

Active Investment Decisions by Members of the Chilean DC Pension System

Performance and Learning

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Road map

- Motivation.
- Non-parametric analysis.
- Performance.
- Learning.
- Conclusions.

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- There is a *default path*, designed to replicate a life-cycle fund.
- The majority of affiliates have *low knowledge*.
- **The presence of biases in decision making could be detrimental for DC plan members' wellbeing.**

Inertia

- Inertia in individuals' portfolio choices has been documented in the US by Biliias et al (2010).
- For 401(k) pension plans, Madrian and Shea (2001), Agnew, et al (2003) and Mitchell, et al (2006), report *low involvement* in investment decisions.
- These results have been used as arguments in favor of the introduction of *default investment plans*.
- Moreover, inertia has been related to the *disposition effect* (Dhar and Zhu, 2006 and Frazzini, 2006).

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 - younger individuals (Cappelletti et al, 2010; Ameriks and Zeldes, 2004).

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- Nicolosi et al (2009), Seru et al (2010) and Koestner et al (2012) present evidence suggesting that performance improves with experience.
- However, Glaser and Weber (2007) argue that learning won't occur if investors do not realize their past poor performance.

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- Best performers have (slightly) better market-timing ability than worst performers and *react differently to market volatility* (increasing/holding equity exposure instead of decreasing it).

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- Best performers have (slightly) better market-timing ability than worst performers and *react differently to market volatility* (increasing/holding equity exposure instead of decreasing it).
- **Individuals that display improvement in performance do so by keeping steady equity exposures during volatile periods, rather than by increased market timing ability.**

Descriptive Statistics

- We consider affiliates that joined no later than 2008 and that are reported as active (e.g. non-retired).
- Affiliates are followed from January 2008 to May 2013: 6,229,015 affiliates; 463,587 made at least one voluntary change; 940,520 changes.
- Most affiliates (60%) remain in the default investment option.

Personal Variables			
Gender		VPS	
Female	42.06%	Without VPS	95.57%
Male	57.94%	With VPS	4.43%
Age		Contribution Density	
< 35 years	39.49%	<=0.25	19.95%
35 to 45	29.57%	0.25 to 0.5	12.41%
45 to 55	23.29%	0.5 to 0.75	14.38%
> 55 years	7.65%	>0.75	53.26%
Average Taxable Income	\$ 604.00		
Average Balance – Mandatory Account	\$ 14,649		
Average Balance – Voluntary Account (1)	\$ 4,641		

Equity Allocation and Fund Changes	
Equity Allocation – Mandatory Account	53.35%
At least one fund change	1.88%
Average annual fund changes (2)	0.42
Average change in equity allocation (2)	11.82
Average accumulated change in equity allocation (2)	-4.93

Descriptive Statistics: Affiliates that Make Changes (%)

	N	Average	SD		N	Average	SD
Year (1)				Mandatory Account Balance Quintile (1)			
Year 2008	6,199,374	2.2	14.7	1 st Quintile	3,643,473	0.3	5.8
Year 2009	6,213,518	2.1**	14.5	2 nd Quintile	6,636,454	0.3	5.8
Year 2010	6,217,969	0.4**	6.4	3 rd Quintile	8,434,143	0.7**	8.3
Year 2011	6,221,821	2.1**	14.5	4 th Quintile	9,156,715	1.5**	12
Year 2012	6,223,151	2.4**	15.3	5 th Quintile	9,429,574	5.0**	21.9
Year 2013	6,224,526	2.0**	13.9	VPS Account Balance Quintile (1)			
Gender (2)				1 st Quintile	335,877	8.9	28.5
Female	15,678,985	1.6	12.4	2 nd Quintile	327,970	7.7**	26.6
Male	21,621,374	2.1**	14.4	3 rd Quintile	324,517	8.6**	28
Age (1)				4 th Quintile	330,616	11.2**	31.5
< 35 Years	14,716,642	1.2	10.8	5 th Quintile	335,506	14.5**	35.2
35 to 45	11,041,495	2.1**	14.3	Without VPS	35,645,873	1.5**	12.1
45 to 55	8,693,138	2.4**	15.3	Type of Member (2)			
>55 Years	2,849,084	3.1**	17.3	Employed	35,879,100	1.9	13.6
Taxable Income Quintile (1)				Self-employed	1,110,848	1.8**	13.3
1 st Quintile	8,655,863	0.8	8.7	Worker (3)	308,814	2.5**	15.5
2 nd Quintile	6,237,385	0.4**	6.4	Voluntary (4)	1,597	6.7**	25
3 rd Quintile	7,467,787	0.7**	8.1	Contribution Density (1)			
4 th Quintile	7,471,461	1.5**	12.1	<=0.25	7,414,147	0.3	5.3
5 th Quintile	7,467,863	6.0**	23.8	0.25 - 0.5	4,625,759	0.6**	7.9
VPS (2)				0.5 - 0.75	5,366,147	1.1**	10.2
Without VPS	35,645,873	1.5	12.1	>0.75	19,894,306	3.0**	17
With VPS	1,654,486	10.2**	30.2				

