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Asset Allocations in a Thai Defined Contribution Fund: A Behavioural Experiment Conditioned by Financial Expertise

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ABSTRACT

This paper reports the results of a behavioural experiment on the ability of Thai individuals to make informed investment decisions under a defined contribution self-management option. Using an asset allocation dataset from members of the Thai Government Pension Fund (TGPF) and a control sample of financially knowledgeable individuals (MBA finance students), we report that TGPF members are relatively more risk averse, exhibit a greater home investment bias, and over-react to market price movements. Financially savvy MBA students hold more shares and international securities, and earn greater long-term returns. The fact that the emotional TGPF members' allocations outperform the TGPF default plan, along with strong preferences for time liquidity diversification, provide challenges for TGPF managers to review their financial engineering and to lobby for a revision of the restrictive investment ceilings.

JEL Classification: D91, E21, G11, G23, I10, J10

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INTRODUCTION

A fundamental requirement of pension plans is that managers invest members' funds, or allow members to allocate their own asset portfolios, to return a socially acceptable living pension in retirement. As a reaction to ageing populations, a worldwide trend in pension plans is to shift final payment risk to members by introducing defined contribution schemes. A feature of the contribution schemes is that the contributors must either accept the default plan or opt to determine their own allocations. We examine self-managed pension asset allocation choices in the emerging Thai market.

In emerging Asian markets where lifetime wages are lower, cultural expectations are to provide financial support for the extended family; there is limited government social security and with improving life spans, such choices have exacerbated importance. An additional consideration in Asia is that the pension default schemes are undiversified with asset allocation skewed inwards towards one's own country government bonds, resulting in low long-term returns (Asher, 1999, 2000; Asher and Newman, 2001). The question then is, should contributors move to self-management of their own pensions, with additional consideration of heterogeneous demographics comprising different attitudes to risk driven by gender, age, and liquidity requirements. We examine the self-allocation issue using experimental data from Thai Government Pension Fund Members (TGPF),[1] and compare results against a 'financially literate' control group of MBA students who have completed finance and investment courses.

There are several fundamental differences in Asia that challenge the wisdom of allowing a template introduction of the self-managed option, extricated from developed country pension plans. First, investment experience matters; the concept of saving and investing for one's own retirement is a relatively new concept in the Asian emerging markets. Second, levels of financial education are relatively low, teaching methods traditionally focus on rote techniques, and financial knowledge acquisition is not a high priority. Third, closer family bonds with expectations of wider support for elderly relatives, but with lower levels of social welfare, is the norm. These factors potentially lead to conservative risk preferences, investment framing, and behaviorally biased actions that may produce lower pension returns.[2]

In this paper, we test and compare by allowing respondents to make re-allocations among five asset classes, to build a pension plan across twenty years as they approach retirement. We then report asset allocations and returns across demographic decompositions (gender, status, age, income, education), and model short-term allocation reactions to upward/downward price movements. Finally, we compare the decision results with the TGPF default plan. Our research results are framed to provide a lens into asset allocation under a self-managed option, the impact of financial literacy, and whether the default plan reflects the proclivity of TGPF members.

We find that TGPF members have a relatively lower tolerance for risk and have a strong home bias preference in their asset allocation decisions. Most identify themselves as having no financial experience and this is reflected in their investment decisions, with reactive responses

[1] Thailand was one of the first emerging countries to introduce individual savings and investment choices for government pension fund members.

[2] Allowing a self-managed option in developed countries is comparatively less problematic. Levels of financial education are stronger with basic financial concepts included in most pre-16 high school syllabi, and with business news and analysis having a high profile in the mainstream media. This leads to relatively informed savings and investment decisions (Byrne, 2007), with the difference in decision-making between financially informed individuals and the general population relatively insignificant (Hardin and Looney, 2012).

to market movements. MBA students have a more measured approach to risk with greater allocations in shares and international securities, with the majority taking a longer term holding strategy when confronted with recent information. These allocations transfer into higher long-term average returns with higher risk tolerance, which is the most significant determinant of higher returns. Both respondents display predictable young age related aggressive portfolios with a reversion to less risky and liquid investments as retirement approaches. This is consistent with the liquidity time diversification but at odds with the sticky buy-and-hold results reported in the U.S. by Sundali and Guerrero (2009). Finally, female MBA students display similar asset allocation decisions to their male counterparts.

The lowest long-term returns are recorded by TGPF member characteristics comprising: married females (6.1%), members older than 41 years (5.9%), and certificate/diploma members (5.7%). However, these are still higher than recent returns from the default plan (4.5%) and long-term target returns of 4.5% to 5.5%. This raises questions about whether the asset allocations of the TGPF even reflect their more conservative constituents and support recent calls by TGPF administrators for a lifting of the imposed international investment ceilings.

The remainder of the paper proceeds as follows. Next section reviews the literature and develops empirical hypotheses, and further outlines the experimental method. The next section presents the main results and finally provides a summary and concludes the paper.

LITERATURE REVIEW

The Thai Government Pension Fund (TGPF)

Ageing populations are a global phenomenon with demographic shifts highlighted by the projected change in the old age dependency ratio from 10.4% in 2005 to 23.51% by 2020 (Kesornsucharit, 2003). Across the world, countries with public sector defined benefit pension systems are facing financial problems due to program maturation, ageing populations, falling productivity growth, competitive pressures, and globalization (Williamson, 2005). These changes have a clear and substantive impact on the ability of the state to provide continued adequate retirement benefits. As a result, most countries are shifting from defined benefit pension schemes to defined contribution plans that transfer return risk and place more reliance on individual contributions.

