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Article

The Impact of Community Involvement on Game Life-Cycle: Evidence based on Gaming Platform Steam

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Online-Appendix zu

„The Impact of Community Involvement on Game Life-Cycle: Evidence based on Gaming Platform Steam”

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Appendix

Table A1: Summary Statistics Cross-Sectional Dataset "Release"

Variable	Definition	Dummy	Log	Mean	SD	Min	Max	N
<i>Price (Release)</i>	Price of a game at release			2.13	1.25	-0.11	4.50	2039
<i>Workshop</i>	Players can create game content & use others' content	x	x	0.10	0.29	0	1	2039
<i>Tradingcards</i>	Players can earn collect game items & trade	x		0.72	0.45	0	1	2039
<i>Achievements</i>	Players can earn awards & display on profile	x		0.69	0.46	0	1	2039
<i>Leaderboards</i>	Players can compare performance in rankings	x		0.13	0.34	0	1	2039
<i>Multiplayer</i>	Game supports multiplayer	x		0.36	0.48	0	1	2039
<i>Contoller Support</i>	Game supports controllers	x		0.50	0.50	0	1	2039
<i>Cloud Gaming</i>	Game has various cloud functionalities	x		0.44	0.50	0	1	2039
<i>Virtual Reality</i>	Game supports virtual reality	x		0.01	0.07	0	1	2039
<i>TV Compatible</i>	Game is playable on TV-Screen	x		0.15	0.35	0	1	2039
<i>Remote Gaming</i>	Game is playable privately remotely with friends	x		0.12	0.33	0	1	2039
<i>In-app-purchases</i>	Game offers players to buy game items	x		0.05	0.22	0	1	2039
<i>Number Languages</i>	Number of available languages in game			5.43	5.12	1	29	2039
<i>Number Pictures</i>	Number of pictures on store page to promote game			11.24	7.17	0	87	2039
<i>Number Trailers</i>	Number of trailers on store page to promote game			2.08	2.24	0	38	2039
<i>Developer Experience</i>	Number of games (co-)developed so far			2.73	4.19	1	39	2039
<i>Publisher Experience</i>	Number of games (co-)published so far			7.79	12.61	1	75	2039
<i>Number Markets</i>	Number of regions game is available			39.61	3.93	9	41	2039
<i>Platform Owner</i>	Platform owner Valve developed the game	x		0.00	0.02	0	1	2039
<i>Genre Action</i>	Game belongs to genre Action	x		0.49	0.50	0	1	2039
<i>Genre Indie</i>	Game belongs to genre Indie	x		0.66	0.47	0	1	2039
<i>Genre Strategy</i>	Game belongs to genre Strategy	x		0.26	0.44	0	1	2039
<i>Genre Simulation</i>	Game belongs to genre Simulation	x		0.24	0.43	0	1	2039
<i>Genre Roleplay</i>	Game belongs to genre Roleplay	x		0.23	0.42	0	1	2039
<i>Genre Casual</i>	Game belongs to genre Casual	x		0.28	0.45	0	1	2039
<i>Genre Nudity</i>	Game belongs to genre Nudity	x		0.01	0.06	0	1	2039
<i>Genre Sport</i>	Game belongs to genre Sport	x		0.05	0.22	0	1	2039
<i>Release Month</i>	Release month of games	x		Feb 2017	15.55	Nov 2014	Mar 2020	2039
Factor Variable		Freq.	Percent	Cum.				
<i>Operating System</i>								
<i>Windows</i>	Game available for Windows only	1301	63.81	63.81				
<i>Windows & Linux</i>	Game available for Windows & Linux only	51	2.50	66.31				
<i>Windows & Mac</i>	Game available for Windows & Mac only	226	11.08	77.39				
<i>Windows & Mac & Linux</i>	Game available for all OS	461	22.61	100.00				

Table A2: Summary Statistics Cross-Sectional Dataset "Present"

<i>Variable</i>	<i>Definition</i>	<i>Dummy</i>	<i>Log</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>N</i>
<i>Price (Present)</i>	Price of a game at present (March 2020)		x	2.13	1.269	-0.02	4.38	1928
<i>User Rating</i>	User rating for game			73.48	18.061	0	100	1928
<i>Number Ratings</i>	Number of total ratings for game			8,361.06	44,498.48	1	1,394,123	1928
<i>Average Playtime</i>	Average individual playtime in min. for a game to date			799.33	1679.575	1	30,303	1928
<i>Number DLC</i>	Number of additional paid content for game			2.43	13.517	0	422	1928
<i>Age</i>	Age in days of game			1,104.98	499.192	23	1,934	1928

Note: Only additional variables that are not already in the previous dataset are presented.

