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## **Personal Investment Decisions in Emerging Markets: Evidence from the Thai Government Pension Fund**

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### *Abstract*

This paper investigates the ability of individuals in emerging market to make optimal investment decisions for future retirement. Utilising an experimental survey methodology on members of the Thai Government Pension Fund and a control sample of financially knowledgeable individuals who are also based in Thailand, we find that fund members tend to be more risk averse, exhibit a home bias preference, and underreact to market movements. Single females are particularly risk averse. On average, fund members earn lower returns from their investment decisions while simultaneously bearing higher risk. Our regression analysis convincingly points to a fundamental difference in the factors underlying investment decisions across the population, with age the only common denominator. As more and more countries allow workers flexibility to decide on their savings and investment for retirement, our research suggests that extending this to emerging markets may not be entirely appropriate, especially when workers have little knowledge of core financial concepts.

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

*Keywords:* Emerging Markets Gender, Risk, Investment Decisions, Marriage, Pensions, Thailand.

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## **I. Introduction**

This paper examines the capacity of individuals in emerging markets (EM) to correctly make their own investment decisions for future retirement. In recent years, regulators have recognised that a unitary formula for pension savings and investment, which covers a wide swathe of the population, is suboptimal. In many countries, such as the US, UK, and Australia, pension funds now provide their members with a range of savings and investment choices so that a full range of potential retirement options can be chosen. As this trend continues, EM regulators are beginning to consider the same level of decision-making for workers under their own legislative umbrellas. One of the first emerging countries to introduce variable savings and investment choices is Thailand for its Government Pension Fund. Given the fundamental structural differences between emerging and developed markets, there is no reason to expect that workers in less financially developed countries would have the same capability to make their own appropriate pension investment and savings decisions for retirement.

This premise is the basis of the current study and a motivation to examine the investment decisions of workers in Thailand (our experimental sample). The empirical framework builds on research that highlights differences between individuals in emerging and developed markets. Adults in emerging markets frequently care for elderly relatives in the family home, have closer family bonds, stronger religious practice, weaker levels of public social welfare, and lower life expectancy. Together, these factors arguably make savings and investment decisions for retirement significantly more important than in developed markets where social welfare for pensioners is largely provided by government.

While much of the analysis undertaken in this paper has already been carried out in developed countries, this is the first study to explicitly consider these issues in an emerging market context. It is also one of the first attempts to model the risk preferences of individuals in a setting where investment decisions

can literally mean the difference between prosperity and poverty. Due to a chronic lack of data availability and need for EM regulators to understand the risk profiles of investors, it is unsurprising that a study of the present type has not been carried out before. However, with their rapidly increasing complexity and growing observance of developed country codes (examples include widespread adoption of International Accounting Standards and Basel II/III), an understanding of the risk preferences of emerging market individuals (and any differences from developed market counterparts) is important.

As a case study of the potential differences that may exist between the emerging and developed market population, consider the example of a 38-year old married female university professor. As is common with many in both emerging and developed countries, the professor has a family of three children and an extended family of one younger brother and both parents still living. However, unlike her developed country counterparts, the professor not only needs to consider her own welfare in retirement but, because of weak social welfare structures, also that of her mother and father (and possibly younger brother). In most emerging markets, elderly relatives (not just parents) are financially supported by younger family members and not the state. The concept of saving and investing for one's retirement is also relatively new and not embedded within the traditional familial responsibilities of emerging societies. Furthermore, whereas individuals of past generations will have expected their children to care for them in retirement, this is less true of the present generation of emerging country workers. Finally, as the financial sophistication of emerging market countries is fairly low, so also is the financial sophistication of the average EM individual. Together, these factors may potentially lead to different risk preferences and tolerances, suboptimal financial decisions, and more behaviourally biased actions for workers in emerging environments.

In developed countries, workers are regularly bombarded with financial and business news in the mainstream media. Levels of financial education are generally quite strong with most high school syllabi covering financial concepts such as interest and compounding at age 16 or below. This is not the case in most emerging markets where teaching methods traditionally focus on rote techniques together with strong language and mathematical foundational skills. Thus, there may be very large differences in the capacities of the general EM worker population to make informed long-term financial decisions from that of EM individuals who have undergone financial training at university, either at home or abroad. Given that most EM workers will have significantly lower levels of financial understanding, it is necessary that there is an understanding of the impact formal financial education has on financial decisions in this environment. In developed economies, pension fund members have been shown to make relatively informed savings and investment decisions for retirement, even without formal financial education. This is not necessarily a valid expectation for pension fund members in emerging markets.