Thailand is experiencing similar changes in the demographic structure of its population with falling fertility rates and increasing life expectancy (Kanjanaphoomin, 2005). In response, the Thai government has adopted the World Bank's three-pillar model by gradually phasing out their defined pension system (Pillar I) for public sector employees, which are approximately one third of the current workforce. If maintained, predictions are that future Thai governments would be unlikely to meet these liabilities at the current rate of demographic change.[3]

Embedded in the TGPF is a pillar II option for members to contribute to a defined contribution plan (TDC). After 27 March 1997, the TDC scheme became mandatory for all individuals appointed in the Thai public sector. The TDC scheme has several important

[3] The default policies were a reduction in government pensions or increased funding through greater taxation—neither option was deemed socially desirable

components related to risk.[4] First, all new government officers now bear the risk associated with their pension—such as diversification, longevity, liquidity, country specific, and global exposure risks. These risks can be managed by accepting the TDC default portfolio or by self-management of asset allocations.[5] Self-management was introduced in February 2008. In addition, the TGPF investment sub-committee has a review mandate, set by national legislation, on the investment strategy of the default fund to have no lower than 60% low risk securities with no more than 35% in capital market equity instruments, 25% in overseas securities, and 8% in real estate.

Of note is a divergence between the current default fund allocations and potential self-management limits. Performance of the default was significantly reduced by the global financial crisis in 2008 with a negative return of 5.15% and a loss (for the first time in its history) of THB 16,997 million (approximately US$475 million). Consequently, the pooled asset allocation policy became more conservative with approximately 70% of fund assets now allocated to lower risk securities—the majority being Thai debt (59%). Moreover, the proportion of capital market equity investments fell to 28%, of which 15% was global equity.

There are two issues that deserve further comment. First, the high proportion of local Thai debt that provides a lower relative return and a bias towards a very low risk profile. This may reflect a demand for low risk investments by fund members or signify the use of pension funds for internal political purposes rather than risk reduction. In this regard, Oviatt *et al.* (2000) document that centralized fund management by a government decreases the competitiveness of the fund management industry and increases over-investment in government securities. Second, the low proportion invested in Thai and global equities, shifts the investment frontier inwards and forces default fund members into portfolios with less favorable risk-return structures.[6]

The above introduces several tensions in decision-making and allocation planning. First, given the low returns and the lack of diversification inherent in the default scheme, should members opt out and make their own asset portfolio allocations within the 2008 ceiling limits? Second, do they have the necessary knowledge to undertake better asset allocation decisions or would they roughly replicate the default scheme? Third, would members handle the complexities that depend on consumption smoothing and own wealth (Gomes and Michaelides, 2005), age liquidity requirements (Brodie *et al.*, 2009), and dynamic hedging with the unwinding of stock and exchange rate exposures (Michaelides and Zhang 2015) Fourth, how do personal educational attributes, such as education level, determine asset allocations? These questions are developed into formal hypotheses in the following section.

[4] TDC members in accepting pension risk receive several inducements. From December 2007, the Government Pension Act (1997) allowed members to make additional voluntary contributions up to a maximum of 15% of their salary, together with the constant government contribution of 3%. Further incentives were provided by making contributions of up to THB 300,000 (about US$8,400) per annum tax-free, along with the non-taxation of fund income.

[5] Retaining the default option can be driven by implied endorsement of a more "professional" portfolio allocation, a risk averse preference for a more conservative portfolio, and insufficient individual effort and knowledge required to switch away from the default

[6] In general, Asian provident funds exhibit comparatively poor return performance from high levels of investment in domestic government debt (Asher, 1999, 2000; Asher and Newman, 2001).

Hypotheses

The hypotheses are developed within a received proposition that conflicting behavioral biases invoke heterogeneous asset allocations. The purpose is to inform about the efficacy of allowing own portfolio allocation, specifically in the TPGF and more generally in emerging Asian economies.

Individuals might over-increase risk exposure if driven by cognitive over-confidence in their own analytical abilities. Similarly, members may be influenced by a cognitive bias and framing effects that extrapolate past optimistic price movements, and induce overreaction to new information and/or emotional or impulsive decision-making (Benartzi and Thaler, 1999; Kazemian *et al.*, 2015; Ratner and Herbst, 2005; Summers and Duxbury, 2012; Venkatraman *et al.*, 2006).

In contrast, conservatism, inertia, and lack of confidence may lead members to maintain sub-optimal investment allocations (Samuelson and Zeckhauser, 1988). They may even ignore profitable arbitrage opportunities when tax-free contribution incentives are allowed (Budsaratragoon *et al.*, 2012), or where active management is required. For example, contributors with low epistemic motivation or individual loss aversion (Kahneman and Tversky, 1984; Thaler, 1985; Polman, 2012), may be reluctant to make appropriate unwinding decisions (Michaelides and Zhang, 2015). Risk averse conservatism may also lead to naive or inappropriate diversification strategies or a simple strategy that tracks the default with some minor modifications (Benartzi and Thaler, 2001; Amit and Sagiv, 2013). A common example is a preponderance for 'home bias' (Gale,. et al, 2002), that results in a high proportion of members choosing to over-invest in familiar domestic assets. These 'home bias' constraints in international portfolio diversification are required to protect pension funds from domestic inflation, currency risk, and country-specific risk.

Hence, if the above behavioral attributes, previously observed by investors in developed economies, can also be attributed to TGPF members, pensions will be suboptimal for members who undertake a self-managed strategy. Although there is the default portfolio option, the unbalanced home bias nature of asset allocation does not bode well for future pensioners. For the purpose of our study, individual attitudes and asset allocation preferences are a first order concern for TGPF members.[7]

Overlaying these behavioral traits is the role of education in informing decision-making. For example, does obtaining a postgraduate degree increase or reduce risk taking or does financial literacy play a more important role? Several commentators observe that financial literacy is the more important driver of a financially logical investment plan, resulting in lower levels of self-induced over-confidence and a higher degree of portfolio diversification in equity (Byrne, 2007; Gort *et al.*, 2008; Fornero & Monticone, 2011; Clark *et al.*, 2015). Similarly, Norden (2010) reported positive returns for investors with financial expertise who rebalanced globally, but negative returns for those who only rebalanced domestically. Subsequent hypotheses are framed to assess the marginal impact of financial literacy.

