 AM



Java Program used for running card analysis

SPCardAnal  
ysisTwo

This report presents an empirical analysis of game balance in Saint Petersburg, identifying statistical outliers and dominant strategies to inform the design of a balanced "Edition 3." Rather than relying on subjective observation, we generated objective performance data through extensive Monte-Carlo simulations using two advanced AI players: **AIDanFMCTrainerTimeManaged** (a time-sensitive agent trained on FlatMC data with feature selection) and **AIDanExpectiMiniMaxTimeManaged** (a time-sensitive version of our tournament two player).

For the preliminary analysis, to ensure statistical significance, we simulated 1,200 games for the First Edition and 750 games for the Second Edition, with strict time limits of 3.0 to 3.5 minutes per game to replicate tournament pressure. Our analysis separates performance metrics into two distinct game phases: Early Game (Rounds 1 through 4) and Late Game (Round 5 onwards). This distinction allows us to isolate "snowball" cards (those that grant a disproportionate advantage when purchased early) from cards intended specifically for end-game scoring.

To identify unbalanced cards accurately, we categorized cards by type (Workers, Aristocrats, Buildings) and normalized their Win Rates and Pick Rates using the Modified Z-Score. Based on the logic implemented in SPCardAnalysisTwo.java, the Buy Rate (labeled as "Pick Rate" in the generated report) is calculated by dividing the total number of times a specific card was purchased (buysTotal) by the total number of unique times that card appeared in the market (appearancesTotal). The Win Rate is determined by dividing the number of games won by a player who purchased the card (winsTotal) by the total number of times the card was purchased (buysTotal), providing a percentage that indicates how often buying the card correlates with a victory. These metrics are calculated both globally and for specific game phases (Early vs. Late) to isolate temporal performance. Unlike a standard Z-score, which can be skewed by extreme outliers, this method uses the median and the Median Absolute Deviation (MAD) to provide a robust measure of how far a card's win rate deviates from its peers. The formula used is:

$$M_i = \frac{0.6475 \times (x_i - \tilde{x})}{MAD}$$

Where  $x_i$  represents the individual card's win rate,  $\tilde{x}$  is the median win rate for that specific card type, and  $MAD$  is the median of the absolute deviations from the median. A constant of 0.6745 is applied to align the scale with a standard normal distribution. This robust statistical approach allows us to detect true outliers while accounting for the small sample size of unique cards. Note that the *Marijnski-Theater* has been excluded from the preliminary analysis due to a known mechanical bug in the current simulation environment.

Based on the performance data generated from the First and Second Edition simulations, we identified critical imbalances where specific cards either dominated the win condition or were statistically irrelevant to competitive play. We simulated 9 different variations of cards.csv to identify the best balance changes. Using these insights, we engineered Edition 3, implementing targeted cost and value adjustments to flatten the power curve.

# Report on the Edition 1 Deck

Friday, December 5, 2025 11:32 AM

As stated earlier, since pick rate and win rate are compared in different scales, we decided to normalize the values. We used adjusted Z-score, which uses Median and MAD. The result is a behavior similar to that of a Z-score.

Card Name	Type	Pick Rate	Win Rate	Late Pick Rate	Late Win Rate	Status	mod z-score Pick Rate	mod z-score Win Rate	mod z-score Late Pick Rate	mod z-score Late Win Rate
Tax Man	trading aristocrat	0.57	0.64	0.64	0.64	WIN CONDITION	-2.473166667	<b>1.68625</b>	-1.854875	1.68625

**Tax Man** (trading): This card has the highest Win Rate (0.64) and Late Win Rate (0.64) in the report, with a high positive modified z-score (1.68625), indicating it is overpowered and needs a mechanical adjustment