The central contribution of the paper is that the savings and investment decisions of EM workers are shown to be very different from past research studies on individuals in developed countries. EM workers are highly risk averse and exhibit an exceptionally 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 very little change in portfolio composition in response to external market movements. Surprisingly, there is also relatively little variation in asset allocation across the standard demographic groupings (age, salary, gender, marital status). Finally, as befitting their poor levels of financial knowledge, our simulation results point to significantly lower levels of portfolio performance in relation to a control sample of financially trained individuals.

The results of our experimental analysis very clearly show that emerging market governments must proceed with caution in allowing their populace to make their own savings and investment decisions for retirement. Although individuals' initial asset allocations are consistent with their self-identified risk preferences, they exhibit a number of severe behavioural patterns including an irrational home-bias preference, under-reaction to external events, and loss aversion. Moreover, investment performance is relatively poor compared to a financially knowledgeable control sample. The findings in this paper suggest that before giving EM workers power over savings and investment for retirement, governments should first ensure they have a minimum level of financial education so that workers are able to make more rational informed decisions.

The remainder of the paper is as follows: Section 2 reviews the literature and develops the empirical hypotheses. Section 3 presents the Thai institutional environment and Section 4 explains the experimental methodology. Section 5 presents the main results and in Section 6 a number of robustness tests are carried out. Section 7 concludes.

## **II. Literature Review and Hypotheses**

The mean-variance model (Markowitz, 1959) is the traditional approach that is typically used to determine the optimal asset allocation for a given portfolio. Given  $n$  risky assets, which offer returns having a joint probability distribution, an investor will allocate his current wealth to maximise expected utility from end of period wealth (Kroll, Levy and Rapoport, 1988). In such circumstances expected utility is maximized at the optimal combination of mean and variance which provides the highest expected return for an individual's risk tolerance.

The mean-variance model is a single period model. Investors therefore have to repeat the step of deciding on risk tolerances and the composition of asset classes in the investment portfolio each period. Assuming constant risk preferences over time, the mean-variance model suggests little change in asset allocation. In practice, investment advisors recommend different asset allocation strategies based upon an individual's investment horizons. The risk of the portfolio should also decrease as the investment horizon increases. This concept is called the time diversification principle explained by Jaggia and Thosar (2000). Young investors are likely to allocate more aggressively and overweight their stock portfolio, while older investors will allocate more conservatively and underweight their stock portfolio.

Another important factor in explaining asset allocation decisions is behavioural finance. In the extant literature several biases have been identified that affect investors' decisions when selecting the portfolio asset allocation over long time horizons. Investor cognitive biases may therefore lead to sub-optimal investments. First, the  $1/n$  strategy results in investors for retirement naturally choosing to hold an equally weighted portfolio. This has been attributed to the fact that employees have limited investment knowledge and thus allocate the portfolio evenly across the assets offered within the defined contribution plan (Benartzi and Thaler, 2001). Second, loss aversion affects investors' sensitivity to losses and gains (Kahneman and Tversky, 1984 and Thaler, 1985). Benartzi and Thaler (1999) found that investors psychologically weight investment losses more heavily than investment gains. Myopia, meanwhile, results in the avoidance of riskier investments over shorter horizons. Consequently, long-term investors allocate more of their portfolio to riskier assets than would be the case with an optimal portfolio. Last, the framing effect can impact asset allocation decisions. Benartzi and Thaler (1999) found that pension asset allocation strategies of university employees are influenced by the presentation of historical asset returns.

In the face of aging populations, emerging market pension funds are expected to face similar financing problems to those that have been observed in developed countries (Walter, 1999; Chan-Lau, 2005). One clear consequence of this is the move away from defined benefit pensions to defined contribution pensions. To take into account the plan sponsor's risk, defined benefit pension investments attempt to match fund assets and liabilities (Blake, 1999 and 2003). In contrast however the appropriate investment strategy for defined contribution pensions is to maximize the expected portfolio returns for the given risk (Blake, 2003).