Our first two hypotheses are grounded in the degree of risk-tolerance when undertaking

[7] Pfau and Atisophon (2008) estimated that Thais who worked for forty years receive only a median of 13-14% of their final five years income from their TDC

a self-managed portfolio option. There is a greater expectation for financial self-support as well as social expectations to support the extended family because of poor government social welfare funding (Maurer-Fazio *et al.*, 2011), resulting in a greater propensity for loss and regret aversion (Reb, 2008). Moreover, a lack of business and financial education among the general Thai population presumes a conservative allocation approach (Willis, 2008). On balance, we assess that TGPF members would opt for a conservative approach and that MBA students would more likely opt for a more aggressive pension portfolio. This would not only include a higher proportion of home equity but also a lower home bias with increased foreign stocks and bonds in their portfolio (Anderson *et al.*, 2011).

H1a: TGPF members will have a low tolerance attitude to risk and will opt for a conservative investment portfolio

H1b: MBA students, because of higher financial literacy, will be less risk averse than TGPF members and will opt for a more aggressive investment portfolio

The next hypotheses relate to gender and the qualifying impact from financial literacy. Females, in general, are more risk averse in their financial decisions (Croson and Greezy, 2009), and decisions related to asset allocation for retirement pensions (Arano *et al.*, 2010). Moreover, the social demographics of Thailand place greater incentives on females to take a conservative approach to pension asset allocation. For example, Thai females are less likely to invest long-term because they are more likely to exit employment due to stronger family responsibilities, a male dominated society with lower opportunities for advancement, and because they have lower financial independence. Hence:

H2a: Females will opt for a more conservative portfolio compared to males

H2b: MBA females will opt for a more aggressive portfolio compared to TGPF females

Dynamic wealth and liquidity pension strategies are complex. They allow for non-constant risk aversion, changing liquidity preferences as retirement approaches, and modifications for complete unwinding or sharp increases of stock exposures as economic shocks occur (Michaelides and Zhang, 2015). Our hypotheses incorporate the prospect theory preferences that allow for inter-temporal changes in risk aversion. For example, a liquidity preference approach would allocate a gradual inter-temporal transfer to lower risk (and increased liquidity) as one approaches retirement age (Jaggia and Thosar, 2000; Gomes and Michaelides, 2005). Moreover, younger MBA students would probably opt for a more aggressive portfolio with higher weightings in domestic stock and foreign securities. Hence:

H3a: Younger respondents will have more aggressive portfolios than older respondents

H3b: Younger MBA students will have more aggressive portfolios compared to TGPF members

The next hypotheses examine the reaction of respondents to recent movements in price since their last allocation. Focusing on TGPF members' decision-making, there are a number of behavioral traits that may affect their reactions. A lack of financial decision-making skills, low epistemic motivation negatively related to the likelihood of making complex decisions, and a lack of market awareness may lead members to passively hold their investment irrespective

of what is happening to the value of the asset class components in their portfolio (Kahneman and Tversky, 1984; Polman, 2012; Amit and Sagiv, 2013). Further, they may be influenced by short-term framing effects that induce overreaction to new information and emotional or impulsive decision-making (Benartzi and Thaler, 1999; Ratner and Herbst, 2005; Venkatraman *et al.*, 2006; Summers and Duxbury, 2012). Thus, the reaction of TGPF members to past price movements is more predictable. Extending to MBA students, who have completed courses in finance, the presumption is that they are aware of portfolio theories that prescribe a passive buy and hold strategy. Since pension allocations are long-term strategies, we would expect less reactionary trading by MBA students to market price volatility. Hence:

H4a: TGPF members will react to a greater degree by altering portfolio allocations when assessing recent past market price movements

H4b: MBA students will more likely retain a buy and hold strategy when assessing recent past price movements

The final hypothesis relates to investment performance and risk classified by respondent's characteristics. A higher degree of financially knowledgeable diversification across risky investments will result in higher long-term returns, and a lack of financial expertise will lead to lower returns: Hence:

H5: Return performance will be a function of risk and TGPF members will have lower expected returns than financially literate MBA students.

EXPERIMENTAL METHOD

We focus on how pensionable individuals choose to allocate their assets when the time horizon is long, how they reallocate as retirement approaches, and whether they react to changes in asset returns. Our method applies the experimental technique of Sundali and Guerrero (2009) by providing a spreadsheet on annual return data on Thai stocks, bonds, and cash over the last twenty years (1992-2011) by adding a twenty-year return data on global stock and bond returns and the last three-year returns.

We start by randomly selecting 6,000 individuals from the 1,167,378 TGPF members. We sent a covering letter identifying the research objectives and making a request for his/her assistance in completing the questionnaire. Over a six-month period, we received 931 useable replies and from that reply group, we further requested support in undertaking a controlled investment simulation, which required permission to enter government offices to allow respondents access to separate laptop computers. In total, 176 TGPF members accepted.

As a control for financial literacy, we sent the same invitation to MBA students who had completed a Masters level Financial Management or Investments course at the Chulalongkorn University (Elliot *et al.*, 2007). In total, 77 MBA students volunteered to participate.