Card Name	Type	Pick Rate	Win Rate	Early Pick Rate	Early Win Rate	Late Pick Rate	Late Win Rate	mod z-score Pick Rate	mod z-score Win Rate	mod z-score Early Pick Rate	mod z-score Early Win Rate	mod z-score Late Pick Rate	mod z-score Late Win Rate
Weaving Mill	trading worker	0.73	0.56	0.79	0.59	0.69	0.55	-0.449666667	1.349	-0.74195	<b>5.396</b>	-0.524611111	0.449666667
Wharf	trading worker	0.74	0.55	0.73	0.58	0.7	0.54	-0.374722222	1.01175	-1.14665	<b>4.7215</b>	-0.449666667	0.224833333
Gold Smelter	trading worker	0.64	0.43	0.46	0.37	0.64	0.45	-1.124166667	<b>-3.03525</b>	-2.9678	-9.443	-0.899333333	-1.798666667
Potjomkin's Village	building	0.73	0.47	0.52	0.45	0.89	0.49	0.037472222	<b>-2.698</b>	-0.292283333	-1.059928571	0.306590909	-1.349
Warehouse	building	0.71	0.46	0.47	0.43	0.94	0.48	-0.112416667	<b>-3.3725</b>	-0.517166667	-1.445357143	0.919772727	-2.0235

**Weaving Mill**(worker): It has a high overall Pick Rate (0.73) and a strong Win Rate (0.56), suggesting it's a popular and effective card that may be contributing too much power to its archetype.

**Gold Smelter** (worker): With a very low Win Rate (0.43) and an even worse Early Win Rate (0.37), combined with negative modified z-scores (e.g., -9.443 for Early Win Rate), this card is highly ineffective and requires a significant buff.

**Warehouse** (building): Its low Win Rate (0.46) and negative modified z-score (-3.3725) indicate it's not contributing to wins and needs a power increase to justify its pick.

**Potjomkin's Village** (building): Despite a high Late Pick Rate (0.89), its Win Rate remains low (0.47) with a negative modified z-score (-2.698), suggesting it fails to effectively convert late picks into wins.

**Wharf** (trading worker): While it has a high Pick Rate (0.74), its Win Rate (0.55) is only slightly above average, so it should be monitored to ensure it doesn't become overpowered following other archetype changes

Card Name	Type	Early Pick Rate	Early Win Rate	z-score Early Pick Rate	z-score Early Win Rate
Mistress of Ceremonies	aristocrat	0.5	0.76	1.4333125	<b>2.36075</b>

**Mistress of Ceremonies** (aristocrat): Its extremely high Early Win Rate (0.76) and very high positive modified z-score (2.36075) suggest it's too dominant when picked early and should be monitored for a potential nerf.

Report on the Edition 2 deck

Friday, December 5, 2025 11:59 AM

Edition	Quantit	Type	Name	Cost	Rubles	Points	Other	Abbrev.	ed2 Qui	ed2 Typ	ed2 Nat	ed2 Co	ed2 Rut	ed2 Poi	ed2 Oth	ed2 Abt	Same n	change	st
1	2	building	Observatory	6	0	0	1 point if u	bo	2	building	Observato	7	0	0	1 point if u	bo2	TRUE	1	
1	2	aristocrat	Judge	16	5	2		a16	2	aristocrat	Judge	17	5	2		a17	TRUE	1	
1	2	aristocrat	Mistress of Ceremonies	18	6	3		a18	2	aristocrat	Mistress o	20	6	3		a20	TRUE	2	
1	1	trading ari	Patriarch	14	0	4		ta14	1	trading ari	Patriarch	16	0	4		ta16p	TRUE	2	
1	1	trading ari	Tax Man	16	0	0	1 ruble per ta	16	1	trading ari	Tax Man	17	0	0	1 ruble per ta	17	TRUE	1	

The table above shows the changes made to the original deck. We can see that five cards were nerfed (Observatory, Judge, Mistress of Ceremonies, Patriarch, and Tax Man), all by increasing its price.

Card Name	Type	Pick Ra	Win Rat	Early Pi	Early W	Late Pi	Late W
Observatory	building	-0.09	0.02	-0.06	-0.03	-0.08	0.02
Judge	aristocrat	-0.03	-0.01	-0.11	-0.07	-0.03	-0.01
Tax Man	trading aristocrat	-0.04	-0.03			-0.01	-0.03
Mistress of Cerem	aristocrat	-0.07	-0.06	-0.1	-0.12	-0.07	-0.05
Patriarch	trading aristocrat	-0.06	-0.07			-0.07	-0.08

We can see that the nerf is definitely working on these cards, with pick rate and win rate on these cards decreasing from Edition 1 deck to the Edition 2 deck (early pick & win rate for Tax Man and Patriarch are deducted due to a small sample size of buys). However, based on our observations, Observatory, Judge, and Patriarch did not necessarily deserved their nerfs, as their win rates were all middle of the pack (check first edition analysis) in their respective card categories. Here are the full statistics for deck edition 2.