A number of studies have investigated the asset allocation of pension funds, but only in developed markets. The main conclusion is that international portfolio diversification is crucial to protect the funds from domestic inflation. Nonetheless, many pension funds limit cross-border investment due to socially responsible investment guidelines (Wilshire Associates, 2002), investment regulation (Yermo, 2003), lack of transparency (Davis, 2002) and the possibly substantial short-term loss (Kimmis et al, 2002 and Blake, 2003). In other words, regulatory risk aversion creates a bias in investment towards domestic assets.

In most Asian countries the national provident fund is the main source of income for a retiree. Government intervention can therefore influence the investment decisions of pension funds (Asher, 1999 and 2000). Holzman et al (2000) document that centralized fund management decreases the competitiveness of the fund management industry. Consequently, the fund management industry is conservative with pension assets being heavily invested in government securities. Asian provident funds have also been found to exhibit poor performance in many empirical studies. [For example see Asher (1999 and 2000) and Asher and Newman (2001)].

Most defined contribution plans, even in developed countries, provide a default fund for members with some scope for an individualised specific asset allocation strategy. However, the majority of scheme

members end up in the default fund as they have not elected for any other fund, (see Choi et al. (2002) for the US and Bridgeland (2002) for the UK). Previous studies focused on investigating the effect of alternative asset allocation strategies on predicted outcomes by using stochastic simulation such as Booth and Yakoubov (2000), Blake, Cairn and Dowd (2001) and Hibbert and Mowbray (2002). Byrne et al. (2007) analyzed the real structure of default funds in the UK and suggested that pension providers and pension members should jointly assess the employees' profiles prior to deciding the default fund.

To date there has been only very limited research on the savings and investment decisions for retirement in emerging markets, and Thailand in particular. Limanon et al. (2007) examined the impact of demography on civil servants' lifestyles and savings and found that the population's age structure was the principal factor affecting their way of life, savings behavior and investment strategies. Using a hypothetical worker approach and stochastic forecasting technique, Pfau and Atisophon (2008) found that Thai formal workers who worked for forty years would receive only about a median replacement rate (13-14%) of their final five years income under a defined contribution plan.

### ***Hypotheses***

The purpose of the paper is to identify the salient risk characteristics of emerging market workers and investigate whether there are any substantial differences between them and their developed market counterparts. There are greater social expectations for families in poorer countries to financially and socially support elderly relatives, and there is a concomitant lack of strong government social welfare programmes. This ensures that a stable income in retirement is arguably of greater importance in emerging markets. In addition, changing social norms, the westernisation of many emerging market societies, the emergence of a new middle class, a potential weakening of the cohesive family unit, and greater financial independence of females, means that for workers the retirement period is one of great uncertainty. Finally,

a general lack of financial education among individuals in emerging markets means that confidence is lacking with respect to making long-term financial decisions. In this context, it is natural to expect that individuals will be less tolerant of risk and choose a more conservative investment portfolio for retirement. Also, their investment decision making style may be more cautious and methodical. This leads to three sub-hypotheses concerning the characteristics of EM workers.

*H1a: emerging market workers will have a low tolerance to risk.*

*H1b: emerging market workers will have a more cautious approach to investment decision-making.*

*H1c: emerging market workers will have a more conservative investment portfolio for retirement.*

The social demographics of emerging markets are very different from western societies. Female workers have much stronger family responsibilities and less financial independence than males. Thus, there is a very real issue for females to consider when they have not married and are also expected to support elderly relatives. With no clear income streams in retirement and potentially overpowering financial responsibilities, it would be expected that the savings and investment decision are influenced by such factors as gender, marital status, and age.

*H2a: Female workers will have a more conservative portfolio than males*

*H2b: Single Female workers will have a more conservative portfolio than married female workers*

Following on from Jaggia and Thossar (2000), we expect that younger EM workers would have a more aggressive investment portfolio than older workers. An aggressive portfolio would be one that had a stronger weighting in domestic stocks and foreign securities. However, given the low levels of financial

sophistication and general lack of confidence in EM workers, it is expected that there would be a marked home bias as shown in REF.

