



BERNSTEIN

Rohit Venkat
NSS Data Science 5 Cohort
Capstone Project

Predictive Modeling of Client Investment Behavior

Private Wealth Management

About Bernstein Private Wealth Management

- Boutique private wealth management arm of AllianceBernstein LP
- 34,000 ultra-high-net worth clients / \$120 billion in assets under management

How Can AB Grow Its Private Wealth Management Business?

Deriving business insights from client investment behavior

Which clients are contributing significant assets?

Translation:

- Which clients benefit the most from their relationship with Bernstein?
- Which investment products and services are the most compelling to investors?

Which clients are contributing little to no assets?

Translation:

- Which investment products and services are underperforming?
- Which client segments have been overlooked?

Can We Predict Which Clients Will Contribute Significant Assets?

Using complexity rules to predict client investment behavior

Complexity rules: labels used by Bernstein's advisors to describe their relationship with clients

Spearman Correlation of Account Values vs. Complexity Rules

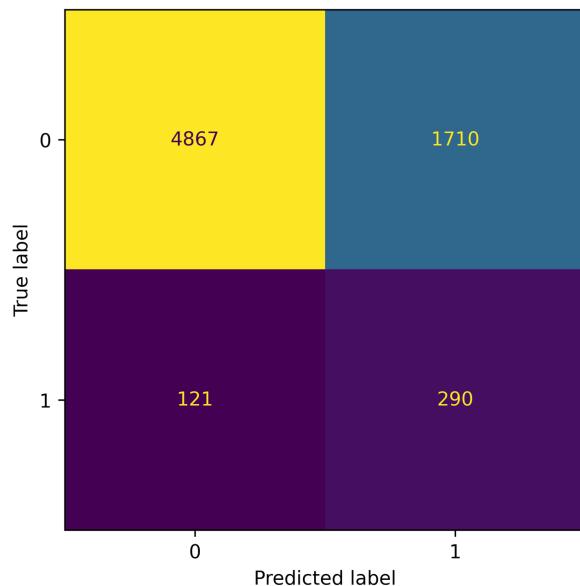
★ 9MonthProd	18	16	6	12	10	33	15	-4	-12	10	16	17	1	7	2	8	12	1	0	7	10	9	0	2	1	9	9	17	11	28	-0	10	11	4	13	10	8	18	0
9MonthOutflow	-22	-17	-9	-23	-19	-26	-13	10	29	-11	-28	-45	-1	-6	-2	-24	-22	1	1	-6	-5	-7	-4	-5	-9	-15	-13	-26	-12	-37	11	-8	-11	-2	-11	-3	-30	-31	20
9MonthNet	-9	-5	-5	-12	-10	-4	-2	5	17	-5	-13	-32	-1	-2	-1	-16	-12	1	1	-1	3	2	-3	-4	-7	-7	-7	-13	-2	-16	11	2	-2	1	0	3	-23	-17	18
9MonthNetPct	0	3	-1	-5	-4	5	2	0	12	-2	-2	-18	-1	1	0	-11	-4	2	1	2	6	4	-0	-2	-4	-2	-2	2	-2	9	4	2	2	4	6	-15	-8	15	
BeginningValue	32	28	15	28	24	36	18	-15	-30	12	37	54	2	10	3	24	28	3	0	9	11	13	8	6	9	20	17	35	17	50	-15	13	16	5	16	8	31	36	-19
CurrentValue	30	26	13	25	22	36	18	-14	-27	12	34	50	2	9	3	22	25	2	0	9	10	12	7	5	8	19	16	33	17	48	-13	12	15	5	15	8	28	33	-17

Predictive Modeling of Client Production

Which clients will contribute over \$1 million in production over 9 months based on complexity data alone?

Model setup:

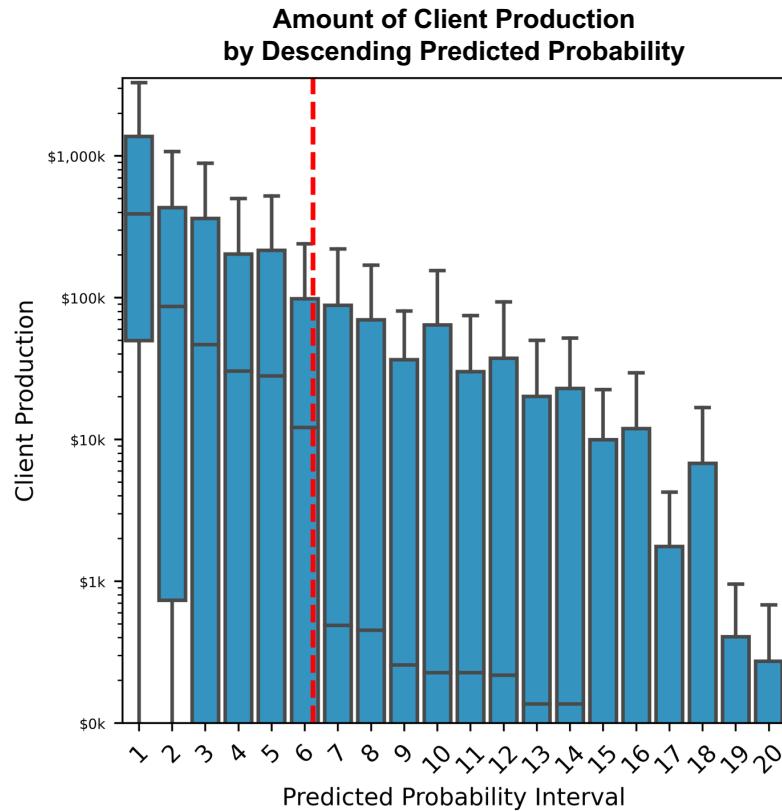
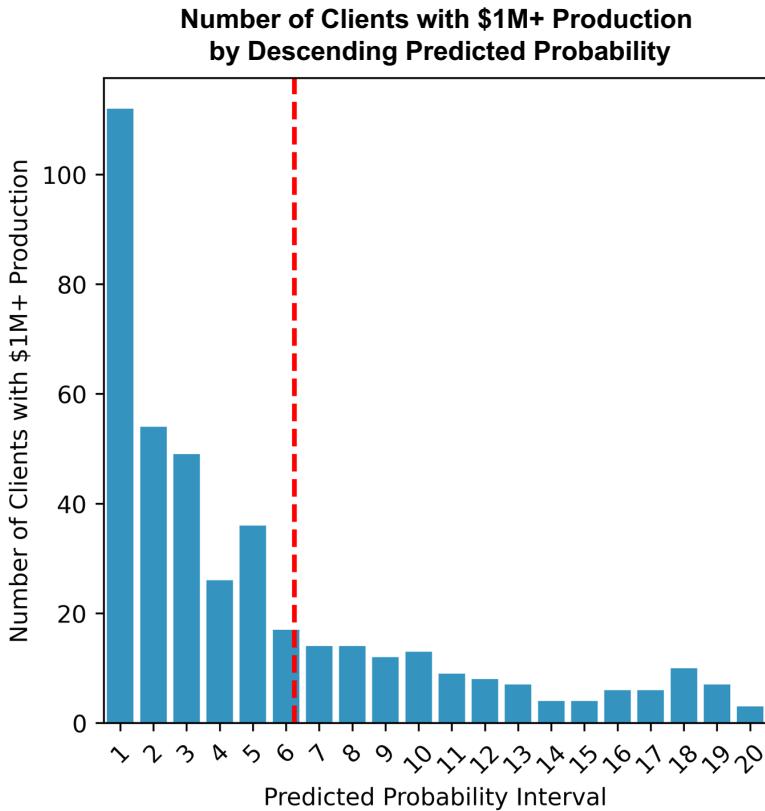
- LASSO logistic regression model with balanced class weights
- 70:30 train-test split of 23,292 clients
- \$250k-\$1M production (“indeterminate set”) filtered from training data
- 3-fold cross validation and hyperparameter optimization grid search on training data



	precision	recall	f1-score	support
0	0.98	0.74	0.84	6577
1	0.14	0.71	0.24	411
accuracy				0.74
macro avg	0.56	0.72	0.54	6988

Predictive Modeling of Client Production

Which clients will contribute over \$1 million in production over 9 months based on complexity data alone?



Predictive Modeling of Client Production

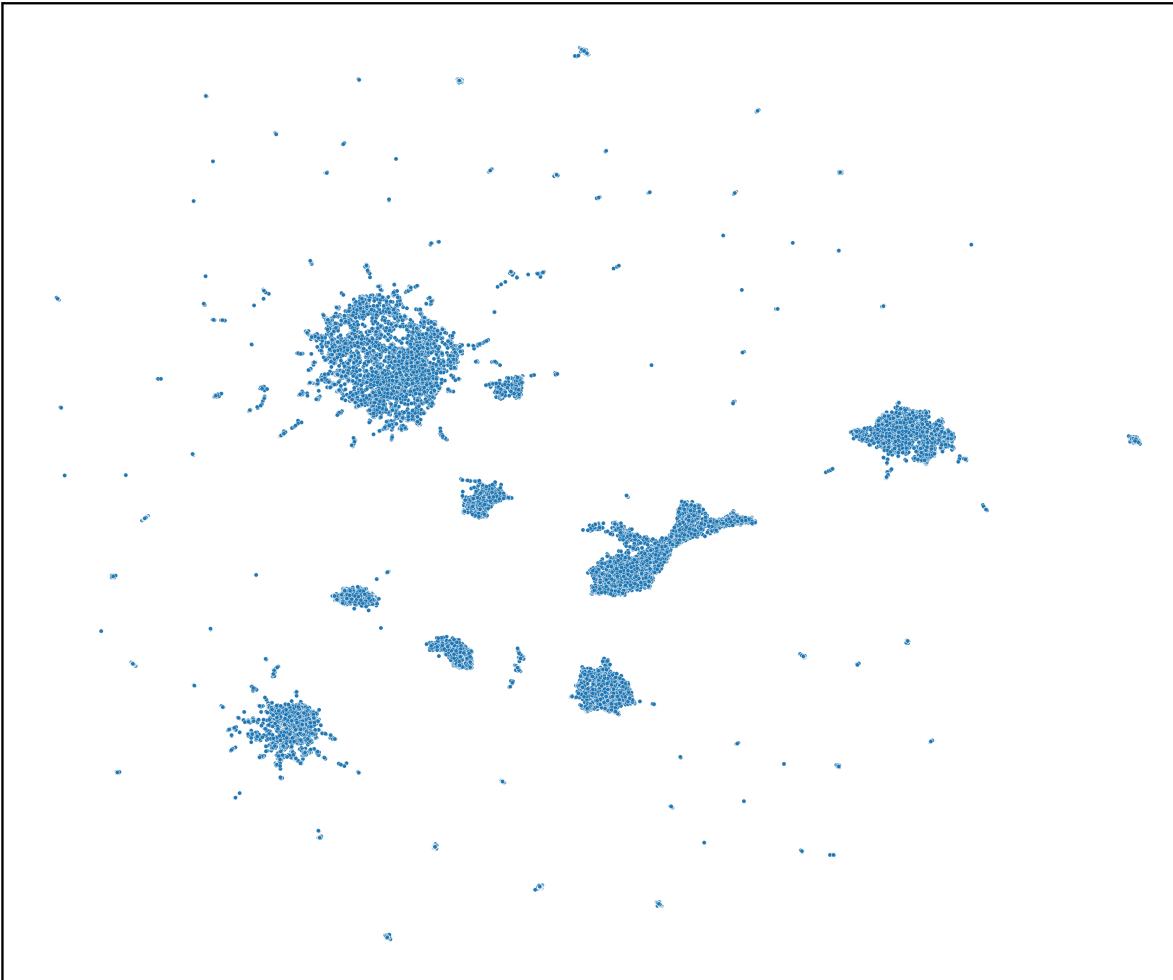
Which clients will contribute over \$1 million in production over 9 months based on complexity data alone?