CardBalanceReport\_Edition4

Card Name	Type	Total Ac	Total Bu	Pick Ra	Win Rat	Early Ac	Early Bu	Early Pi	Early W	Late Ap	Late Bu	Late Ptc	Late Wl	Status
Judge	aristocrat	1093	820	0.75	0.58	227	77	0.34	0.58	1001	743	0.74	0.58	Balanced
Admiral	trading ari	333	268	0.8	0.59	89	16	0.18	0.69	280	252	0.9	0.59	Balanced
Mistress o	aristocrat	1110	822	0.74	0.57	209	84	0.4	0.64	1009	738	0.73	0.56	Balanced
Builder	trading ari	330	283	0.86	0.59	85	41	0.48	0.59	260	242	0.93	0.59	Balanced
Chamber l	trading ari	321	266	0.83	0.63	100	48	0.48	0.67	237	218	0.92	0.62	WIN CONDITION
Warehous	aristocrat	2789	1599	0.57	0.56	537	101	0.19	0.69	2601	1498	0.58	0.55	Balanced
Czar	trading ari	346	244	0.71	0.56	102	4	0.04	0.25	297	240	0.81	0.57	Balanced
Administ	aristocrat	2784	2013	0.72	0.55	521	204	0.39	0.64	2522	1809	0.72	0.54	Balanced
Minister of	trading ari	325	252	0.78	0.58	97	11	0.11	0.45	277	241	0.87	0.59	Balanced
Controller	aristocrat	1688	1098	0.65	0.55	334	105	0.31	0.67	1543	993	0.64	0.53	Balanced
Patriarch	trading ari	325	254	0.78	0.52	94	13	0.14	0.77	273	241	0.88	0.51	EARLY GAMES SNOWBALL
Pope	trading ari	322	262	0.81	0.64	100	38	0.38	0.68	256	224	0.88	0.63	WIN CONDITION
Author	aristocrat	3324	2912	0.88	0.54	578	392	0.68	0.58	2893	2520	0.87	0.54	Balanced
Senator	trading ari	351	291	0.83	0.57	109	36	0.33	0.75	284	255	0.9	0.55	EARLY GAMES SNOWBALL
Tax Man	trading ari	333	177	0.53	0.61	88	0	0	0	283	177	0.63	0.61	WIN CONDITION
Secretary	aristocrat	2255	1291	0.57	0.54	422	93	0.22	0.67	2087	1198	0.57	0.53	Balanced
Weapon M	trading ari	321	273	0.85	0.59	85	30	0.35	0.63	265	243	0.92	0.59	Balanced

Card Name	Type	Pick Ra	Win Rat	Early Pi	Early W	Late Ptc	Late Wl	Status	mod z-s	mod z-s	mod z-s	mod z-s	mod z-s	mod z-s	re Late Wl
Weaving Mill	trading wo	0.73	0.56	0.8	0.61	0.68	0.53	Balanced	-0.33725	2.698	-0.44967	2.248333	-0.5396	0	
Wharf	trading wo	0.71	0.56	0.68	0.56	0.68	0.56	Balanced	-0.44967	2.698	-1.12417	1.124167	-0.5396	1.01175	
Lumberjack	worker	1	0.55	1	0.53	0.99	0.57	MUSTBUY	1.180375	2.0235	0.6745	0.449667	1.55135	1.349	
Gold Miner	worker	0.99	0.53	1	0.5	0.98	0.56	MUSTBUY	1.124167	0.6745	0.6745	-0.22483	1.4839	1.01175	
Fur Shop	trading wo	0.79	0.52	0.76	0.44	0.76	0.55	Balanced	0	0	-0.6745	-1.57383	0	0.6745	
Shepherd	worker	0.96	0.52	1	0.52	0.93	0.53	MUSTBUY	0.955542	0	0.6745	0.224833	1.14665	0	
Fur Trapper	worker	0.92	0.51	0.99	0.52	0.86	0.51	MUSTBUY	0.730708	-0.6745	0.618292	0.224833	0.6745	-0.6745	
Gold Smelter	trading wo	0.59	0.51	0.3	0.48	0.62	0.51	Balanced	-1.12417	-0.6745	-3.26008	-0.6745	-0.9443	-0.6745	
Ship Builder	worker	0.87	0.51	0.96	0.51	0.76	0.52	Balanced	0.449667	-0.6745	0.449667	0	0	-0.33725	
Czar and Carpenter	worker	0.67	0.5	0.88	0.47	0.45	0.55	Balanced	-0.6745	-1.349	0	-0.89933	-2.09095	0.6745	
Carpenter Workshop	trading wo	0.68	0.47	0.5	0.41	0.67	0.49	Balanced	-0.61829	-3.3725	-2.13592	-2.24833	-0.60705	-1.349	
Avr		0.81	0.521818	0.806364	0.504545	0.761818	0.534545								
Stdev		0.137642	0.025873	0.222313	0.05246	0.15862	0.024258								
Median		0.79	0.52	0.88	0.51	0.76	0.53								
MAD		0.12	0.01	0.12	0.03	0.1	0.02								