Table A3: Summary Statistics Panel Dataset

<i>Variable</i>	<i>Definition</i>	<i>Dummy</i>	<i>Log</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>N</i>
<i>Price (Panel)</i>	Daily price of a game over time		x	1.88	1.26	-3.91	4.61	2,479,769
<i>Player Numbers</i>	Average monthly number of players for game over time		x	2.96	2.90	-4.61	14.28	2,049,825
<i>Age</i>	Age in month of a game over time			21.47	14.49	0.03	64.47	2,536,948

Note: Only additional variables that are not already in the previous datasets are presented.

Figure A1: Distribution of Residuals

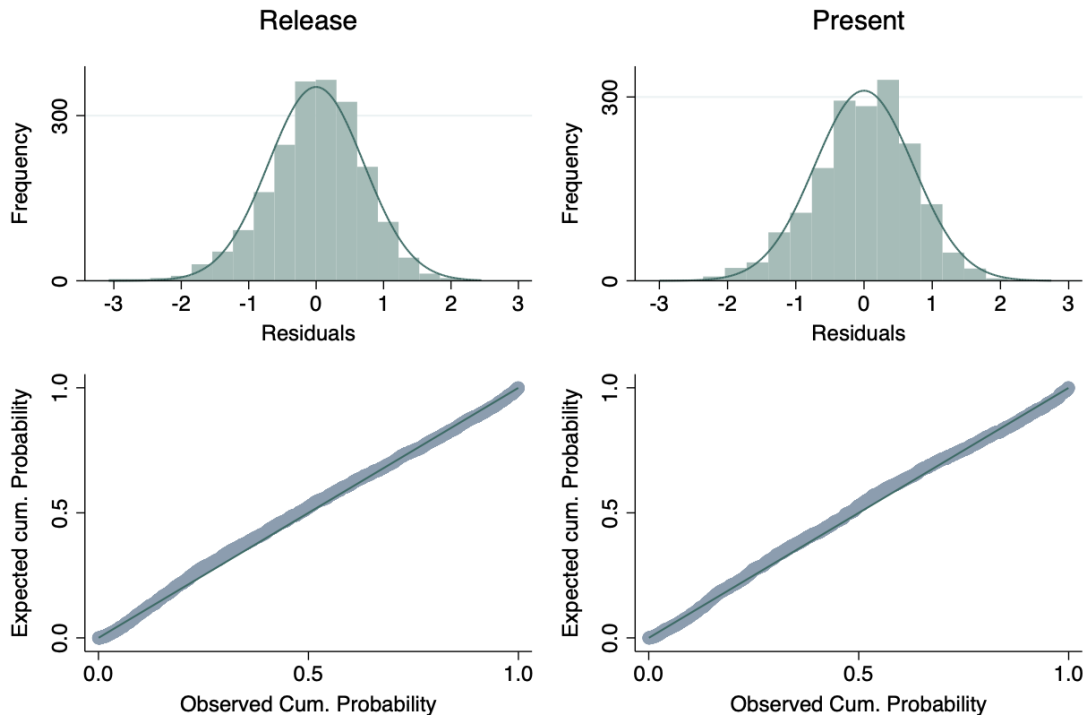


Figure A2: Distribution of Prices in Present depending on Age of Game

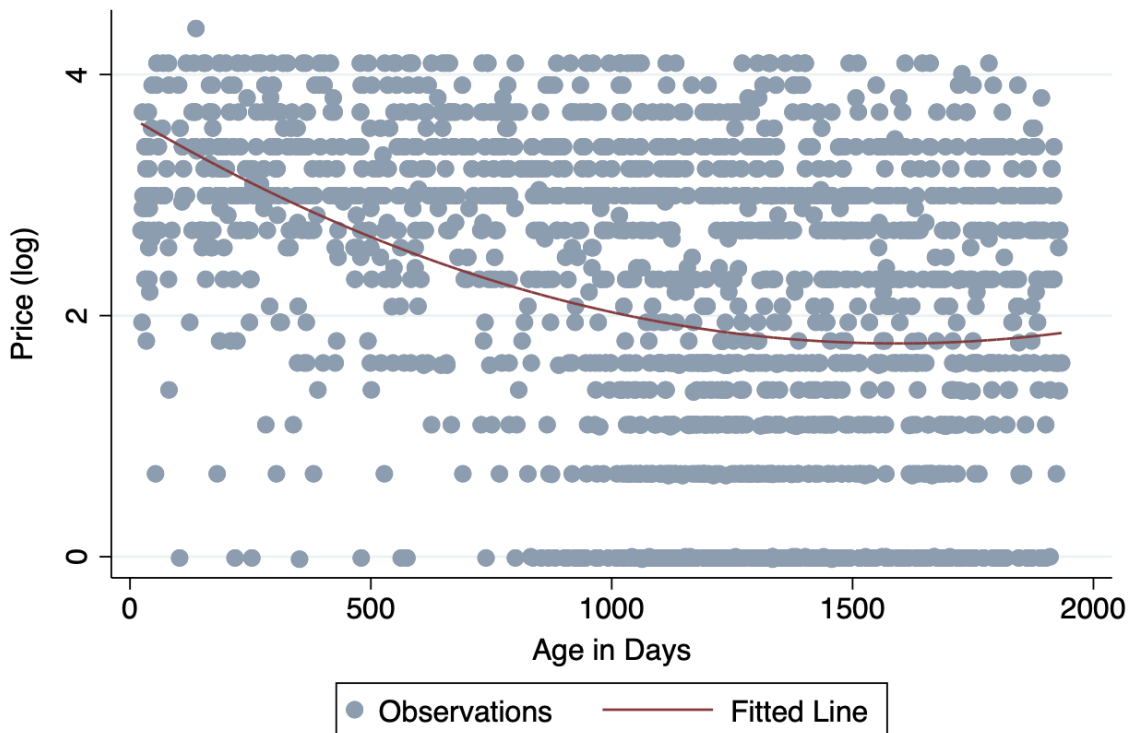


Table A4: Variance Inflation Factors Regression Model 1

Variable	VIF	1/VIF
<i>Workshop</i>	1.260	0.795
<i>Tradingcards</i>	1.480	0.674
<i>Achievements</i>	1.500	0.667
<i>Leaderboards</i>	1.170	0.854
<i>Multiplayer</i>	1.870	0.535
<i>Contoller Support</i>	1.620	0.618
<i>Cloud Gaming</i>	1.540	0.650
<i>Virtual Reality</i>	1.050	0.955
<i>TV Compatible</i>	1.530	0.653
<i>Remote Gaming</i>	1.620	0.619
<i>In-app-purchases</i>	1.210	0.827
<i>Number Languages</i>	1.490	0.670
<i>Number Pictures</i>	1.270	0.788
<i>Number Trailers</i>	1.370	0.731
<i>Developer Experience</i>	1.550	0.646
<i>Publisher Experience</i>	1.620	0.618
<i>Number Markets</i>	1.130	0.882
<i>Platform Owner</i>	1.120	0.890
<i>Operating System</i>	1.17 (Avg.)	0.85 (Avg.)
<i>Genres</i>	1.21 (Avg.)	0.83 (Avg.)
<i>Release Month</i>	2.21 (Avg.)	0.45 (Avg.)

