

How general are risk preferences? Choices under uncertainty in different domains*

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Abstract. We examine the extent to which an individual's actual insurance and investment choices display a stable ranking in willingness to bear risk, relative to his peers, across different contexts. We do so by examining the same individuals' decisions regarding their 401(k) asset allocations and their choices in five different employer-provided insurance domains, including health and disability insurance. We reject the null that there is no domain-general component of preferences. Among the five insurance domains, the magnitude of the domain-general component of preferences appears substantial; we find for example that one's choices in other insurance domains are substantially more predictive of one's choice in a given insurance domain than either one's detailed demographic characteristics or one's claims experience in that domain. However, we find considerably less predictive power between one's insurance choices and the riskiness of one's 401(k) asset allocations, suggesting that the common element of an individual's preferences may be stronger among domains that are "closer" in context. We also find that the relationship between insurance and investment choices appears considerably larger for employees who may be associated with better "financial sophistication." Overall, we view our findings as largely consistent with an important domain-general component of risk preferences.

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Table 1: Employee characteristics in baseline sample

	Mean	Std. Dev.	5th pctile	95th pctile
Panel A: Demographics				
Age	43.9	9.2	28	58
Annual wage (000\$)	58.4	71.7	25.6	114
Job tenure with Alcoa (years)	13.2	9.6	1	30
Female	0.23			
White	0.85			
Hourly (non-salary) employee	0.32			
Unionized employee	0.02			
Single coverage tier ^a	0.19			
Number of covered individuals per employee ^a	2.92	1.46	1	5
Panel B: Annual Payouts by domain				
Health insurance claims (\$)	5,221.4	10,606.8	60.3	18,091.7
Prescription drug insurance claims (\$)	1,491.8	2,162.2	0.0	5,507.3
Dental insurance claims (\$)	781.3	837.3	0.0	2,443.0
Short-term disability insurance (fraction with any claims) ^b	0.061			
Long-term disability insurance (fraction with any claims) ^c	0.002			
Annual 401(k) contribution (\$)	4,616.2	3,199.5	709.6	11,225.8

The table is based on the 12,752 employees who constitute our baseline sample.

^a The coverage tier and covered individuals are based on the medical coverage choices; we view them as reasonable proxies for family size and structure.

^b Conditional on having a short-term disability claim, the average claim length is 51 days.

^c Conditional on having a long-term disability claim, the average claim length in our data is 345. However, the long-term claim data is truncated at about two years, so 345 should be viewed as a lower bound.

Table 2: Summary of benefit options

	Share	Premium saving relative to safest option	Expected incremental cost	Std. Dev. Of incremental cost
	(1)	(2)	(3)	(4)
Health Insurance				
Option 1	17.3%	1,016.6	1,415.6	1,052.4
Option 2	1.3%	747.7	880.0	559.7
Option 3	2.7%	545.3	645.6	380.8
Option 4	26.3%	325.0	350.8	173.4
Option 5	52.4%			
Prescription Drug Insurance				
Option 1	23.8%	181.2	248.6	385.0
Option 2	9.7%	109.6	124.3	192.5
Option 3	66.4%			
Dental Insurance				
Option 1	30.0%	95.7	45.2	112.9
Option 2	70.0%			
Short-Term Disability Insurance^a				
Option 1	15.5%	165.1	140.2	825.7
Option 2	17.9%	63.5	70.3	413.4
Option 3	66.6%			
Long-Term Disability Insurance^a				
Option 1	16.3%	152.4	17.0	395.7
Option 2	14.9%	63.5	8.5	197.9
Option 3	68.8%			
401(k) allocation^b				
Risk-free 0%	40.6%	--	-421.7	514.0
Risk-free 0-25%	19.9%	--		
Risk-free 25-50%	12.8%	--		
Risk-free 50-75%	6.5%	--	-210.8	257.0
Risk-free 75-100%	3.4%	--		
Risk-free 100%	16.8%	--		