Card Name	Type	Pick Rat	Win Rat	Early Pick	Early Win	Late Pick	Late Win	Status	mod z-s	mod z-s +1	mod z-s -1	mod z-s	mod z-s	re Late Win Rate
Harbor	tradingbui	0.69	0.57	0.83	0.49	0.61	0.6	Balanced	-0.22483	2.0235	0.858021	0	-3.70975	3.03525
Bank	tradingbui	0.74	0.55	0.71	0.49	0.68	0.58	Balanced	0.096357	1.349	0.476678	0	-2.76545	2.36075
Observato	building	0.4	0.53	0.06	0.42	0.68	0.54	Balanced	-2.08774	0.6745	-1.58893	-2.36075	-2.76545	1.01175
Peterhof	tradingbui	0.77	0.53	0.82	0.51	0.71	0.54	Balanced	0.289071	0.6745	0.826243	0.6745	-2.36075	1.01175
Theater	building	0.57	0.53	0.23	0.55	0.88	0.53	Balanced	-0.99569	0.6745	-1.04869	2.0235	-0.06745	0.6745
Hospital	building	0.58	0.52	0.23	0.55	0.9	0.51	Balanced	-0.93145	0.33725	-1.04869	2.0235	0.20235	0
Market	building	0.72	0.52	0.47	0.51	0.97	0.53	Balanced	-0.03212	0.33725	-0.28601	0.6745	1.14665	0.6745
Academy	building	0.58	0.51	0.25	0.57	0.91	0.48	Balanced	-0.93145	0	-0.98514	2.698	0.33725	-1.01175
Pub	building	0.82	0.51	0.7	0.47	0.9	0.56	Balanced	0.610262	0	0.4449	-0.6745	0.20235	1.68625
Warehouse	building	0.71	0.51	0.44	0.49	0.98	0.52	Balanced	-0.09636	0	-0.38134	0	1.28155	0.33725
Winter Pal	tradingbui	0.87	0.51	0.61	0.49	0.88	0.51	Balanced	0.931452	0	0.158893	0	-0.06745	0
Customs	building	0.65	0.5	0.33	0.48	0.97	0.51	Balanced	-0.48179	-0.33725	-0.73091	-0.33725	1.14665	0
Firehouse	building	0.59	0.5	0.25	0.47	0.89	0.52	Balanced	-0.86721	-0.33725	-0.98514	-0.6745	0.06745	0.33725
Library	building	0.58	0.49	0.21	0.51	0.92	0.49	Balanced	-0.93145	-0.6745	-1.11225	0.6745	0.47215	-0.6745
St. Isaac's	tradingbui	0.86	0.49	0.69	0.5	0.85	0.49	Balanced	0.867214	-0.6745	0.413121	0.33725	-0.47215	-0.6745
Hermitage	tradingbui	0.84	0.48	0.75	0.43	0.82	0.49	Balanced	0.738738	-1.01175	0.603793	-2.0235	-0.87685	-0.6745
Church of	tradingbui	0.82	0.47	0.75	0.46	0.8	0.47	Balanced	0.610262	-1.349	0.603793	-1.01175	-1.14665	-1.349
Smolny Ca	tradingbui	0.75	0.47	0.66	0.39	0.72	0.49	Balanced	0.160595	-1.349	0.317786	-3.3725	-2.22585	-0.6745
Potjomkin'	building	0.73	0.46	0.53	0.46	0.92	0.46	Balanced	0.032119	-1.68625	-0.09534	-1.01175	0.47215	-1.68625
Catherine	tradingbui	0.86	0.45	0.59	0.54	0.89	0.43	Balanced	0.867214	-2.0235	0.095336	1.68625	0.06745	-2.698
Avr		0.7065	0.505	0.5055	0.489	0.844	0.5125							
Stdev		0.123056	0.029411	0.232862	0.04392	0.105754	0.039481							
Median		0.725	0.51	0.56	0.49	0.885	0.51							
MAD		0.105	0.02	0.21225	0.02	0.05	0.02							