Descriptive Statistics: Equity Allocation (%)

	N	Average	SD		N	Average	SD
Year (1)				Mandatory Account Balance Quintile (1)			
Year 2008	6,199,374	55.51	15.54	1 st Quintile	3,643,473	58.72	14.1
Year 2009	6,213,518	53.85**	16.96	2 nd Quintile	6,636,454	57.27**	14.68
Year 2010	6,217,969	54.04**	16.96	3 rd Quintile	8,434,143	54.70**	15.6
Year 2011	6,221,821	53.82**	17.25	4 th Quintile	9,156,715	50.85**	17.26
Year 2012	6,223,151	52.10**	18.31	5 th Quintile	9,429,574	49.75**	20.68
Year 2013	6,224,526	50.83**	19.11	VPS Account Balance Quintile (1)			
Gender (2)				1 st Quintile	335,877	57.73	23.76
Female	15,678,985	53.17	17.49	2 nd Quintile	327,970	56.11**	22.51
Male	21,621,374	53.49**	17.43	3 rd Quintile	324,517	55.96*	23.02
Age (1)				4 th Quintile	330,616	58.32**	23.55
< 35 Years	14,716,642	63.97	11.66	5 th Quintile	335,506	56.28**	23.9
35 to 45 Years	11,041,495	51.64**	16.13	Without VPS	35,645,873	53.19**	17.11
45 to 55 Years	8,693,138	44.29**	15.79	Type of Member (2)			
> 55 Years	2,849,084	32.81**	15.88	Employed	35,879,100	53.61	17.39
Taxable Income Quintile (1)				Self-employed	1,110,848	46.09**	18.01
1 st Quintile	8,655,863	53.08	16.34	Worker (3)	308,814	49.91**	17.45
2 nd Quintile	6,237,385	52.46**	15.28	Voluntary (4)	1,597	49.52**	22.16
3 rd Quintile	7,467,787	51.03**	16.14	Contribution Density (1)			
4 th Quintile	7,471,461	53.37**	17.3	<=0.25	7,414,147	51.43	15.39
5 th Quintile	7,467,863	56.74**	20.97	0.25 - 0.5	4,625,759	53.80**	15.74
VPS (2)				0.5 - 0.75	5,366,147	54.63**	16.39
Without VPS	35,645,873	53.19	17.11	>0.75	19,894,306	53.62**	18.74
With VPS	1,654,486	56.89**	23.38				

Performance versus Pension Funds

- Funds A, B, C, D and E returns between 2008-2013: -5.9%; 4%; 11.8%; 19.1%; and 24.6%, respectively.

Bracket	Performance Bracket	Affiliates' Average Return	N° Affiliates	%
1	< Fund A	-12.50%	175,184	37.8
2	>Fund A & <Fund B	0.00%	135,691	29.3
3	>Fund B & <Fund C	7.80%	108,808	23.5
4	>Fund C & <Fund D	14.70%	30,706	6.6
5	>Fund D & <Fund E	21.90%	7,214	1.6
6	>Fund E	32.70%	5,984	1.3
	Total	-1.20%	463,587	100

Descriptive Statistics of Dependent Variable

The dependent variable is the change in equity allocation and takes values between -75% and 75%.

Variable	Equity Allocation Change (X)	N° of Changes	%
-4	$X \leq -60\%$	218,838	23.27
-3	$-60\% < X \leq -40\%$	121,115	12.88
-2	$-40\% < X \leq -20\%$	143,166	15.22
-1	$-20\% < X \leq 0\%$	81,061	8.62
1	$0\% < X \leq 20\%$	126,290	13.43
2	$20\% < X \leq 40\%$	78,681	8.37
3	$40\% < X \leq 60\%$	48,657	5.17
4	$60\% < X$	122,714	13.05
Total		940,522	100

Control Variables

- Individual
 - Gender (Male=1)
 - Age
 - Taxable income quantile
 - Account balance quantile
 - VPS (Presence of account = 1)
 - Contribution density
- Market
 - Fund A's return (continuous and P90, P10 dummies)
 - Fund A's volatility (GARCH(1,1) continuous and P90 dummy)

Multinomial logit results: Individual variables

- Affiliates are likelier to make abrupt changes in equity if: they are males; young; have higher financial wealth; and a VPS account (proxy for financial wealth and sophistication).