	Description	Complexity Rule	Coefficient
	One or more owners is NOT a Delegator, Validator, or Soloist	65	0.33
	Relationship contains individually managed bonds	20	0.26
	One or more owners is [Key] / [Super Key]	2–3	0.26
	Relationship has 1+ accounts invested in institutional products	27	0.19
	Relationship contains 3+ individually managed equity services	21	-0.18
	Relationship has [1-2] / [3+] investing entities other than personal, join, or IRA	6-7	0.16
	Relationship has [10-15] / [16-20] / [21+] invested accounts	49–51	0.14
	Resource request: Barnard, Eisenman, Chaloff, Kirr, Bates, Turner	57	0.13
	Relationship has [1] / [2-5] / [5-7] / [8+] Alt. or FE	10–13	0.13
	One or more accounts contains DAA/Tax-Aware DAA	62	-0.12
	Fee relationship has [3-5] / [5+] sales relationships linked	52–53	0.11
	Relationship has unmanaged assets > \$1M	45	0.11
	Relationship has 3+ Resource Requests Annually	54	0.11
	Relationship has at least one account with guidelines or an IPS routed	58	0.10
	Relationship contains Option Advantage	19	0.09
	Relationship has had an approved WFA analyze [\$5-10M] / [\$10-20M] / [\$20M+]	41–43	0.09
	Relationship has a PaTH account	32	0.08
	Relationship has an Exchange Fund	31	0.06
	One Alt. or FE subscription/commitment of [\$1-2M] / [\$2-5M] / [\$5M+]	14–16	0.05
Resource request:	Single Stock Analysis, Alternatives and Focused Equities, Planning Overview, Tax Management, International Planning	55	0.05