Card Name	Type	Pick Rat	Win Rat	Late Pick	Late Win	Status	mod z-s	mod z-s +1	mod z-s -1	mod z-s	re Late Win Rate
Pope	tradingaristocrat	0.81	0.64	0.88	0.63	WIN CONC	0.33725	2.36075	0.112417	2.0235	
Chamber Maid	tradingaristocrat	0.83	0.63	0.92	0.62	WIN CONC	0.562083	2.0235	0.562083	1.68625	
Tax Man	tradingaristocrat	0.53	0.61	0.63	0.61	WIN CONC	-2.81042	1.349	-2.698	1.349	
Admiral	tradingaristocrat	0.8	0.59	0.9	0.59	Balanced	0.224833	0.6745	0.33725	0.6745	
Builder	tradingaristocrat	0.86	0.59	0.93	0.59	Balanced	0.899333	0.6745	0.6745	0.6745	
Weapon Master	tradingaristocrat	0.85	0.59	0.92	0.59	Balanced	0.786917	0.6745	0.562083	0.6745	
Judge	aristocrat	0.75	0.58	0.74	0.58	Balanced	-0.33725	0.33725	-1.46142	0.33725	
Minister of Forei	tradingaristocrat	0.78	0.58	0.87	0.59	Balanced	0	0.33725	0	0.6745	
Mistress of Cere	aristocrat	0.74	0.57	0.73	0.56	Balanced	-0.44967	0	-1.57383	-0.33725	
Senator	tradingaristocrat	0.83	0.57	0.9	0.55	EARLY GA	0.562083	0	0.33725	-0.6745	
Warehouse Mar	aristocrat	0.57	0.56	0.58	0.55	Balanced	-2.36075	-0.33725	-3.26008	-0.6745	
Czar	tradingaristocrat	0.71	0.56	0.81	0.57	Balanced	-0.78692	-0.33725	-0.6745	0	
Administrator	aristocrat	0.72	0.55	0.72	0.54	Balanced	-0.6745	-0.6745	-1.68625	-1.01175	
Controller	aristocrat	0.65	0.55	0.64	0.53	Balanced	-1.46142	-0.6745	-2.58558	-1.349	
Author	aristocrat	0.88	0.54	0.87	0.54	Balanced	1.124167	-1.01175	0	-1.01175	
Secretary	aristocrat	0.57	0.54	0.57	0.53	Balanced	-2.36075	-1.01175	-3.3725	-1.349	
Patriarch	tradingaristocrat	0.78	0.52	0.88	0.51	EARLY GA	0	-1.68625	0.112417	-2.0235	
Avr		0.744706	0.574706	0.793529	0.569412						
Stdev		0.104325	0.031082	0.123285	0.033338						
Median		0.78	0.57	0.87	0.57						
MAD		0.06	0.02	0.06	0.02						

Card Name	Type	Early Pick	Early Win Rate		
Admiral	tradingaristocrat	0.18	0.69	-2.2933	0.449667
Weapon Master	tradingaristocrat	0.35	0.63	0	-0.89933
Senator	tradingaristocrat	0.33	0.75	-0.2698	1.798667
Pope	tradingaristocrat	0.38	0.68	0.4047	0.224833
Builder	tradingaristocrat	0.48	0.59	1.7537	-1.79867
Chamber Maid	tradingaristocrat	0.48	0.67	1.7537	0
Judge	aristocrat	0.34	0.58	-0.1349	-2.0235
Mistress of Cere	aristocrat	0.4	0.64	0.6745	-0.6745
Secretary	aristocrat	0.22	0.67	-1.7537	0
Warehouse Mar	aristocrat	0.19	0.69	-2.1584	0.449667
Controller	aristocrat	0.31	0.67	-0.5396	0
Administrator	aristocrat	0.39	0.64	0.5396	-0.6745
Author	aristocrat	0.68	0.58	4.4517	-2.0235
Median		0.35	0.67		
MAD		0.05	0.03		