Table A5: Variance Inflation Factors Regression Model 2

Variable	VIF	1/VIF
<i>Workshop</i>	1.270	0.788
<i>Tradingcards</i>	1.400	0.715
<i>Achievements</i>	1.490	0.671
<i>Leaderboards</i>	1.140	0.876
<i>Multiplayer</i>	1.810	0.551
<i>Contoller Support</i>	1.600	0.624
<i>Cloud Gaming</i>	1.510	0.661
<i>Virtual Reality</i>	1.040	0.962
<i>TV Compatible</i>	1.510	0.663
<i>Remote Gaming</i>	1.610	0.620
<i>In-app-purchases</i>	1.150	0.867
<i>Number Languages</i>	1.480	0.675
<i>Number Pictures</i>	1.270	0.790
<i>Number Trailers</i>	1.380	0.722
<i>Developer Experience</i>	1.480	0.677
<i>Publisher Experience</i>	1.560	0.640
<i>Number Markets</i>	1.080	0.926
<i>Platform Owner</i>	1.090	0.919
<i>Operating System</i>	1.15 (Avg.)	0.86 (Avg.)
<i>Genres</i>	1.19 (Avg.)	0.84 (Avg.)
<i>User Rating</i>	1.14	0.71
<i>Number Ratings</i>	1.43	0.70
<i>Average Playtime</i>	1.50	0.66
<i>Number DLC</i>	1.10	0.90
<i>Age</i>	19.71	0.05
<i>Age*Age</i>	18.62	0.05

Note: High factors for Age and Age*Age are expected, as they naturally depend on each other. Hence, both variables will have large Standard Errors, but still control adequately for time effects

Table A6: Model 1 Regression Output and Robustness Checks

Model	Model 1: Main		Model 1: Extended		Model 1: Reduced	
Independent Variable	Price Release (log)		Price Release (log)		Price Release (log)	
<i>Workshop</i>	0.16**	(0.05)	0.14**	(0.05)	0.15**	(0.06)
<i>Tradingcards</i>	-0.32***	(0.04)	-0.30***	(0.04)	-0.31***	(0.04)
<i>Achievements</i>	0.09	(0.04)	0.07	(0.04)	0.26*	(0.04)
<i>Leaderboards</i>	-0.04	(0.05)	-0.01	(0.05)	0.03	(0.05)
<i>Source SDK</i>	-0.17	(0.12)	-0.29*	(0.13)	-0.02	(0.12)
<i>Multiplayer</i>	0.33***	(0.04)	0.35***	(0.04)	0.31***	(0.04)
<i>Controller Support</i>	0.22***	(0.04)	0.19***	(0.04)		
<i>Cloud Gaming</i>	0.31***	(0.04)	0.28***	(0.04)		
<i>Virtual Reality</i>	1.11***	(0.14)	1.03***	(0.16)		
<i>TV Compatible</i>	0.29***	(0.05)	0.26***	(0.05)		
<i>Remote Gaming</i>	-0.09	(0.06)	-0.09	(0.06)		
<i>In-app-purchases</i>	0.17*	(0.07)	0.17*	(0.07)		
<i>Number Languages</i>	0.03***	(0.00)	0.02***	(0.00)	0.04***	(0.00)
<i>Number Pictures</i>	0.01***	(0.00)	0.01***	(0.00)	0.01***	(0.00)
<i>Number Trailers</i>	0.04***	(0.01)	0.04***	(0.01)	0.06***	(0.01)
<i>Developer Experience</i>	0.01*	(0.00)	0.01*	(0.00)	0.01	(0.00)
<i>Publisher Experience</i>	0.00*	(0.00)	0.00*	(0.00)	0.00**	(0.00)
<i>Number Markets</i>	0.01*	(0.01)	0.01*	(0.01)	0.02***	(0.01)
<i>Platform Owner</i>	-2.62*	(1.05)	-2.54**	(0.90)	-2.46*	(1.05)
<i>Genre Action</i>	0.07	(0.04)	0.11**	(0.04)	0.13***	(0.04)
<i>Genre Indie</i>	-0.60***	(0.05)	-0.58***	(0.05)	-0.65***	(0.05)
<i>Genre Strategy</i>	0.30***	(0.04)	0.34***	(0.04)	0.24***	(0.04)
<i>Genre Simulation</i>	0.23***	(0.04)	0.20***	(0.04)	0.20***	(0.05)
<i>Genre Roleplay</i>	0.15***	(0.04)	0.15***	(0.04)	0.21***	(0.04)
<i>Genre Racing</i>	-0.25**	(0.10)	-0.20*	(0.10)	-0.28**	(0.10)
<i>Genre Casual</i>	-0.59***	(0.04)	-0.56***	(0.04)	-0.65***	(0.04)
<i>Genre Nudity</i>	0.54*	(0.26)	0.43	(0.23)	0.50	(0.30)
<i>Genre Sports</i>	0.10	(0.08)	0.15*	(0.08)	0.18*	(0.08)
<i>Windows</i>	<i>Base</i>		<i>Base</i>		<i>Base</i>	
<i>Windows & Linux</i>	-0.04	(0.11)	-0.04	(0.11)	0.00	(0.11)
<i>Windows & Mac</i>	0.03	(0.05)	0.02	(0.05)	0.02	(0.06)
<i>Windows & Mac & Linux</i>	-0.00	(0.05)	-0.01	(0.05)	0.05	(0.05)
<i>Tag: Great Soutrack</i>			0.23***	(0.04)		
<i>Tag: Atmospheric</i>			0.18***	(0.04)		
<i>Tag: Funny</i>			-0.03	(0.05)		
<i>Tag: Difficult</i>			-0.09*	(0.05)		
<i>Tag: Materpiece</i>			0.02	(0.10)		
<i>Tag: Classic</i>			-0.08	(0.08)		
<i>Tag: Familyfriendly</i>			0.09	(0.07)		
<i>Tag: Replayvalue</i>			-0.01	(0.06)		
<i>Tag: Cute</i>			0.13*	(0.06)		
<i>Tag: Realstic</i>			0.23***	(0.06)		
<i>ReleaseMonths-Dummies</i>	<i>-Omitted from output for readibiliy-</i>					
<i>Constant</i>	1.53***	(0.26)	1.51***	(0.26)	1.44***	(0.25)
N	2,029		2,022		2,029	
Adj. R2	0.66		0.67		0.62	