Client Segmentation + Predictive Modeling Analysis

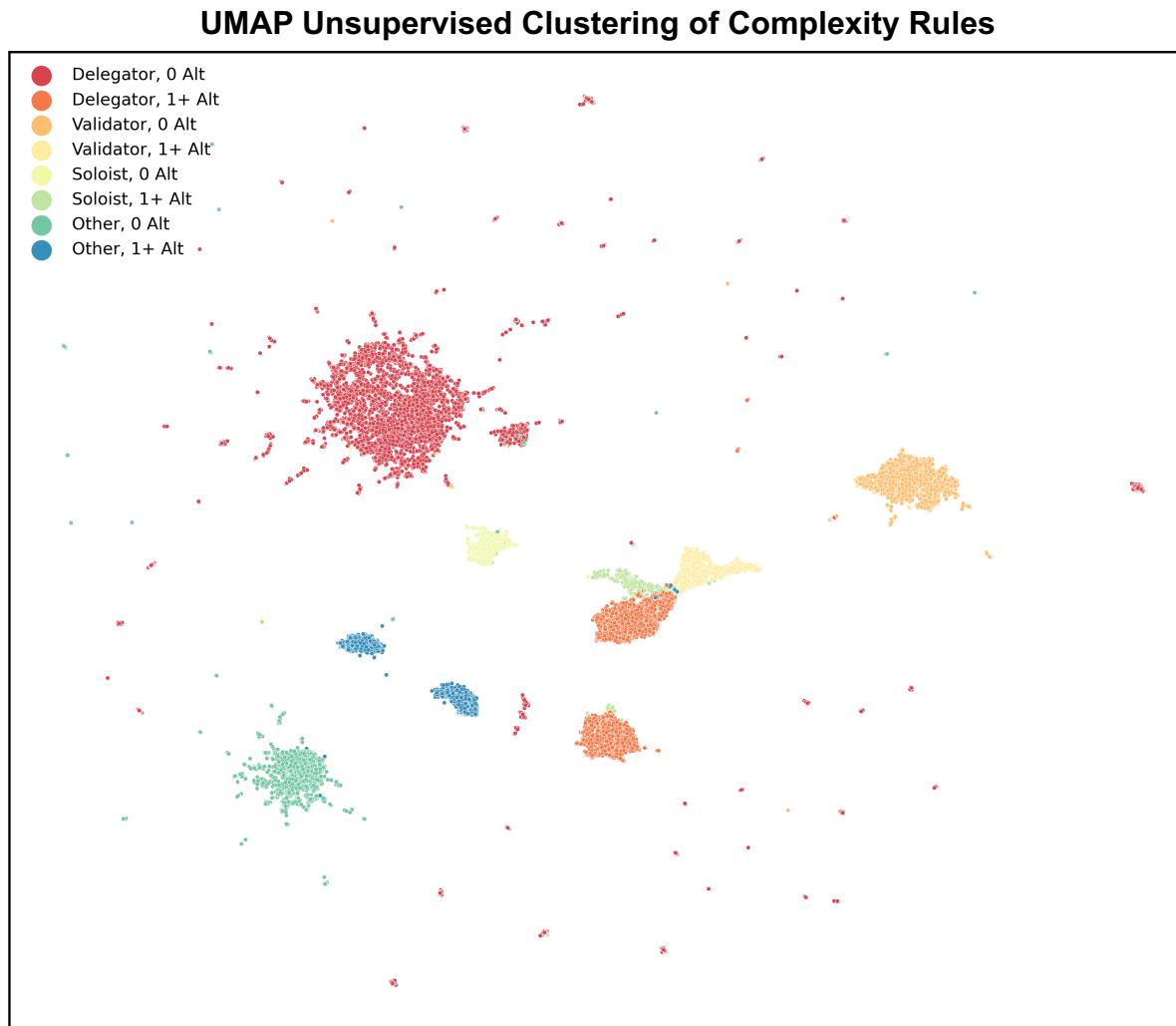
Which complexity rules predict investment production for different client segments?

UMAP Unsupervised Clustering of Complexity Rules



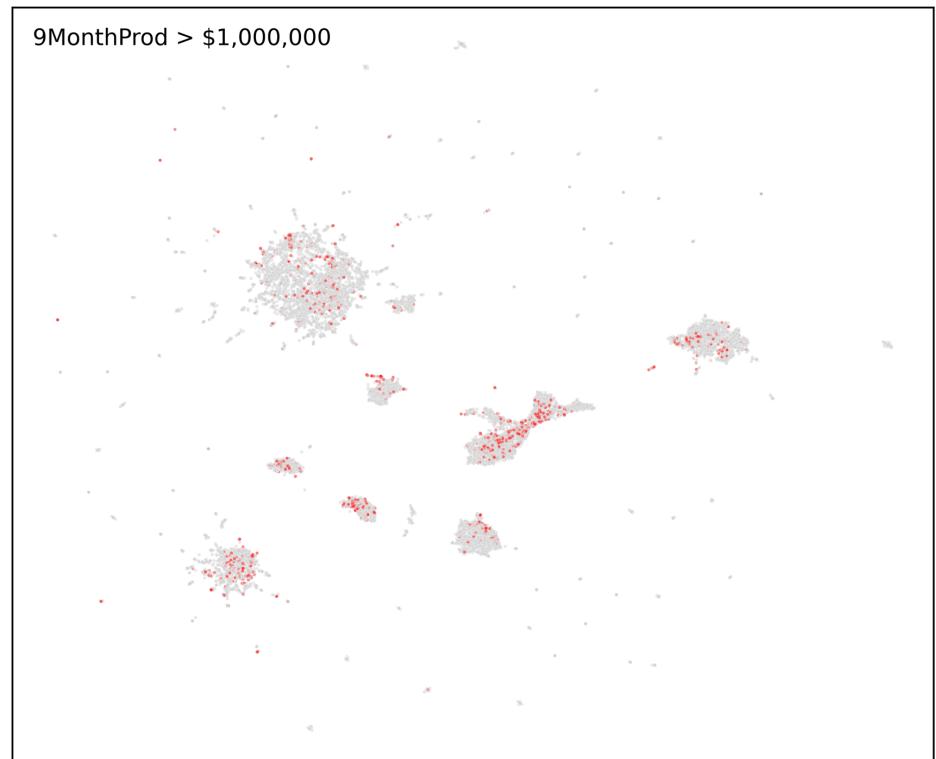
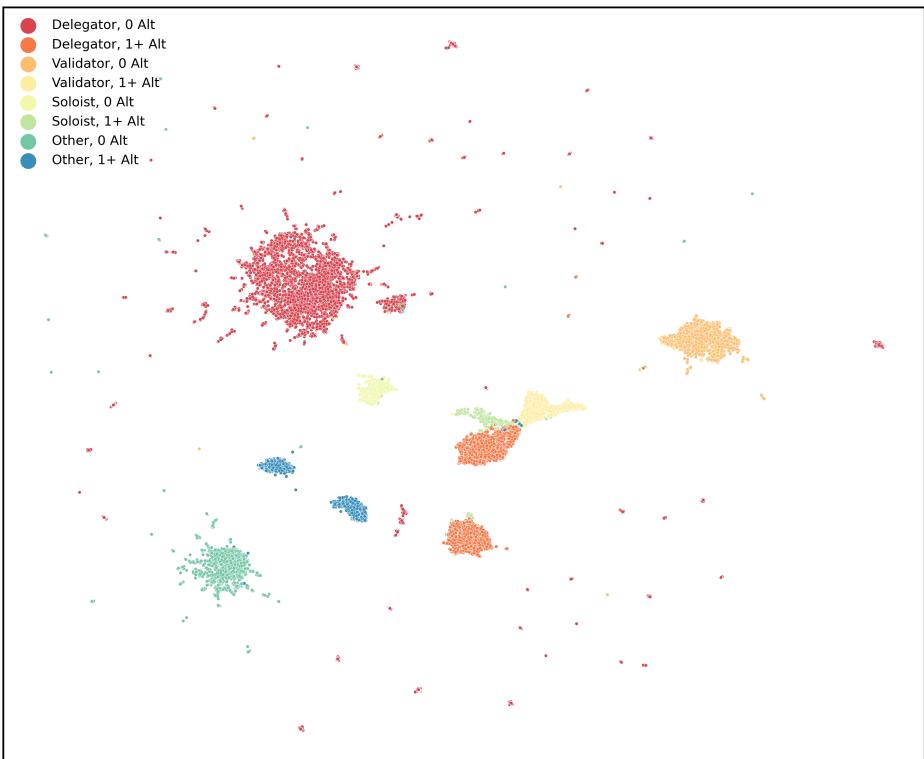
Client Segmentation + Predictive Modeling Analysis