Each respondent was first asked to complete a questionnaire about his/her demographic characteristics (gender, marital status, age, income, education, and risk attitude), and then to participate in a computerized simulation to allocate an initial set of asset class weights for their pension portfolio. The respondent should make asset allocation decisions once a year for a

period of up to twenty years as retirement approaches at age sixty (or less than twenty times if the respondent is older than forty years). Each subject received 1,000 Thai Bhat and the allocation was to be between five asset classes: Thai bank deposits, Thai stocks, Thai bonds, foreign stocks, and foreign bonds.[8] Before the first year decision, two information sets were provided: Set one was a spreadsheet containing the annual return statistics (mean, standard deviation, minimum, and maximum) of each asset class over the past twenty years, and set two contained the same summary statistics over the last three years. They were further informed that high-risk assets can generate high returns but could also lead to large losses. After the initial asset allocation was completed, participants were then provided with a spreadsheet containing the expected long-term portfolio return and the value at the end of the investment horizon. This was repeated after each year's allocation. That is, at the end of the simulation exercise, participants had made a series of *n* investment asset allocation decisions corresponding to the number of years, *n*, left until retirement.

This research design mimics the continuing decision-making process of TGPF members and adds a control for situations where narrow short-term framing effects may occur. We rely on the theory of Kahneman and Lovallo (1993) who show that a multiple prospect (with bundled single prospects) better expresses a longer term focus and dynamic decision-making. Since each individual has the possibility to re-evaluate investment decisions on an annual basis, the cumulative effect of systematic choices reinforces any systematic behavioral bias.

Finally, using regression, we quantitatively determine the relationship between the expected return and investment in stock and the respondents' demographic characteristics as follows:

$$E(RP) = \beta_0 + \beta_1 Gender + \beta_2 Status + \beta_3 Age + \beta_4 Income + \beta_5 Edu + \beta_6 Exper + \beta_7 Self \quad (1)$$

$$RiskyInv = \beta_0 + \beta_1 Gender + \beta_2 Status + \beta_3 Age + \beta_4 Income + \beta_5 Edu + \beta_6 Exper + \beta_7 Self \quad (2)$$

Where E(Rp) is the portfolio expected return and RiskyInv is the proportion of domestic stock or foreign securities held in the portfolio. Explanatory variables include dummy variables for Gender (male), Status (married/widowed), and Education (graduated with Master's degree or higher), and discrete variables for Age, Income (monthly income), Investment experience, and Self-identified risk tolerance.

EMPIRICAL RESULTS

Table 1 presents the demographic characteristics of the TGPF sample and the MBA control sample. TGPF members are distributed across age and more likely to be married and female. In contrast, MBA students are clustered in the under forties, more likely to be single, with a higher level of monthly salary. A high proportion of TGPF members (62%) have postgraduate qualifications but, by construction, our MBA sample has a lower level of post-graduate qualifications (22%). Finally, the two samples are statistically different across all the defined demographic characteristics.

[8] Thai stockmarket (SET Index) and Global Equity (MSCI World Index) were downloaded from Bloomberg; the Thai bond returns before 1999 were obtained from a synthetic index by calculating the beta of Thai government bonds on US Bonds and from 2000 to 2013 from the Thai BMA bond return index; the US bond index by Lehman/Barclay was composed of US Government bonds with duration of 4.5 years; and the savings deposit from Thai commercial Banks was downloaded from CEIC.

Table 1: Demographic characteristics between TGPF members and MBA students

	TGPF members	%	MBA students	%	Chi-square
I. Gender					
Female	109	61.93	36	46.75	5.0442
Male	67	38.07	41	53.25	
II. Status					
Single	100	57.47	56	72.73	8.1649
Married	74	42.53	20	25.97	
Widow/Separate	0	0	1	1.3	
III. Age					
< 31 years	58	32.58	46	59.74	18.0226
31 – 40 years	54	30.34	18	23.38	
41 – 50 years	39	21.91	9	11.69	
> 50 years	27	15.17	4	5.19	
IV. Income					
< THB 20,000	87	50.29	0	0	107.7383
THB 20,000 - 40,000	56	32.37	17	22.08	
THB 40,000 - 60,000	21	12.14	29	37.66	
THB 60,000 - 80,000	6	3.47	4	5.19	
> THB 80,000	3	1.73	27	35.06	
V. Education					
Certificate/Diploma	2	1.14	0	0	28.5726
Bachelor Degree	67	38.07	43	78.18	
Master Degree	86	48.86	12	21.82	
PhD	21	11.93	0	0	

The responses relating to investment experience and risk tolerance are summarized in Table 2. Risk preferences are assessed in two ways. First, we asked them directly how tolerant they were of financial risk on a scale of one (not at all) to five (very high). Second, they were assessed on attitudes toward risk and investment gains and losses and the investment choices they were most comfortable with using six questions from the TIAA-CREF risk questionnaire.[9] The summation of these scores ranges from 0 to 100: a conservative portfolio (0–26), a moderately conservative portfolio (27–48), a moderately aggressive portfolio (49–70), and an aggressive portfolio (71–100).

Self-identified risk tolerance is not statistically different across the TGPF and MBA groups. However, when subjected to the more methodical TIAA-CREF assessment, they are very different with the majority of TGPF members falling within the conservative band and significantly more risk-averse when compared to MBA students. This result has partial support for hypothesis one in that TGPF members have a lower tolerance for risk. Finally, over 60 percent of TGPF members have no or very little investment experience compared to only 30 percent of MBA students.

[9] TIAA-CREF is one of the largest providers of retirement financial services in the US. It has approximately two million staff members from colleges, universities, and related institutions (Sundali and Guerrero, 2009).

Table 2: Experience and attitudes to risk

	TGPF members	%	MBA students	%	Chi-square
I. Investment experience					
Not at all	63	38.89	2	2.60	41.169
Very little	37	22.84	21	27.27	
Some	53	32.72	41	53.25	
High	6	3.70	12	15.58	
Very high	3	1.85	1	1.30	
II. Self-identified risk tolerance					
Not at all	3	2.07	0	0	7.0222
Very little	31	21.38	10	13.89	
Some	93	64.14	45	62.50	
High	16	11.03	14	19.44	
Very high	2	1.38	3	4.17	
III. Risk preference measured by TIAA-CREF					
Conservative	103	57.87	14	18.18	49.1783
Moderately conservative	52	29.21	26	33.77	
Moderately aggressive	22	12.36	31	40.26	
Aggressive	1	0.56	6	7.79	

Asset Allocations and Attitudes to Risk

Table 3 reports initial asset allocations classified by respondents' self-identified risk tolerance and bears out the significant relationships between risk tolerance and asset allocations. TGPF members in the lowest risk tolerance quintile, allocated 90% to Thai cash (61.7%) and Thai bonds (28.3%), and none to foreign investments. As the risk tolerance increases, there is a decline in the allocation to cash with the reallocation mostly constrained to domestic Thai stocks and bonds. For MBA students, the reallocation is strongly towards stocks, both Thai and foreign, and away from cash and bonds. The asset allocations for MBA students are significantly different and more risky.