All options are shown in the ordinal ranking from more (option 1) to less risk exposure (with the possible exception of health insurance option 1; see text and Appendix Tables A1 and A2 for details). Column (1) shows the fraction who chose each option in our baseline sample. Column (2) shows the average (in the baseline sample) premium savings from choosing a given option relative to choosing the safest (least risk exposure) option; these vary across employees based on benefit menu, coverage tier (for health, drug and dental), and wages (for short- and long-term disability). Columns (3) and (4) show, respectively, the average and standard deviation of the incremental cost that the insurer would face (counterfactually for most of the sample) in covering our baseline sample of employees, given the realized spending and coverage tier choices, with the safest option (i.e.. the highest numbered option) relative to the option shown.

^a Short-term and long-term disability benefits (columns (3), and (4)) and premiums (column (2)) are proportional to the employee's wage.

^b For 401(k), columns (3) and (4) report expected incremental dollar payout (and associated standard deviation) for 0% vs. 100% in risk-free asset (first row) and 50% vs. 100% in risk-free asset (second row) assuming the average annual employee contribution in our baseline sample of \$4,616. For the risky investment portfolio, we assumed the allocation across different risky funds observed in the baseline sample, and similarly for the risk free part of the investment portfolio (see Table A2).

Table 3: Main results

Panel A: Spearman rank correlations

	Health	Drug	Dental	STD	LTD
Drug	0.400				
Dental	0.242	0.275			
STD	0.226	0.210	0.179		
LTD	0.180	0.199	0.173	0.593	
401(k)	0.057	0.061	0.036	0.029	0.028
				(0.002)	(0.002)

Average correlation is 0.192

Panel B: Baseline specification, multivariate regression

	Health	Drug	Dental	STD	LTD
Drug	0.452				
Dental	0.238	0.267			
STD	0.188	0.197	0.169		
LTD	0.155	0.191	0.165	0.600	
401(k)	0.057	0.056	0.035	0.029	0.018
				(0.001)	(0.042)

Average correlation is 0.188

Panel C: Multivariate regression, Controlling for predicted and realized risk

	Health	Drug	Dental	STD	LTD
Drug	0.412				
Dental	0.207	0.25			
STD	0.155	0.156	0.156		
LTD	0.129	0.156	0.153	0.593	
401(k)	0.039	0.032	0.026	0.002	-0.002
			(0.004)	(0.844)	(0.817)

Average correlation is 0.164

The table reports results for our baseline sample of 12,752 employees. Unless reported otherwise in parentheses, the p-values associated with whether the correlation coefficient is different from zero are all less than 0.001. Each cell reports a pairwise correlation. The average correlation is simply the average of the fifteen pairwise correlations shown, and is provided only as a single summary number. Panel A reports Spearman rank correlations, and Panel B reports the correlation structure from the multivariate regression shown in equation (1) with control (indicator) variables for the benefit menu the employee faces. Panel C reports the results from another variant of equation (1) which additionally includes controls for predicted and realized risk in all domains for each equation; see the text for details on the construction of these risk variables.

Table 4: Predictive power of different variables

Regressors	Dependent variable					
	Health	Drug	Dental	STD	LTD	401(k)
Choices in other domains	0.227	0.243	0.102	0.374	0.368	0.004
Predicted and realized risk	0.067	0.106	0.056	0.043	0.023	0.023
Demographics	0.037	0.044	0.025	0.039	0.033	0.043
Choices in less related domains	0.082	0.102	0.077	0.063	0.054	0.004
All of the above	0.245	0.292	0.144	0.394	0.378	0.046

Each entry in the table reports the adjusted R^2 from a separate OLS regression of the dependent variable shown in the column heading. In all regressions, the dependent variable is the enumerated coverage choice in the domain given by the column header, after partialing out menu fixed effects. The regressors are given by the row header. “Choices in other domains” contain the vector of the enumerated choices in all five other domains. “Predicted and realized risk” refers to a vector of both predicted and realized risks in all domains (see text for more details on how these are constructed). “Choices in less related domains” omits the other choice which is most correlated with the dependent variable (Drug in Health and Health in Drug, Drug in Dental, LTD in STD and STD in LTD, Health in 401(k)). Demographics consist of age, age squared, dummy variables for gender, race and employee type (hourly or salary), job tenure in Alcoa, annual wage, and a dummy for single coverage tier (as a proxy for family composition).