Which complexity rules predict investment production for different client segments?



Client Segmentation + Predictive Modeling Analysis

Which complexity rules predict investment production for different client segments?



Client Segmentation + Predictive Modeling Analysis

Which complexity rules predict investment production for different client segments?

Activation = Coefficient × Weight

	Description	Complexity Rule	Coefficient	Delegator	Validator	Soloist	Other
		0 Alt	1+ Alt	0 Alt	1+ Alt	0 Alt	1+ Alt
	One or more owners is NOT a Delegator, Validator, or Soloist	65	0.33				
	Relationship contains individually managed bonds	20	0.26				
	One or more owners is [Key] / [Super Key]	2-3	0.26				
	Relationship has 1+ accounts invested in institutional products	27	0.19				
	Relationship contains 3+ individually managed equity services	21	-0.18				
	Relationship has [1-2] / [3+] investing entities other than personal, join, or IRA	6-7	0.16				
	Relationship has [10-15] / [16-20] / [21+] invested accounts	49-51	0.14				
	Resource request: Barnard, Eisenman, Chaloff, Kirr, Bates, Turner	57	0.13				
	Relationship has [1] / [2-5] / [5-7] / [8+] Alt. or FE	10-13	0.13				
	One or more accounts contains DAA/Tax-Aware DAA	62	-0.12				
	Fee relationship has [3-5] / [5+] sales relationships linked	52-53	0.11				
	Relationship has unmanaged assets > \$1M	45	0.11				
	Relationship has 3+ Resource Requests Annually	54	0.11				
	Relationship has at least one account with guidelines or an IPS routed	58	0.10				
	Relationship contains Option Advantage	19	0.09				
	Relationship has had an approved WFA analyze [\$5-10M] / [\$10-20M] / [\$20M+]	41-43	0.09				
	Relationship has a PaTH account	32	0.08				
	Relationship has an Exchange Fund	31	0.06				
	One Alt. or FE subscription/commitment of [\$1-2M] / [\$2-5M] / [\$5M+]	14-16	0.05				
Resource request:	Single Stock Analysis, Alternatives and Focused Equities, Planning Overview, Tax Management, International Planning	55	0.05				

Key Findings

- **Non-Delegator/Validator/Soloist** clients most likely represent new clients who have not been designated an investor type.
- Clients with **1+ Alternative Assets** are strong positive predictors of client investment production because they likely have more assets to contribute to Bernstein to begin with.
- **Individually Managed Bonds** and **Resource Requests** are healthy positive predictors of client investment production but appear to be underutilized across client segments.
- **Recommendation:** Provide clients with more opportunities to take investment decisions into their own hands while better engaging them with useful resources.