Table 3: Self-identified risk tolerance and initial asset allocation

	TGPF members				
	Cash	Thai stocks	Thai bonds	Foreign stocks	Foreign bonds
1 (not at all)	61.67	10.00	28.33	0.00	0.00
2	28.87	10.32	42.26	5.32	13.23
3	30.70	15.51	33.74	6.40	13.66
4	23.44	23.75	31.56	9.38	11.88
5 (Very high)	12.50	2.50	45.00	5.00	35.00
F-statistic	8.35	5.62	5.42	11.65	2.6

Table 3 (Cont.)

MBA students					
	Cash	Thai stocks	Thai bonds	Foreign stocks	Foreign bonds
1 (not at all)	0.00	0.00	0.00	0.00	0.00
2	26.50	17.50	31.50	9.00	15.50
3	14.33	21.89	25.41	16.37	21.99
4	13.94	29.03	19.78	20.69	16.56
5 (Very high)	5.00	50.00	6.67	36.67	1.67
F-statistic					

Table 4 reports the twenty-year average allocations and final year allocations. MBA students allocate higher percentages to Thai stocks and to foreign securities. This is even the case in the final allocation when the respondents are approaching retirement. Figure 1 also provides a visual of how asset allocations change as retirement approaches. Regardless of time, TGPF members allocate a dominant proportion to cash and Thai stocks, while MBA students have a much more diversified portfolio that is generally dominated by Thai stocks. However, as retirement approaches, there is a steeper reallocation towards cash as the inter-temporal demand for liquidity increases.

Table 4: Twenty year allocations to each asset class

	Cash	Thai stocks	Thai bonds	Foreign stocks	Foreign bonds
I. Final year allocations					
TGFP members	32.75	11.75	37.96	5.12	12.41
MBA students	29.33	24.00	19.67	15.00	12.00
t-statistic	-5.31	4.61	-3.82	5.64	-4.90
II. Average 20 year allocations					
TGPF members	27.11	17.13	31.84	9.67	14.25
MBA students	17.00	24.06	21.31	18.92	18.71
t-statistic	-22.02	15.78	-20.98	25.38	17.04

Taking all into account, TGPF members have a lower tolerance to risk compared to MBA students. Evidence is provided by the persistent higher allocations to cash and Thai bonds and a reluctance to undertake international stock investments. Hence, H1a and H1b are supported.

Demographic Attitudes to Risk

Table 5 reports initial allocations by demographics. MBA respondents have a significantly higher risk profile regardless of any demographic breakdowns—MBA students always opt for higher risk Thai stocks and foreign securities.

Hypotheses two and three make predictions on risk attitudes according to gender and age demographics. Females, especially married females, are expected to be more risk averse than males. However, on initial inspection, the evidence on gender is not strong. There is a slightly lower allocation to cash and a higher allocation to Thai shares for males, and married females appear to be more risk averse. On an inter-temporal basis, we regress average twenty-year

risky allocations against identified demographics. A focus on gender from Table 6 reveals that female TGPF members have a greater home investment bias, with a lower allocation to foreign securities, but there is no gender difference for MBA females.[10] Hence, H2a is partially supported.

Table 5: Initial asset allocations by demographics

		TGPF members				
		Cash	Thai stocks	Thai bonds	Foreign stocks	Foreign bonds
I	Gender					
	Female	30.55	12.04	36.42	6.40	14.59
	Male	27.09	17.27	38.03	5.60	12.01
	F statistic	15.11	13.28	12.29	28.58	5.98
II	Status					
	Single	30.10	14.89	34.03	6.28	14.70
	Married	28.04	12.70	41.01	6.01	12.23
	Widow/Divorce/ Separate	n.a.	n.a.	n.a.	n.a.	n.a.
	F statistic	9.46	6.33	9.9	18.58	6.06
III	Age					
	< 31 years	31.03	17.31	29.88	6.95	14.83
	31 – 40 years	23.24	16.39	39.07	6.48	14.81
	41 – 50 years	33.33	7.95	42.31	5.00	11.41
	> 50 years	30.74	11.48	39.44	6.11	12.22
	F statistic	8.21	6.4	8.1	14.26	4.07
IV	Income					
	< THB 20,000	30.34	14.30	34.06	6.53	14.77
	THB 20,000 - 40,000	26.70	12.95	40.45	6.25	13.66
	THB 40,000 - 60,000	27.14	9.52	44.29	4.29	14.76
	THB 60,000 - 80,000	41.67	28.33	25.00	5.00	0.00
	> THB 80,000	16.67	26.67	36.67	10.00	10.00
	F statistic	7.04	4.05	6.68	11.74	3.76
V	Education					
	Certificate/Diploma	15.00	5.00	35.00	0.00	45.00
	Bachelor Degree	32.01	9.61	39.90	5.57	12.91
	Master Degree	29.24	15.29	35.12	5.81	14.53
	PhD	21.67	23.81	35.95	9.52	9.05
	F statistic	8.44	7.87	6.51	15.06	6.08
VI	Gender & Status					
	Single female	32.09	13.85	32.73	6.05	15.27
	Married female	28.77	9.81	40.38	6.89	14.15
	F statistic	6.89	5.88	6.18	11.33	3.17

[10] Consistent with Adams and Ragunathan (2014) who contend that females with high levels of financial literacy take on similar levels of risk to males.