As you can see, the nerfs definitely works for Tax Man and Mistress of Ceremonies, reducing their abnormal win rates from edition 1. However, other cards are also affected, and some cards jumped out to be significantly better than in edition 1 (e.g. Pope (or Abbott), Harbor). We suspect this is the result of the nerfs to other cards that maybe shouldn't have been nerfed, or due to the small sample size. We're going to keep the nerfs on Tax Man and Mistress of Ceremonies and adjust other cards we identified in the analysis of the Edition 1 deck in our Edition 3 deck.

Card Balance Suggestions

Saturday, December 6, 2025 10:14 PM

We ran 9 total Monte Carlo Simulation, each with 1500+ games, with different variants of balance changes, and came to the balance changes below.

Workers:  
Changes:

Edi	Quant	Type	Name	Cost	Rubles	Points	Other	Abbrev	Edi	Quant	Type	Name	Cost	Rubles	Points	Other	Abbrev	change	change	change	Not Ch
1	1	trading worker	Gold Smelter	0	0	0	0	0	1	1	trading worker	Gold Smelter	0	0	0	0	0	0	0	0	0
1	1	trading worker	Weaving Mill	0	0	0	0	0	1	1	trading worker	Weaving Mill	0	0	0	0	0	0	0	0	0
1	1	trading worker	Wharf	0	0	0	0	0	1	1	trading worker	Wharf	0	0	0	0	0	0	0	0	0

Old Statistics:

Card Name	Type	Pick Rate	Win Rate	Early Pick	Early Win	Late Pick	Late Win	Status	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc
Weaving Mill	trading wt	0.73	0.56	0.79	0.59	0.69	0.55	Balanced	-0.44967	1.349	-0.74195	5.396	-0.52461	0.449667							
Wharf	trading wt	0.74	0.55	0.73	0.50	0.7	0.54	Balanced	-0.57472	1.01175	-1.14885	4.7215	-0.44967	0.224853							
Lumberjack	worker	0.99	0.55	1	0.53	0.98	0.57	MUST BUY	0.29989	1.01175	0.6745	1.349	1.68778	0.899333							
Fur Shop	trading wt	0.79	0.53	0.76	0.5	0.77	0.54	Balanced	0	0.33725	-0.5443	-0.6745	0.074944	0.224853							
Gold Miner	worker	0.98	0.53	1	0.51	0.97	0.55	MUST BUY	1.42944	0.33725	0.6745	0	1.573833	0.449667							
Shepherd	worker	0.96	0.52	1	0.51	0.93	0.53	MUST BUY	1.274256	0	0.6745	0	1.274256	0							
Fur Trapper	worker	0.92	0.51	0.99	0.51	0.85	0.5	MUST BUY	0.974278	-0.33725	0.66705	0	0.6745	-0.6745							
Ship and Carpenter	worker	0.17	0.5	0.9	0.52	0.5	0.48	Balanced	-0.63747	-0.6745	0	0.6745	-1.12417								
Ship Builder	worker	0.87	0.5	0.96	0.5	0.76	0.49	Balanced	0.99956	-0.6745	0.4047	-0.6745	0	-0.89933							
Carpenter Workshop	trading wt	0.71	0.48	0.5	0.4	0.7	0.5	Balanced	-0.59906	-1.349	-2.1698	-7.4195	-0.44967	-0.6745							
Gold Smelter	trading wt	0.64	0.43	0.46	0.37	0.64	0.45	Balanced	-1.12417	-1.03525	-2.9678	-0.443	-0.89933	-1.79867							
Air		0.020909	0.514545	0.626364	0.501818	0.771818	0.518182														
Stdev		0.12094	0.035513	0.189796	0.902496	0.142115	0.034855														
Median		0.79	0.52	0.5	0.51	0.76	0.53														
MAD		0.09	0.02	0.1	0.01	0.09	0.03														

With these changes, we were able to:

- Nerf Weaving Mill and Wharf such that their early win rate is dropped significantly.
- Gold Smelter gets a deserving buff to its win rate.
- There's a significant reduction in the early win rate standard deviation
- We do notice the low pick rate for Carpenter Workshop & Gold Smelter. However, we believe this is due to our player not seeing through enough of the benefit of having these two cards.