Acknowledgements

Kirk Gripenstraw

AllianceBernstein, VP of Data Insights & Analytics

Michael Holloway

Nashville Software School, Lead Instructor

Veronica Ikeshoji-Orlati

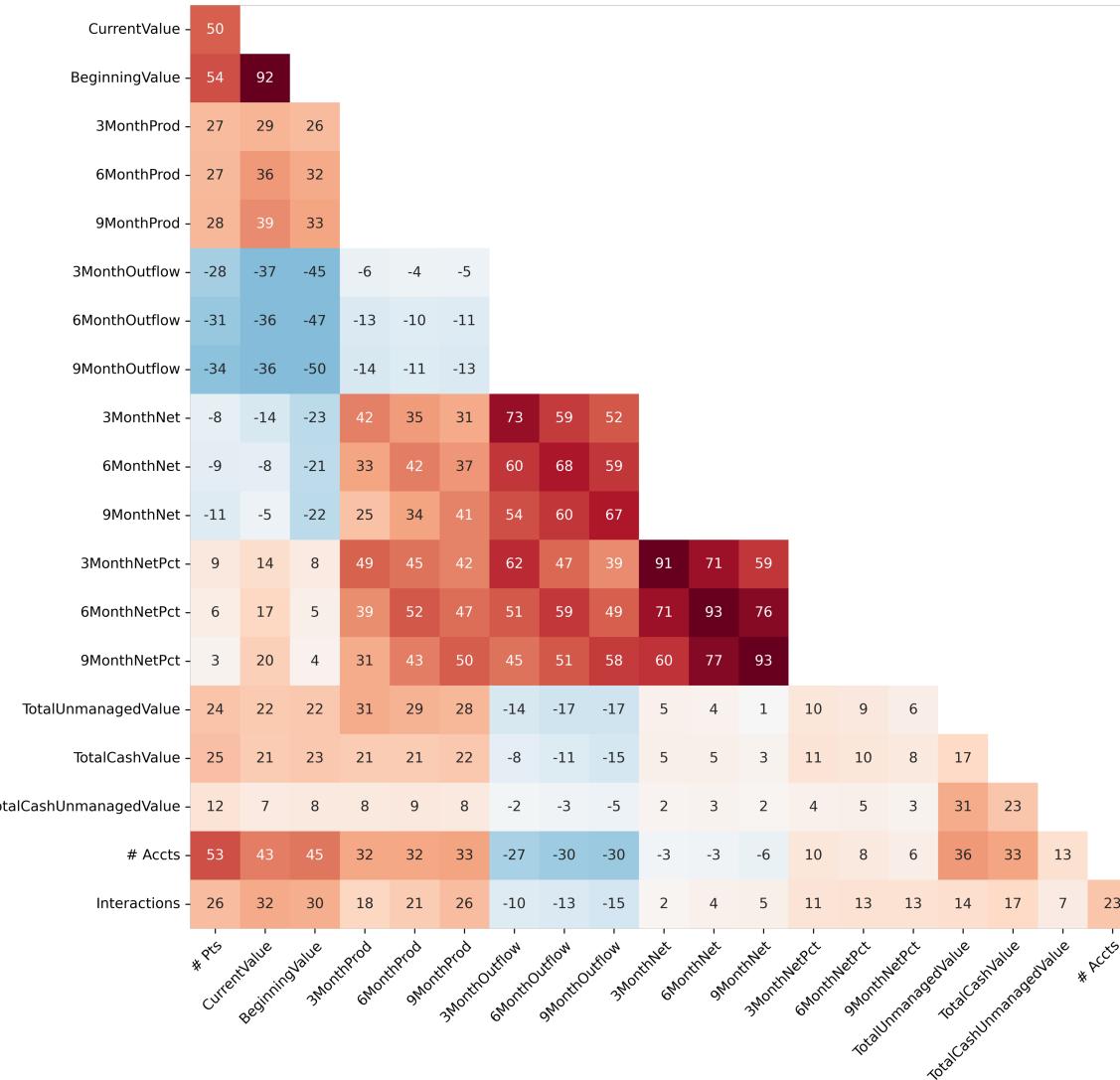
Nashville Software School, Teaching Assistant

Alvin Wendt

Nashville Software School, Teaching Assistant

Appendix

What are the relationships between *Total Complexity Points*, *Client Interactions*, and subsequent *Production*, *Outflow*, and *Net*?