Table 5 (Cont.)

		MBA students				
		Cash	Thai stocks	Thai bonds	Foreign stocks	Foreign bonds
I	Gender					
	Female	17.36	19.58	25.69	16.94	20.42
	Male	14.27	26.37	22.45	17.72	19.18
	F statistic					
II	Status					
	Single	13.22	22.88	23.94	17.26	22.70
	Married	22.00	24.75	24.75	17.50	11.00
	Widow/Divorce/ Separate	30.00	10.00	10.00	20.00	30.00
	F statistic					
III	Age					
	< 31 years	10.76	24.92	24.50	16.84	22.97
	31 – 40 years	24.17	17.22	21.31	20.93	16.37
	41 – 50 years	19.44	28.33	21.67	16.67	13.89
	> 50 years	26.25	18.75	35.00	8.75	11.25
	F statistic					
IV	Income					
	< THB 20,000	n.a.	n.a.	n.a.	n.a.	n.a.
	THB 20,000 - 40,000	13.82	19.71	27.06	13.53	25.88
	THB 40,000 - 60,000	10.17	25.86	23.45	20.69	19.83
	THB 60,000 - 80,000	17.50	15.00	18.75	27.50	21.25
	> THB 80,000	22.60	23.75	23.35	14.69	15.61
	F statistic					
V	Education					
	Certificate/Diploma	n.a.	n.a.	n.a.	n.a.	n.a.
	Bachelor Degree	13.67	23.61	23.68	17.28	21.77
	Master Degree	22.94	21.76	25.00	17.65	12.65
	PhD	n.a.	n.a.	n.a.	n.a.	n.a.
	F statistic					
IV	Gender & Status					
	Single female	15.58	18.65	26.54	15.58	23.65
	Married female	21.11	23.33	25.00	20.56	10.00
	F statistic					

Table 6 also reveals that increasing age is associated with lower allocations to risky assets, and that higher self-identified risk tolerance is positively associated with more risky allocations. Significant differences for MBA students include a higher overall level of risky foreign investments (40.9%), a positive impact of self-assessed investment experience on foreign investments, and a positive association between income and domestic stock allocation. There is a higher allocation to domestic stock if the TGPF member holds a post-graduate education, but not so for MBA students.

Table 6: Explanators of portfolio return and risky allocations on respondent characteristics

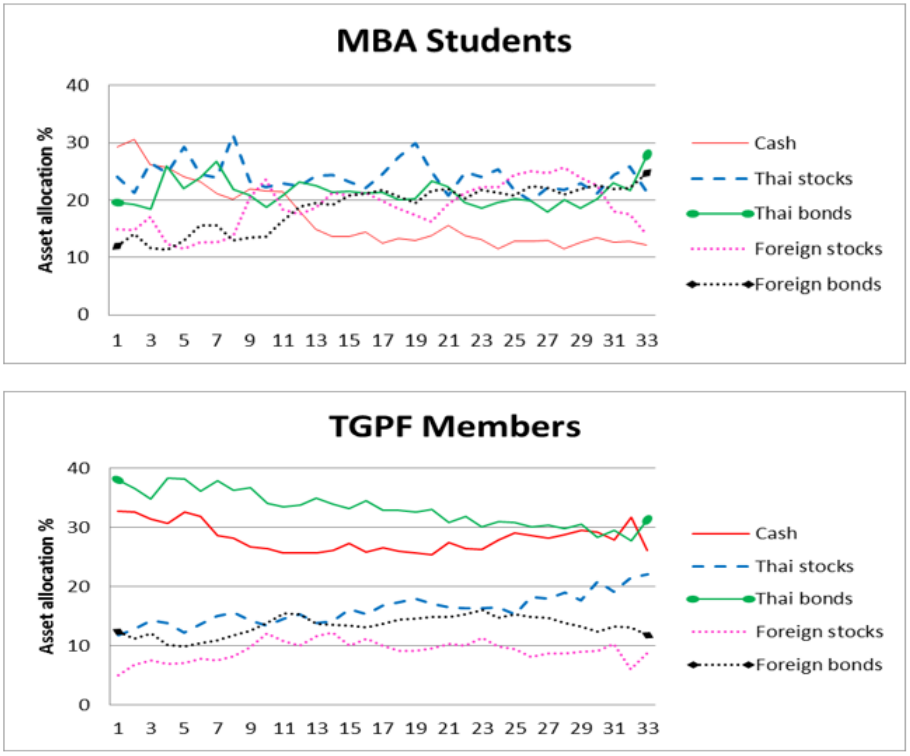
E(RP) = β0 + β1Gender + β2Status + β3Age + β4Income + β5Edu + β6Exper + β7Self

RiskyInv = β0 + β1Gender + β2Status + β3Age + β4Income + β5Edu + β6Exper + β7Self

	TGPF Members			MBA Students		
	E(R)%	% Domestic Stock	% Foreign Stock & Bonds	E(R)%	% Domestic Stock	% Foreign Stock & Bonds
Intercept	7.01***	13.62*	18.90	7.24***	13.14	40.86**
	(13.39)	(1.86)	(1.63)	(10.94)	(0.63)	(2.15)
Gender	0.12	1.93	-6.37**	-0.04	2.45	-0.91
	(0.80)	(0.54)	(-1.96)	(-0.32)	(0.56)	(-0.23)
Status	-0.37**	-6.30	2.98	0.12	-4.75	3.17
	(-2.18)	(-1.53)	(0.79)	(0.60)	(-0.74)	(0.54)
Age	-0.04***	-0.53**	-0.35*	-0.04***	-0.82*	-0.64*
	(-3.92)	(-2.33)	(-1.70)	(-3.00)	(-1.97)	(-1.70)
Income	0.07	2.48	4.32	0.02	12.53**	1.51
	(0.32)	(0.49)	(0.94)	(0.12)	(2.25)	(0.30)
Education	0.22	8.36**	-0.68	0.23	1.46	-1.57
	(1.41)	(2.19)	(-0.20)	(1.27)	(0.25)	(-0.30)
Investment experience	-0.03	1.95	-3.09	0.16	11.53**	3.05*
	(-0.23)	(0.57)	(-0.99)	(1.03)	(2.41)	(1.70)
Self-identified risk tolerance	0.25**	4.89**	5.36**	0.31***	12.34***	3.72
	(2.42)	(1.98)	(2.39)	(3.05)	(3.78)	(1.26)
Adj R-square	0.1600	0.1400	0.0931	0.2700	0.3200	0.1603
N	145	145	145	72	72	72