Note: Robust SE in parentheses. ReleaseMonth-Dummies omitted from output: 64 Dummies with Nov2014 as base, some are significant. *** p<0.001, ** p<0.01, * p<0.5.

Table A7: Model 2 Regression Output and Robustness Checks

Model	Model 2: Main		Model 2: Extended		Model 2: Reduced	
Independent Variable	Price Release (log)		Price Release (log)		Price Release (log)	
<i>Workshop</i>	0.15**	(0.06)	0.14**	(0.05)	0.13*	(0.06)
<i>Tradingcards</i>	-0.40***	(0.05)	-0.39***	(0.05)	-0.38***	(0.05)
<i>Achievements</i>	0.12*	(0.05)	0.10*	(0.05)	0.27***	(0.05)
<i>Leaderboards</i>	0.02	(0.05)	0.04	(0.05)	0.07	(0.05)
<i>Source SDK</i>	-0.25	(0.32)	-0.36	(0.24)	-0.16	(0.28)
<i>Multiplayer</i>	0.29***	(0.05)	0.31***	(0.05)	0.29***	(0.04)
<i>Controller Support</i>	0.22***	(0.05)	0.19***	(0.05)		
<i>Cloud Gaming</i>	0.29***	(0.04)	0.26***	(0.04)		
<i>Virtual Reality</i>	1.07***	(0.13)	1.04***	(0.15)		
<i>TV Compatible</i>	0.27***	(0.05)	0.24***	(0.05)		
<i>Remote Gaming</i>	-0.04	(0.06)	-0.02	(0.06)		
<i>In-app-purchases</i>	-0.02	(0.11)	-0.04	(0.11)		
<i>Number Languages</i>	0.03***	(0.01)	0.03***	(0.01)	0.04***	(0.01)
<i>Number Pictures</i>	0.01***	(0.00)	0.01***	(0.00)	0.01**	(0.00)
<i>Number Trailers</i>	0.05***	(0.01)	0.05***	(0.01)	0.06***	(0.02)
<i>Developer Experience</i>	0.00	(0.01)	-0.00	(0.01)	-0.00	(0.00)
<i>Publisher Experience</i>	0.01***	(0.00)	0.01***	(0.00)	0.01***	(0.00)
<i>Number Markets</i>	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
<i>Platform Owner</i>	-0.73*	(0.32)	-0.71**	(0.22)	-0.55	(0.29)
<i>Genre Action</i>	0.05	(0.04)	0.07	(0.04)	0.10*	(0.04)
<i>Genre Indie</i>	-0.48***	(0.05)	-0.46***	(0.05)	-0.53***	(0.05)
<i>Genre Strategy</i>	0.25***	(0.05)	0.29***	(0.05)	0.19***	(0.04)
<i>Genre Simulation</i>	0.31***	(0.05)	0.30***	(0.05)	0.26***	(0.05)
<i>Genre Roleplay</i>	0.19***	(0.05)	0.18***	(0.05)	0.23***	(0.05)
<i>Genre Racing</i>	-0.18	(0.10)	-0.13	(0.10)	-0.20*	(0.10)
<i>Genre Casual</i>	-0.49***	(0.05)	-0.45***	(0.05)	-0.54***	(0.05)
<i>Genre Nudity</i>	0.72**	(0.26)	0.61*	(0.25)	0.68*	(0.28)
<i>Genre Sports</i>	-0.11	(0.09)	-0.06	(0.09)	-0.03	(0.09)
<i>Windows</i>	<i>Base</i>		<i>Base</i>		<i>Base</i>	