Marginal Effect of Personal Characteristics

Variable	-4	-3	-2	-1	1	2	3	4
Gender	0.04**	-0.029**	-0.023**	-0.026**	0.007**	0.004**	-0.005**	0.031**
Age	-0.086**	0.027**	0.051**	0.032**	-0.012**	0.014**	0.016**	-0.042**
Taxable Income Quintile	0.003**	0.004**	-0.004**	-0.003**	-0.016**	0.001**	0.005**	0.011**
Account Balance Quintile	0.068**	-0.022**	-0.017**	-0.04**	-0.025**	0.007**	0.002**	0.028**
VPS	0.045**	-0.014**	-0.03**	-0.01**	-0.02**	-0.005**	0.006**	0.029**
Contribution Density	-0.011**	0.003**	0.004**	0.005**	0.011**	-0.004**	0	-0.009**

Multinomial logit results: Market variables

- Affiliates seem to be rear-view mirror investors since they chase past returns.
- The main reaction to market turmoil (current and past) is to (considerably) reduce equity exposure.

Marginal Effect of Market Variables

Model 2: Dummy Market Variables								
Variable	-4	-3	-2	-1	1	2	3	4
Ret A p90	-0.125**	-0.028**	-0.019**	0.01**	0.056**	0.05**	0.026**	0.031**
Ret A p90 (-1)	-0.214**	-0.104**	-0.1**	-0.022**	0.153**	0.118**	0.065**	0.104**
Ret A p90 (-2)	-0.139**	-0.08**	-0.068**	-0.004**	0.12**	0.08**	0.039**	0.052**
Ret A p10	-0.005**	0.04**	0.084**	0.044**	0.018**	-0.027**	-0.034**	-0.12**
Ret A p10 (-1)	0.051**	0.014**	0.047**	0.026**	-0.097**	-0.016**	-0.012**	-0.015**
Ret A p10 (-2)	-0.054**	-0.053**	-0.045**	-0.017**	0.103**	0.041**	0	0.026**
DS A p90	0.057**	0.054**	0	-0.017**	0.02**	-0.061**	-0.016**	-0.034**
DS A p90 (-1)	0.008**	0.015**	0.024**	0.005**	-0.054**	0	0.01**	-0.01**
DS A p90 (-2)	-0.012**	0.072**	0.12**	0.05**	-0.058**	-0.055**	-0.031**	-0.086**

Worst versus Best Performers

Worst & Best Performers Differ in Reaction to Volatility

Variable	-4	-3	-2	-1	1	2	3	4
Worst Performance Group: Multinomial logit Marginal Effects								
Ret A p90	-0.156**	0.026**	0.037**	0.006**	0.043**	0.026**	0.016**	0
Ret A p90 (-1)	-0.356**	-0.083**	-0.077**	0	0.166**	0.1**	0.083**	0.162**
Ret A p90 (-2)	-0.244**	-0.066**	-0.052**	0.014**	0.119**	0.066**	0.057**	0.105**
Ret A p10	0	0.088**	0.083**	0.019**	0.01**	-0.019**	-0.034**	-0.141**
Ret A p10 (-1)	0.058**	-0.012**	0	0.031**	-0.044**	0	-0.014**	-0.016**
Ret A p10 (-2)	-0.078**	-0.034**	-0.027**	-0.018**	0.103**	0.047**	-0.007**	0.014**
SD A p90	0.06**	0.042**	0.017**	-0.008**	0.01**	-0.044**	-0.017**	-0.059**
SD A p90 (-1)	0.084**	0.028**	0.01**	-0.013**	-0.084**	-0.019**	0.009**	-0.014**
SD A p90 (-2)	-0.049**	0.157**	0.106**	0.026**	-0.026**	-0.045**	-0.038**	-0.132**
Best Performance Group: Multinomial logit Marginal Effects								
Ret A p90	-0.183**	-0.053**	-0.045**	-0.023**	0.022**	0.066**	0.066**	0.15**
Ret A p90 (-1)	-0.171**	-0.048**	-0.055**	-0.028**	0.052**	0.053**	0.054**	0.143**
Ret A p90 (-2)	0	0	0	0	0	0	0.016**	0
Ret A p10	0.119**	0.072**	0.057**	0.018**	0.038**	-0.06**	-0.063**	-0.181**
Ret A p10 (-1)	0.104**	0.032**	0.065**	0.029**	-0.092**	-0.056**	-0.025**	-0.056**
Ret A p10 (-2)	-0.143**	-0.05**	-0.043**	-0.01**	0.234**	0	0	0
SD A p90	-0.077**	-0.029**	0	0	0.124**	0	0	0
SD A p90 (-1)	-0.145**	-0.031**	-0.039**	-0.014**	0	0.113**	0	0.103**
SD A p90 (-2)	0	0	0	0.019**	-0.05**	0	0	0