Notes: Dependent variables are E(Rp) the portfolio expected return and RiskyInv is the proportion of domestic stock or foreign securities held in the portfolio. Explanatory variables include dummy variables for Gender (male), Status (married/widowed) and Education (graduated with Master's degree or higher), and discrete variables for Age, Income (monthly income), Investment experience, and Self-identified risk tolerance.

Jaggia and Thosar (2000) report that younger investors have a more aggressive investment portfolio with greater weightings in riskier securities. As the demand for liquidity and certainty increases, the allocation to riskier assets should decrease (Jaggia and Thosar, 2000). The initial allocations by age in Table 5 show a high demand for liquid cash holdings for TGPF members even at younger ages, with more age-based aggressive allocations for MBA students. Figure 1 presents the dynamic portfolio unwinding as retirement approaches. TGPF members and MBA students make investment decisions that are consistent with Jaggia and Thosar (2000). For TGPF members, there is strong evidence of a shift from domestic stocks to cash and domestic bonds as retirement approaches. MBA students retain a more balanced portfolio but with the demand for retirement, certainty manifested in increasing cash holdings from about 12-13 years out. Table 4 shows the switch to cash by MBA students (29.3%) significantly away from average holdings of 17%—mostly extracted from reallocating foreign securities.



Notes: These figures exhibit the average percentage of allocation to each asset class over the remaining years until retirement. At the end of each year the respondents are asked to re-allocate within the five asset classes based on supplied past statistics.

Figure 1 Asset allocations over the remaining years until retirement

Reaction to New Information

Our next test relates to the reaction of respondents to the arrival of new information. New information is proxied by the change in stock market prices over the immediate past one and two years. We examine whether negative news elucidates a stronger response than positive news (Brooks *et al.*, 2004), whether TGPF react asymmetrically to new information with a greater degree of over-reaction (Benartzi and Thaler, 1999; Ratner and Herbst, 2005; Venkatraman *et al.*, 2006; Summers and Duxbury, 2012), and whether MBA students take a longer-term approach that tends to ignore short-term market movements.

The majority of TGPF members react to price movements to a greater degree than MBA students, thus supporting H4a. Further, TGPF members are significantly more sensitive to negative price news than positive news, with the greatest level of selling activity occurring after one year and two year continuous price declines. TGPF members are not contrarian traders with a greater level of buying after price rises and a greater level of selling after price declines. As predicted by H4b, MBA students are much more likely to maintain a passive portfolio by ignoring price innovations. However, about one third do price react by higher selling after negative price news. In contrast, there is contrarian trading with a higher selling when past prices increase in foreign securities.

Table 7: Reaction to market price movements

	Up in the last period			Down in the last period			Up and up in the last two periods			Down and down in the last two periods		
	Buy	Sell	Do nothing	Buy	Sell	Do nothing	Buy	Sell	Do nothing	Buy	Sell	Do nothing
I. Thai stocks												
TGPF members	31.51%	28.01%	40.48%	24.95%	41.14%	33.90%	32.42%	29.97%	37.61%	19.69%	41.73%	38.58%
MBA students	16.99%	17.38%	65.63%	13.81%	28.77%	57.42%	17.25%	15.85%	66.90%	13.42%	26.84%	59.74%
Chi-square statistic	108.93			74.83			64.12			14.74		
II. Thai bonds												
TGPF members	32.17%	30.57%	37.26%	20.29%	38.31%	41.40%	35.92%	34.51%	29.58%	24.60%	34.13%	41.27%
MBA students	17.90%	16.76%	65.34%	15.89%	20.93%	63.18%	18.80%	24.06%	57.14%	19.46%	25.17%	55.37%
Chi-square statistic	132.88			86.87			29.40			7.11		
III. Foreign stocks												
TGPF members	31.57%	25.36%	43.07%	23.90%	40.33%	35.77%	29.24%	28.07%	42.69%	30.59%	34.25%	35.16%
MBA students	16.26%	23.95%	59.80%	15.45%	26.83%	57.72%	20.28%	25.35%	54.38%	16.67%	31.58%	51.75%
Chi-square statistic	16.52			63.79			6.09			16.52		
IV. Foreign bonds												
TGPF members	32.05%	25.84%	42.11%	22.29%	37.00%	40.71%	30.94%	25.90%	43.17%	25.64%	34.62%	39.74%
MBA students	16.42%	25.67%	57.91%	16.81%	23.63%	59.56%	17.73%	24.14%	58.13%	14.93%	23.53%	61.54%
Chi-square statistic	53.50			51.37			9.88			17.68		

Notes: This table shows the percentage of respondents who react to past market price movements. The chi-square statistic tests for different reactions between TGPF members and MBA students.

Performance of Fund Member Decisions

Our final tests consider differing portfolio selections and the economic return performance of fund members from their investment decisions. The rationale for allowing TGPF members the choice of their wn portfolio allocations, is to increase their personal utility and to lead to a higher level of return/risk trade-offs through their own control. The subtext is that risk and return will be a function of gender, age, and educational status.