Table 5: Summary correlations by groups

	Obs.	Average correlation	Health-Drug correlation	Health-STD correlation	Health-401(k) correlation
	(1)	(2)	(3)	(4)	(5)
(1) Single coverage	2441	0.224	0.532	0.252	0.074
Non single	10311	0.176	0.421	0.167	0.055
(2) More tenured	11708	0.185	0.448	0.184	0.059
Newly hired	1044	0.195	0.472	0.184	0.023
(3) Higher wage	3151	0.178	0.425	0.146	0.072
Lower wage	3173	0.162	0.439	0.174	0.026
(4) Don't allocate to Alcoa Stock	7468	0.193	0.448	0.195	0.073
Allocate to Alcoa stock	5284	0.180	0.456	0.176	0.033
(5) Rebalance 401(k) portfolio	3626	0.186	0.430	0.178	0.079
Don't rebalance	9126	0.188	0.460	0.190	0.049
(6) Over 55 years old	1700	0.167	0.446	0.147	0.061
Under 35 years old	2568	0.199	0.447	0.209	0.031
(7) Salaried employees	8644	0.187	0.442	0.175	0.069
Hourly employees	4108	0.157	0.453	0.170	0.016

The table reports the correlation coefficients for the subsamples specified in the row headers. The estimates all use our baseline specification (Panel B of Table 3). That is, we report the correlation structure of the error term from estimating the multivariate regression shown in equation (1) with covariates for benefit menu fixed effects. The average correlation in column (2) is the simple average across the fifteen possible pairs of correlations (as in the bottom of each panel of Table 3), while the other columns report the pairwise correlations for the selected pairs shown in the column headings. Row 1 divides the sample by single coverage tier for health and drug vs. all other (non-single) coverage tiers. Row 2 separates out newly hired employees (defined as less than 2 years of tenure) from higher tenured employees. Row 3 separately examines employees with greater than \$72,000 annual wages and less than \$36,000 annual wages (approximately the top and bottom quartiles of wages). Row 4 separates employees who did and did not allocate their own 401(k) contributions to Alcoa stock. Row 5 separates employees who did and did not rebalance their 401(k) portfolio during the year.

Table 6: Robustness

	Obs.	Average correlation	Health-Drug correlation	Health-STD correlation	Health-401(k) correlation
	(1)	(2)	(3)	(4)	(5)
1 Baseline specification	12,752	0.188	0.452	0.188	0.057
<u>A. Alternative specifications</u>					
2 A system of ordered probits	12,666	0.264	0.550	0.292	0.055
3 Discretizing the 401(k) choice	12,752	0.189	0.452	0.188	0.058
4 Control for coverage tier	12,752	0.186	0.447	0.187	0.058
5 Use only the largest pricing menu	7,722	0.195	0.452	0.191	0.069
<u>B. Alternative samples</u>					
6 Include those in opt-out and HMO	15,409	0.165 ^a	--	--	--
7 Include employees who did not contribute to 401(k)	15,402	0.257 ^b	0.446	0.184	--
8 Include those not offered LTD coverage	15,675	0.162 ^c	0.442	0.183	0.052
9 Exclude those in Health Option 1 (due to HRA component)	10,547	0.147	0.226	0.175	0.009
10 Include only new hires	1,044	0.195	0.472	0.184	0.023
11 Exclude individuals who may have chosen default options	11,323	0.191	0.460	0.197	0.059