<i>Windows & Linux</i>	0.14	(0.12)	0.18	(0.12)	0.18	(0.12)
<i>Windows & Mac</i>	-0.03	(0.06)	-0.03	(0.06)	-0.05	(0.06)
<i>Windows & Mac & Linux</i>	0.10*	(0.05)	0.09*	(0.05)	0.14**	(0.05)
<i>User Rating</i>	0.01***	(0.00)	0.01***	(0.00)	0.01***	(0.00)
<i>Number Ratings</i>	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)
<i>Average Playtime</i>	0.00*	(0.00)	0.00*	(0.00)	0.00**	(0.00)
<i>Number DLC</i>	0.00*	(0.00)	0.00*	(0.00)	0.00*	(0.00)
<i>Age</i>	-0.00***	(0.00)	-0.00***	(0.00)	-0.00***	(0.00)
<i>Age*Age</i>	0.00***	(0.00)	0.00***	(0.00)	0.00***	(0.00)
<i>User Tag: Great Sountrack</i>			0.22***	(0.04)		
<i>User Tag: Atmospheric</i>			0.19***	(0.04)		
<i>User Tag: Funny</i>			-0.08	(0.05)		
<i>User Tag: Difficult</i>			-0.03	(0.05)		
<i>User Tag: Materpiece</i>			0.07	(0.10)		
<i>User Tag: Classic</i>			-0.09	(0.09)		
<i>User Tag: Familyfriendly</i>			0.06	(0.07)		
<i>User Tag: Replayvalue</i>			0.05	(0.07)		
<i>User Tag: Cute</i>			0.06	(0.07)		
<i>User Tag: Realstic</i>			0.12	(0.07)		
<i>Constant</i>	1.09***	(0.30)	1.21***	(0.29)	0.88**	(0.30)
N	1,763		1,763		1,763	
Adj. R2	0.68		0.69		0.65	

Note: Robust SE in parentheses. *** p<0.001, ** p<0.01, * p<0.5.

Table A8: Model 3 and 4 Regression Output and Robustness Checks

Model	Model 3: Main	Model 3: Reduced	Model 4: Main
Independent Variable	Price (log)	Price (log)	Price (log)
<i>Age</i>	-0.005*** (0.001)	-0.003*** (0.001)	-0.004*** (0.001)
<i>Age * Workshop</i>	0.002* (0.001)	0.003** (0.001)	0.003** (0.001)
<i>Age * Tradingcards</i>	-0.003*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
<i>Age * Achievements</i>	0.002** (0.001)	0.002** (0.001)	0.003** (0.001)
<i>PlayerNumbers</i>	-0.017*** (0.004)		-0.011*** (0.003)
<i>PlayerNumbers * Age</i>	0.0003** (0.0001)		
<i>PlayerNumbers * Workshop</i>			0.039*** (0.011)
<i>Month-Dummies</i>	-Omitted from output for readability-		
<i>Constant</i>	3.088*** (0.015)	2.950*** (0.011)	3.090*** (0.013)
N	1,799,274	2,185,340	1,799,274
Adj. R2	0.8	0.7	0.8

Note: Robust SE clustered on Game-Level in parentheses. Month-Dummies omitted from output: 64 Dummies with Nov2014 as base, some are significant. *** p<0.001, ** p<0.01, * p<0.5.