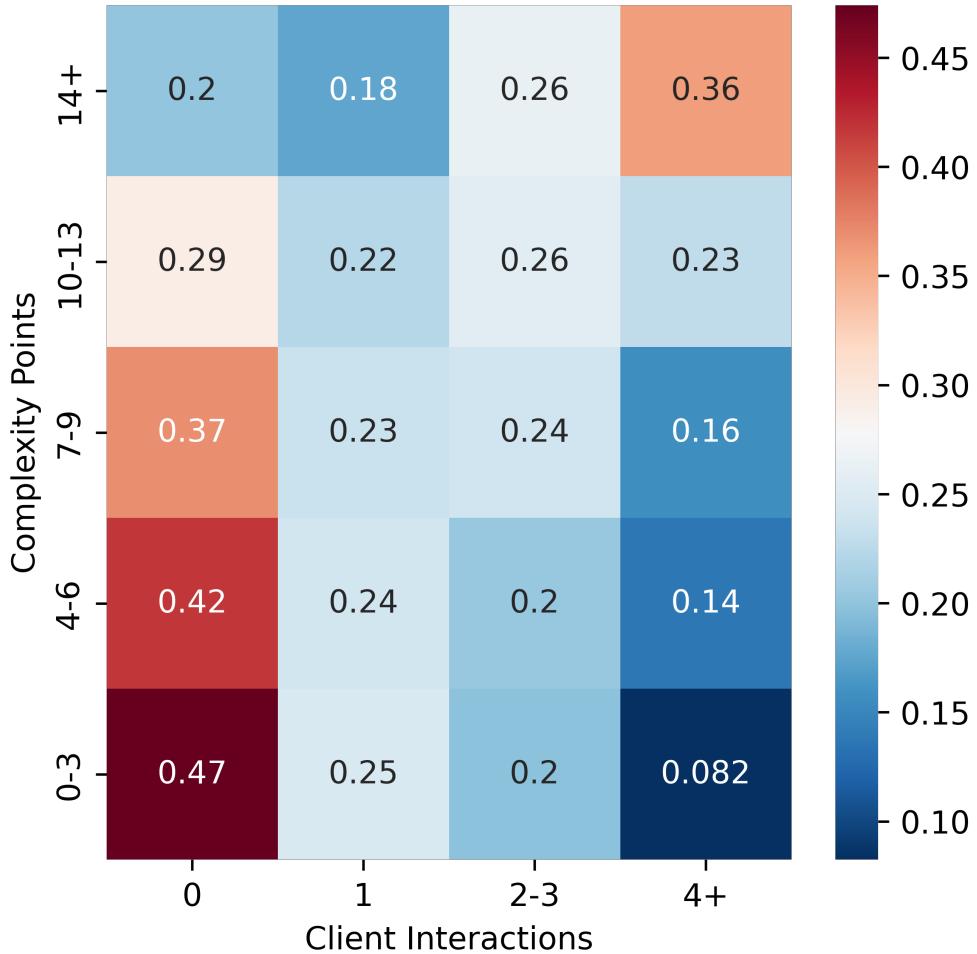
Appendix

What are the relationships between *Individual Complexity Rules*, *Client Interactions*, and subsequent *Production*, *Outflow*, and *Net*?

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41-43	44	45	46	47	48	49-51	52-53	54	55	56	57	58	59	60	61	62	63	64	65
CurrentValue	35	27	15	22	18	36	19	-7	-7	13	36	18	2	10	4	17	21	1	-0	10	8	13	7	4	7	14	16	36	15	43	1	14	15	6	18	5	5	17	-7																					
BeginningValue	38	29	17	25	20	37	20	-7	-9	14	39	21	2	11	4	20	23	2	0	11	8	14	8	5	7	14	17	38	16	45	1	14	16	6	19	5	6	19	-9																					
3MonthProd	19	13	6	8	8	36	16	-0	-7	11	13	-3	1	6	3	8	12	-0	0	7	9	10	-1	1	-1	6	7	15	10	22	2	11	12	5	14	8	-1	10	3																					
6MonthProd	18	15	6	8	8	34	15	-2	-4	11	13	3	1	6	3	6	11	-1	-0	7	8	9	-3	1	-1	6	8	15	9	22	3	10	11	4	13	9	-2	10	3																					
9MonthProd	18	16	6	8	8	34	15	-2	-4	11	15	-0	1	7	3	5	11	0	0	7	9	10	-1	1	-1	6	8	16	10	23	4	11	11	4	14	9	-3	10	5																					
3MonthOutflow	-20	-12	-9	-16	-15	-19	-12	6	10	-11	-25	-25	-0	-3	-3	-18	-16	2	1	-5	0	-3	-3	-6	-7	-9	-11	-22	-7	-28	3	-5	-7	1	-9	4	-15	-18	18																					
6MonthOutflow	-22	-13	-9	-17	-15	-23	-13	5	12	-13	-26	-22	-0	-5	-3	-19	-17	1	0	-6	-1	-4	-3	-6	-7	-9	-12	-24	-8	-30	2	-6	-9	0	-11	2	-14	-19	16																					
9MonthOutflow	-23	-14	-9	-18	-16	-24	-14	4	13	-13	-27	-21	-1	-5	-3	-20	-18	2	0	-6	-3	-6	-4	-6	-7	-9	-13	-25	-10	-30	1	-8	-10	-1	-12	0	-12	-17	13																					
3MonthNet	-4	0	-3	-9	-7	6	2	5	5	-2	-12	-20	0	0	0	-11	-6	1	0	0	5	3	-3	-5	-7	-3	-5	-10	-0	-10	4	3	2	2	1	6	-11	-7	14																					
6MonthNet	-7	-2	-4	-8	-7	3	-1	3	5	-4	-12	-19	-0	-1	-2	-12	-7	1	0	-1	5	4	-3	-4	-6	-3	-6	-12	-0	-10	4	2	-0	2	0	6	-11	-8	14																					
9MonthNet	-9	-2	-4	-9	-8	-1	-1	3	7	-5	-12	-18	-1	-1	-1	-13	-9	2	1	-0	5	3	-3	-4	-6	-4	-7	-12	-1	-12	4	3	-1	2	0	5	-12	-8	14																					
3MonthNetPct	8	10	2	-1	-2	17	7	4	2	1	-1	-16	0	2	1	-6	0	2	1	3	7	6	-0	-4	-4	1	1	2	4	3	6	6	6	4	7	8	-10	-2	13																					
6MonthNetPct	4	7	1	-2	-2	13	4	3	4	-1	-1	-15	-0	2	0	-7	-1	2	0	2	7	6	-0	-3	-3	1	-1	-0	3	1	6	5	4	3	5	8	-11	-4	13																					
9MonthNetPct	2	6	1	-3	-3	9	3	3	6	-2	-1	-15	-1	1	0	-9	-3	2	1	2	7	5	-0	-3	-4	-0	-2	-1	2	0	6	5	3	3	5	6	-12	-4	13																					
TotalUnmanagedValue	12	7	0	4	10	33	17	-1	-7	7	12	7	1	3	2	3	10	-3	-1	4	10	10	-4	0	2	10	8	15	44	26	2	8	9	3	8	0	3	11	4																					
TotalCashValue	15	9	6	8	6	23	11	-1	-9	6	17	-5	3	6	2	5	19	-2	-2	5	10	10	-2	2	1	5	8	16	10	18	1	10	11	3	14	0	-6	6	6																					
TotalCashUnmanagedValue	4	3	1	4	5	7	4	-1	-2	2	7	-0	2	5	1	1	11	0	-1	3	5	7	-0	1	1	4	5	7	26	6	2	8	6	3	7	1	-4	1	5																					
# Accts	32	18	8	14	33	58	20	-3	-13	13	22	16	3	5	2	19	34	-3	-1	8	15	11	-4	2	3	14	16	28	13	65	-2	10	12	3	14	4	15	28	-9																					
Interactions	19	18	3	13	7	20	7	-5	-7	6	16	-0	1	10	2	1	5	-3	-1	9	10	9	-2	2	4	8	8	17	8	21	14	14	15	8	14	2	0	13	7																					