This table reports correlation results for variants of the baseline specification. Column (2) shows the simple average of the 15 pairwise correlations, and columns (3) through (5) report correlations for specific pairs. Row 1 replicates the baseline specification (as in Table 3, Panel B) which reports the correlation coefficients of the error term from the multivariate regression shown in equation (1), including benefit menu fixed effects. All rows except row 5 include these benefit menu fixed effects. Row 2 estimates a system of five ordered probits and one linear regression (for the 401(k) domain) rather than the multivariate regression shown in equation (1) (see text for more details). Row 3 replaces the continuous 401(k) riskiness measure with a discretized ordinal measure of 1-5, for each 20% interval of allocations in safe assets. Row 4 includes coverage tier (based on health coverage) fixed effects, and row 5 reports results using the largest (modal) benefit menu (and therefore no menu fixed effects). Rows 6-11 report results from alternative samples. In rows 6, 7, and 8 we include employees that were excluded from the baseline sample, and in these cases we omit the domain that had disqualified these employees from the baseline sample. Therefore the average correlations in these cases are not directly comparable to the baseline specification, although the individual pairs are. In row 10 we limit the sample to new hires (defined as job tenure at Alcoa of less than two years). In row 11 we exclude the approximately 10% of the employees whose choices are fully consistent with the default options in all insurance domains, and are therefore potentially “passive” choosers.

^a The comparable average correlation (that is, over the 6 pairs that do not include health and drug coverage) in the baseline specification is 0.169.

^b The analogous average correlation (that is, over the 10 pairs that do not include 401(k) choices) in the baseline specification is 0.262.

^c The analogous average correlation (that is, over the 10 pairs that do not include long-term disability coverage) in the baseline specification is 0.169.

Table A1: Coverage Details for Insurance Plans

Summary of Key Coverage Details (1)		Additional details (2)
Health Insurance ^a	Deductible (In-network / out-of-network)	
Option 1 ^b	3,000 / 6,000	
Option 2	1,500 / 3,000	After satisfying the annual deductible, cost sharing is 10% in-network and 30% out-of-network for all options. All options also specify in-network and out-of-network out-of-pocket maximums, but these are rarely binding. Preventive care is covered in full under all coverage options.
Option 3	1,000 / 2,000	
Option 4	500 / 1,000	
Option 5	0 / 500	
Prescription Drug Insurance	Cost sharing for branded drugs (retail / mail order)	
Option 1	50% / 40%	All options have cost-sharing of 10% for generic (non-branded) mail order drugs and 20% for generic retail drugs. All options have a \$50 deductible (\$100 for family) and a \$50 (\$100 for mail-order) maximum per prescription.
Option 2	40% / 30%	
Option 3	30% / 20%	
Dental Insurance	Per person Deductible / Maximum annual benefit	The family deductible is double the per-person amount. Both plans fully cover preventative care, provide identical coverage for other special treatments. Oral surgery is covered at 50% under option 1 and 100% under option 2. Orthodontia is not covered under option 1 and is covered at 50% under option 2.
Option 1	50 / 1000	
Option 2	25 / 2000	
Short-Term Disability Insurance ^c	Wage replacement rate	Salary workers have 100% replacement rate for first two weeks of disability under all options; all options provide up to 26 weeks of benefits.
Option 1	mostly 60% (sometimes 40%)	
Option 2	mostly 80% (sometimes 60%)	
Option 3	mostly 100% (sometimes 80%)	
Long-Term Disability Insurance ^c	Replacement rate	All long-term disability coverage is payable after 26 weeks of disability (when the short-term disability coverage is capped).
Option 1	mostly 50%	
Option 2	mostly 60%	
Option 3	mostly 70%	

All options are shown in the ordinal ranking from more (option 1) to less risk exposure (with the possible exception of health insurance option 1; see note b and text for details). Column 1 summarizes key features of each option. Column 2 provides additional details.