Migration between performance brackets

- Two periods are compared: 2008-2010 and 2011-2013.
- Between these periods, 2,160 affiliates migrated from the 1st to the 6th performance bracket.
- These affiliates also register at least one fund change in each sub-period.

2008-2010 Bracket	2011-2013 Bracket						Total
	1	2	3	4	5	6	
1	14,823	2,436	5,989	3,415	2,724	2160	31,547
2	7,036	1,271	3,374	1,686	1,157	602	15,126
3	4,593	909	2,183	983	579	227	9,474
4	3,049	526	1,262	508	380	98	5,823
5	1,346	185	498	273	193	108	2,603
6	6,094	739	1,739	1,164	745	288	10,769
Total	36,941	6,066	15,045	8,029	5,778	3,483	75,342

"Redeemed" affiliates show milder reactions to volatility

Variable	-4	-3	-2	-1	1	2	3	4
Marginal Effects: 2008-2010 Period								
Ret A p90	-0.0958	0.1931**	-0.0216	-0.019**	-0.0197**	-0.0042	-0.0031	-0.0297**
Ret A p90 (-1)	-0.0835	0.0314	-0.059	-0.0018	0.037	0.0086	0.0173	0.05
Ret A p90 (-2)	0.066	-0.0542	-0.0569	0.0065	0.0036	0.0002	0.0045	0.0303
Ret A p10	0.0241	0.0859	-0.0424	-0.0324	0.03	0.0017	0.0013	-0.0681**
Ret A p10 (-1)	0.1135**	0.045	-0.0067	0.0146	-0.1379**	0.0007	-0.0086	-0.0206
Ret A p10 (-2)	-0.0538	-0.0858	0.0112	0.037	0.0365**	-0.001	0.0046	0.0513
DS A p90	0.2529**	0.0308	-0.0718	-0.0462	-0.0262	-0.035	-0.0235	-0.0809
DS A p90 (-1)	-0.066	0.0827**	0.0303	-0.014	-0.0104	-0.0049	-0.002	-0.0158
Marginal Effects: 2011-2013 Period								
Ret A p90	-0.0769	-0.0036	0.1116	0.0304	0.1236	-0.0624	-0.0411	-0.0816
Ret A p90 (-1)	-0.1784**	0.9962**	-0.043**	-0.039**	-0.116**	-0.2211**	-0.1078**	-0.291**
Ret A p90 (-2)	-0.1145**	-0.0081**	-0.0105	-0.0193	0.0638	0.1448**	0.0227	-0.0788
Ret A p10	-0.0901**	-0.0057**	-0.02	-0.0138	0.1699**	0.0947**	-0.0096	-0.1253**
Ret A p10 (-1)	-0.1605**	-0.0012	-0.0365	-0.0261	0.1434	-0.0729	0.0248	0.1289
Ret A p10 (-2)	-0.106**	-0.0038**	-0.0481**	-0.0236	0.0175	0.0445	0.016	0.1036**
DS A p90	-0.0724	0.0052	0.0339	0.0359	0.0829	-0.0221	-0.0325	-0.0308
DS A p90 (-1)	0.1795	-0.0324**	-0.0093	-0.0059	-0.1072**	0.1223	0.0231	-0.17**

Conclusions

- *Men with higher education and potentially higher financial sophistication, with VPS, and with higher contributions* are likelier to make investment decisions.
- *Poor performance*: 37.8% underperformed the Fund A; only 1.3% outperformed Fund E (32.7% versus 24.6%).
- There is *low market timing ability* by affiliates that make voluntary fund changes.
- *Attitude towards volatility* is a key factor: The worst (best) performers tend to lower (maintain or increase) equity exposure during market turmoil.
- Dilemma: Is an increased involvement always desirable? Answer depends on the type of involvement and implies the need for educating affiliates.
- Challenge ahead: exploring more robust performance measures (e.g. Bajgrowicz and Scaillet, 2012, Meyer et al, 2012).