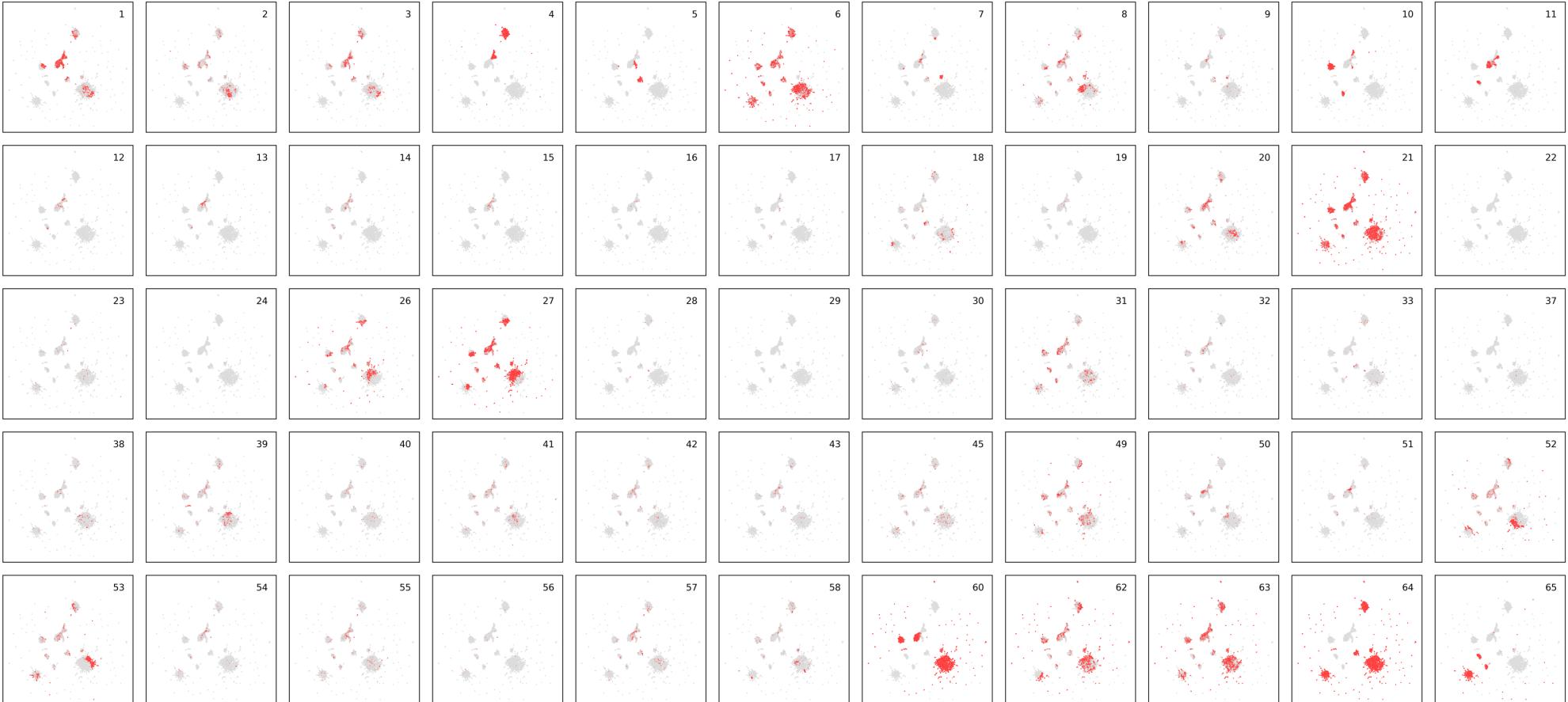
Appendix

What is the relationship between *Total Complexity Points* and *Client Interactions*?



Appendix

Which complexity rules predict investment production for different segments of clients?



Use this text box for footnotes

[A]
[B]

Appendix

Which complexity rules predict investment production for different segments of clients?