^a Health insurance: deductibles are shown for the non-single coverage tier; deductibles for single coverage are half what is shown.

^b Option 1 includes a Health Reimbursement Account (HRA) in which Alcoa contributes \$1,250 in tax free money each year that the employee can use to fund eligible out of pocket health care expenses. Any balance remaining at the end of the year can be rolled over to pay for future out of pocket costs. See text for more details.

^c Short-term and Long-term disability benefits (column (1)) are proportional to the employee's wage.

Table A2: List of funds available for 401(k) allocation

Fund name (Asset Class)	Monthly return				
	Share ^a	Mean	Std. Dev.	Min.	Max.
<u>Classified (by us) as "Risk Free":</u>					
GIC/Stable Value (Fixed Income)	24.47%	0.35	0.02	0.31	0.37
Vanguard Total Bond	3.95%	0.42	0.83	-1.09	1.92
<u>All other classified as risky:</u>					
American Balanced (Balanced Equity)	10.58%	0.65	1.36	-2.34	2.89
Inv. Co. of America (Large Cap US Equity)	9.62%	0.83	1.84	-3.82	3.86
AMCAP (Large US Equity)	6.77%	0.66	2.06	-4.19	4.01
Vanguard Institutional Index (Large Cap US Equity)	9.42%	0.79	2.21	-4.18	4.43
MSDW International Equity	4.09%	1.25	2.32	-3.30	4.92
New Perspective (International Equity)	5.34%	1.49	2.72	-4.13	6.32
Putnam OTC (Mid Cap US Equity)	3.23%	1.01	3.40	-6.35	7.45
Small Cap Core (Small Cap US Equity)	0.30%	0.29	3.44	-6.95	7.90
Putnam Vista (Mid Cap US Equity)	3.71%	0.56	3.55	-8.58	6.75
MSDW Emerging Markets	2.62%	3.13	5.83	-11.69	15.03
Company (Alcoa) Stock Fund	15.90%	1.30	6.71	-8.85	16.79
<u>Benchmarks during the same period:</u>					
Risk free ^b	--	0.37	0.05	0.26	0.43
S&P 500	--	0.63	2.21	-4.40	4.33

Employee contributions to their 401(k) accounts can be made with either pre- or after-tax dollars. Employees can contribute 1-16% of eligible pay with some additional restrictions for some highly paid employees. In our sample, Alcoa usually matches 100% of pre-tax contributions, up to 6% of eligible pay. Employer (Alcoa) contributions are always invested in the company stock and can only be moved to a different fund after two years. In the 2004 data that we are using, the above 13 funds are available for contributions (sorted by the standard deviations of monthly returns). In the analysis we use as a measure of riskiness of the portfolio the share of employee contributions invested in those (two) funds that are presented as least risky. Indeed, as apparent from the table, these two funds exhibit less volatility (and mostly lower expected return). Employees also have the option to invest in a personal choice retirement account in which they have access to other funds besides the 13 funds just described. Direct contributions to this fund are not possible, only transfers, and we do not have detailed data on the composition of investments in these funds. For our analysis we only use direct employee contributions. In 2004 only about 28 percent of the sample rebalances and 24 percent of the sample changes the allocation of their contributions. The average employee contribution in the baseline sample (which restricts attention to non-zero contributions) is around \$4,600. About 40 percent of the sample has no contributions to the risk free funds, and about 17 percent invest all their contributions in the risk free funds. Just over 40 percent of the sample has some employee contributions invested in company stock. The series of returns are based on monthly returns over the 29 month period from August 2005 to December 2007, which was the longest time period for which we have consistent returns data for all funds. Returns data are from CRSP (when available), or from Hewitt (when CRSP data are not available, for the few funds that are not publicly traded).

^a We compute the share of dollars contributed to each fund out of total 401(k) contributions made by all employees in our baseline sample.

^b For the risk free benchmark we use the CRSP three month Fama Risk Free Rates series, which are derived from average lending and borrowing rates.