Table 8 reports the mean return, standard deviation, and Sharpe ratios of TGPF and MBA selected portfolios over the twenty-year re-investment period by demographic characteristics. Mean return and Sharpe ratio are both lower for male and female TPGF portfolios compared to MBA portfolios. MBA student portfolios return a relatively higher twenty-year performance. Mean return is highest for single MBA males (7.43%) and Sharpe ratios are dominant across all single classifications.

Age has significant inverse relations with returns and Sharpe ratio, especially for MBA students (returns of 7.36% and a Sharpe ratio of 0.0554). Finally, a financial education provides

higher returns with MBA students outperforming TGPF members across all categories. Higher levels of education also provide higher returns for TGPF members with a 6.68% return for a PhD versus 5.68% for a certificate/diploma. MBA students earn higher returns; age has a significant inverse (negative) relationship with returns, and higher risk tolerance has a positive relationship across all respondents. Married TGPF members obtain significantly lower returns but there is no difference between returns and gender for MBA students.

Table 8: Portfolio return and risk by characteristics

	TGPF members			MBA students		
	E(R)%	Standard deviation	Sharpe ratio	E(R)%	Standard deviation	Sharpe ratio
I. Gender						
Female	6.1522	0.4053	0.0457	7.0799	0.5900	0.0471
Male	6.4356	0.4161	0.0513	7.2224	0.5671	0.0515
F statistic	39.38		4.73			
II. Gender & Status						
Single female	6.2284	0.3552	0.0543	7.0955	0.5145	0.0543
Married female	6.0728	0.4555	0.0389	7.0771	0.8358	0.0332
Single male	6.4173	0.3922	0.0540	7.4308	0.5897	0.0531
Married male	6.4605	0.4626	0.0467	6.6541	0.5058	0.0465
F statistic	20.46		3.47			
III. Age						
< 31 years	6.3858	0.3587	0.0581	7.3605	0.5523	0.0554
31 – 40 years	6.5936	0.4400	0.0521	6.8985	0.5977	0.0435
41 – 50 years	5.8765	0.3968	0.0397	6.9873	0.6927	0.0388
> 50 years	5.9257	0.4833	0.0336	6.3383	0.5230	0.0390
F statistic	27.18		2.88			
IV. Formal education						
Certificate/ Diploma	5.6832	0.6009	0.0230	n.a.	n.a.	n.a.
Bachelor Degree	6.0458	0.4158	0.0420	7.2004	0.5487	0.0529
Master Degree	6.3384	0.3636	0.0561	6.9984	0.6806	0.0396
PhD	6.6777	0.5656	0.0420	n.a.	n.a.	n.a.
F statistic	21.00		3.40			

Performance of the Default Pension Portfolio

The TGPF default plan has a target return of 4.5% to 5.5%, with actual return of 4.5% over the 2013/14 fiscal years. During the past five years ended 2014, the Thai stock market recorded a 7.8% excess return over the TGPF default plan because of its heavy weighting towards Thai fixed income of nearly 60%.

Recent statements by representatives of the TGPF at the Asia Asset Management's seventh annual Thailand roundtable[11] indicated a desire to increase the foreign allocation ceiling to 40% to diversify risk and increase pension returns. The results from this paper and given that the international correlations with Thai stock index returns are significantly less than one (Dow Jones, 0.77; DAX, 0.47; FTSE, 0.53), the movement towards a higher return/risk default portfolio is supported as a means to increase long-term TGPF pension payouts.

CONCLUSION

In this paper, we undertake a behavioral finance analysis of the impact of allowing flexible decision-making options for retirement in Thailand as an example of an emerging market. We allow TGPF members to undertake the pension asset allocation decisions over a rolling twenty-year period and compare results to those of MBA students. Asset allocations for TGPF members vary across demographic decomposition. Single females, older, and less educated members opt for lower risk asset portfolios with a high level of home investment bias. MBA students make higher investments in shares and international securities, have a lower reaction to recent price movements, and make higher long-term average returns. Overall, financial literacy is associated with more risky investments and a greater degree of asset diversification with higher returns. TGPF females are more risk averse than their male counterparts, but MBA females have a similar risk profile to males resulting in higher long-term returns.

The conservative approach of TGPF members is unlikely due to the asset nature of the default plan. A comparison of the TGPF member allocation and returns to the default plan shows a disconnection with the pension requirements of TGPF members. Whilst the TPGF pension managers have a professional and ethical responsibility to financially engineer default plans (Clark and Urwin, 2008; Sundali and Guerrero, 2009), they may be hampered by political regulations. TGPF is currently applying to have the allocation ceilings relaxed and, whilst they have not yet been successful, this should remain a high priority.

Our paper contributes to the behavioral literature and to pension allocations. Extending the Sundali and Guerrero (2009) study to an emerging market, we add international securities, introduce price shocks, and compare results to subjects with a degree of financial literacy. The comparison with Sundali and Guerrero's U.S. study also highlights some fundamental differences between western and Thai pension allocations. In the Thai sample, both respondents moved back towards a more liquid portfolio as retirement approached—consistent with the liquidity time diversification argument. This was not the case in the U.S. where subjects allocated twice as much to stocks compared to bonds and cash, and did not lower this allocation as retirement approached. This could signify higher personal wealth with less reliance on pensions in the U.S., compared to higher reliance on pensions with incentive to protect final payouts. It places a greater relative focus on TGPF providers to engineer segmented investment plans that enable protection as retirement approaches.

We emphasize that extending studies to examine pension decisions and allocations in emerging Asian markets is fundamental to providing policies to improve the economic and social wellbeing. Our major contribution is to reveal a conservative investment bias within both TGPF members and the default plan and to show the benefits of financial literacy.

[11] Yingyong Nilasena, deputy secretary general of the TGPF defined contribution plan (quoted by Daniel Shane, 19 November 2014, Category News, Asia).

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