Buildings:  
No changes.

Changes were attempted to be made to the original deck. However, none of the statistics came out as balanced as how it was in the first edition deck.

Statistics:	Pick Rate	Win Rate	Early Pick	Early Win	Late Pick	Late Win	Status	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc
Worker	trading building	0.73	0.53	0.75	0.56	0.66	0.55	Balanced	0.037472	1.349	-0.74195	5.396	-0.52461	0.449667							
Smelter	trading building	0.78	0.53	0.65	0.58	0.75	0.52	Balanced	0.020909	1.588	-0.20243	1.80749	-0.44967	0.074944							
St. Isaac	trading building	1.8	0.53	0.72	0.56	0.77	0.52	Balanced	0.020909	1.588	-0.20243	1.80749	-0.44967	0.074944							
Herring	trading building	0.02	0.52	0.71	0.51	0.82	0.52	Balanced	0.121075	-0.648	-0.56265	-0.40196	-0.03588	0							
Library	building	0.96	0.52	0.93	0.52	0.92	0.52	Balanced	-0.224853	0.074944	0.29989	1.01175	0.6745	0.899333							
Wine	trading building	0.98	0.52	0.95	0.52	0.96	0.52	Balanced	0.020909	1.588	-0.20243	1.80749	-0.44967	0.074944							
W. V. building	building	0.73	0.51	0.75	0.55	0.64	0.51	Balanced	-1.12417	0	0.6745	0.074944	0.224853								
Hospital	building	0.57	0.51	0.21	0.5	0.9	0.51	Balanced	-1.349	0	0.6745	0.074944	0.224853								
Overseer	building	0.48	0.51	0.12	0.45	0.94	0.51	Balanced	-0.6745	0	0.6745	0.074944	0.224853								
Peasant	trading building	0.73	0.51	0.77	0.52	0.68	0.51	Balanced	0.037472	1.349	-0.74195	5.396	-0.52461	0.449667							
Teacher	building	0.51	0.51	0.54	0.59	0.51	0.51	Balanced	-0.6745	0.074944	0.224853										
Academy	building	0.58	0.53	0.22	0.51	0.86	0.53	Balanced	-1.12417	-0.6745	0.074944	0.224853									
Cathedral	trading building	0.68	0.53	0.46	0.48	0.91	0.53	Balanced	-1.12417	-0.6745	0.074944	0.224853									
Church	trading building	0.54	0.53	0.49	0.53	0.53	0.53	Balanced	-0.6745	0.074944	0.224853										
Park	building	0.53	0.53	0.46	0.47	0.89	0.54	Balanced	0.037472	1.349	-0.74195	5.396	-0.52461	0.449667							
Cathedral	trading building	0.68	0.48	0.35	0.46	0.94	0.53	Balanced	-0.6745	0.074944	0.224853										
Freemason	building	0.58	0.48	0.25	0.49	0.82	0.49	Balanced	-1.12417	-0.6745	0.074944	0.224853									
Monastery	building	0.72	0.47	0.48	0.46	0.86	0.47	Balanced	-0.6745	0.074944	0.224853										
Prophet	building	0.73	0.47	0.52	0.45	0.89	0.48	Balanced	0.037472	1.349	-0.74195	5.396	-0.52461	0.449667							
Worship	building	0.72	0.46	0.47	0.43	0.86	0.46	Balanced	-0.6745	0.074944	0.224853										
Air		0.7803	0.505	0.582	0.505	0.8075	0.5085														
Stdev		0.12786	0.035513	0.225861	0.035513	0.035513	0.035513														
Median		0.73	0.51	0.585	0.505	0.805	0.51														
MAD		0.08	0.01	0.15	0.035	0.085	0.01														

Aristocrats:

Changes:

Edition	Quantity	Type	Name	Cost	Rubles	Points	Other	Abbrev.	Edition	Quantity	Type	Name	Cost	Rubles	Points	Other	Abbrev.	change	change	change	Not Ch.
1	1	aristocrat	Mistress of Cer	18	6	3		a18		3	New aristocrat	Mistress of Cer	20	6	3		a20	2	0	0	FALSE
1	1	trading aristocrat	Tax Man	16	0	0	1	ruble per tax	a16		3	Card name	16	0	0	0	mod 2-secr mod 2-secr	0	0	0	FALSE

Old Statistics:

Card Name	Type	Pick Rate	Win Rate	Late Pick	Late Win	R Status	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc	mod z-scc
Tax Man	trading aristocrat	0.57	0.64	0.64	0.64	WIN CONC	-2.47317	1.68625	-1.85488	1.68625											
Mistress of Ceremonies	aristocrat	0.81	0.63	0.8	0.61	WIN CONC	0.224833	1.349	-0.50588	0.6745											
Pope	trading aristocrat	0.83	0.63	0.92	0.63	WIN CONC	0.449667	1.349	-0.50588	1.349											
Builder	trading aristocrat	0.84	0.6	0.93	0.59	WIN CONC	0.562083	0.33725	0.590188	0											
Czar	trading aristocrat	0.68	0.6	0.78	0.6	EARLY GAN	-1.23658	0.33725	-0.6745	0.33725											
Weapon Master	trading aristocrat	0.85	0.6	0.94	0.6	Balanced	0.6745	0.33725	0.6745	0.33725											
Admiral	trading aristocrat	0.79	0.59	0.89	0.59	Balanced	0	0	0.252938	0											
Judge	aristocrat	0.78	0.59	0.77	0.59	Balanced	-0.11242	0	-0.75881	0											
Patriarch	trading aristocrat	0.84	0.59	0.95	0.59	Balanced	0.562083	0	0.758813	0											
Senator	trading aristocrat	0.86	0.59	0.94	0.6	Balanced	0.796917	0	0.6745	0.33725											
Chamber Maid	trading aristocrat	0.84	0.57	0.91	0.57	Balanced	0.562083	-0.6745	0.421563	-0.6745											
Controller	aristocrat	0.67	0.57	0.69	0.56	Balanced	-1.349	-0.6745	-1.68625	-0.01375											
Minister of Foreign Affairs	trading aristocrat	0.76	0.57	0.87	0.58	Balanced	-0.33725	-0.6745	0.084313	-0.33725											
Secretary	aristocrat	0.57	0.55	0.57	0.54	Balanced	-2.47317	-1.349	-2.44596	1.68625											
Administrator	aristocrat	0.73	0.54	0.72	0.54	Balanced	-0.6745	-1.68625	-1.18038	1.68625											
Warehouse Manager	aristocrat	0.59	0.54	0.58	0.53	Balanced	-2.24833	-1.68625	-2.36975	-2.0235											
Author	aristocrat	0.87	0.53	0.86	0.53	Balanced	0.899333	-2.0235	0	-2.0235											
Air		0.757647	0.584118	0.807647	0.581765																
Stdev		0.101317	0.031447	0.127165	0.031852																
Median		0.79	0.59	0.86	0.59																
MAD		0.06	0.02	0.08	0.02																

Card Name	Type	Early Pick	Early Win	F z-score Ea	F z-score Early Win Rate
Mistress of Ceremonies	aristocrat	0.5	0.76	1.433313	2.36075
Controller	aristocrat	0.33	0.67	0	0.843125
Secretary	aristocrat	0.23	0.66	-0.84913	0.6745
Judge	aristocrat	0.45	0.65	1.01175	0.505875
Pope	trading aristocrat	0.33	0.63	0	0.168625
Builder	trading aristocrat	0.4	0.63	0.590188	0.168625
Admiral	trading aristocrat	0.25	0.63	-0.6745	0.168625
Warehouse Manager	aristocrat	0.24	0.62	-0.75881	0
Patriarch	trading aristocrat	0.28	0.6	-0.42156	-0.33725
Weapon Master	trading aristocrat	0.29	0.58	-0.33725	-0.6745
Senator	trading aristocrat	0.32	0.57	-0.08431	-0.84913