*H3a: younger EM workers have a more aggressive portfolio than older workers.*

*H3b: EM workers will exhibit a preference for domestic stocks over foreign securities.*

Given the poor financial knowledge of many EM workers, there are a number of potential behavioural traits that they may exhibit in their dynamic investment decisions. Because of the lack of formal decision-making skills, pension fund members may not respond to external news or market events. A lack of confidence may lead members to passively hold their investment irrespective of what is happening to the value of the asset class components in their portfolio. Alternatively, their lack of financial knowledge may lead members to overreact to new information and invest in an emotional or impulsive manner. A priori, it is not clear which behaviour will prevail and ultimately, the issue is an empirical one.

*H4: EM workers will underreact to market movements in the investment decisions.*

The final set of hypotheses relates to fund performance and the ability of emerging market workers to achieve an appropriate return, adjusted for risk, from their investment decisions. Two factors will likely determine investment performance. One, the lack of financial sophistication of EM workers would lead to the expectation that risk-adjusted performance will be less than optimal. In addition, gender is likely to have an important influence on portfolio risk with female workers having a lower risk investment. Likewise, single females are likely to have a lower risk portfolio than married females.

*H5a: EM worker investment performance is lower than financially sophisticated investor performance.*

*H5b: female worker portfolio risk is lower than male portfolio risk*

*H5c: single female worker portfolio risk is lower than married worker portfolio risk.*

### **III. The Thai Institutional Environment**

Restrictions on asset allocation in developed market government pension schemes are generally set through national legislation. These restrictions set the maximum and minimum portfolio weightings for both domestic and foreign assets as opposed to investing based on prudent person principles (Oxera Agenda, 2007). Like all other national pension funds, ministerial rules dictate the investment portfolio of the Thai Government Pension Fund (GPF). Currently the GPF allows scheme members to make additional voluntary contributions up to a limit of 15% of salary and from 2010, the GPF offers scheme members investment choices with regards to the asset allocation within their pension plan. Fund members therefore have to choose both, how much to contribute (the saving decision), and the asset allocation (the investment decision) of their pension portfolio.

Thailand is currently experiencing significant changes to the demographic structure of its population with falling rates of fertility and increasing life expectancy (Jitapunkul et al., 2002); Holzmann et al., 2001, Wiener, 2003; Ruengsakul, 2003, Kesornsucharit, 2003; Kanjanaphoomin, 2005). Aging populations are a global phenomenon and are closely linked to economic development, rapid advances in medical science and most crucially better sanitation and access to clean water. These demographic shifts are highlighted by the projected changes in the old age dependency ratio from 10.4% in 2005 to 23.51% by 2020, (Kesornsucharit, 2003). Across the world, countries with defined benefit pension systems are facing financial problems due to program maturation, aging populations, falling productivity growth, competitive pressures and globalization, Williamson (2005). All of these changes will have a significant impact on the ability of the

state to provide adequate retirement benefits especially as the old age dependency ratio rises. Palmer (2001) and Holzman and Stiglitz (2001) propose that the solution to this impending pensions crisis is to shift away from existing defined benefit pension schemes to funded defined contribution plans.

The Thai government is in the process of adopting the World Bank three-pillar approach to ensure adequate post-retirement incomes. Coverage in the existing Thai pension system only provides retirement incomes for those that work in the formal sector (approximately 1/3 of the current workforce). However, the Thai government has had to move away from the original pension system (Pillar-I) for employees in the public sector.

Pillar-I pension benefits are provided through an unfunded pay-as-you-go (PAYG) defined benefit scheme. In light of rapidly changing demographics this system of pension provision will come under increasing pressure in the future. From the Thai government's perspective, the cost of providing these benefits will continue to increase, thereby putting pressure on fiscal budgets. It is unlikely that the government will not be unable meet these liabilities in the future. However, the cost of meeting this liability will have a detrimental effect on the government's finances and so either government expenditure will need to be reduced elsewhere or revenues will need to be increased through greater taxation. Neither option is socially desirable. In response, to these issues the Thai Government established an occupational scheme as the second pillar to complement the traditional system; the Thai Government Pension Fund (GPF). As of 2005, thirty percent of all retirement assets were held in GPF accounts with a growth rate of approximately five percent.

### ***The Nature of the Thai Government Pension Fund***

Established on 27 March 1997, via the Government Pension Fund Act (1996), the Thai Government Pension fund (GPF) provides a second pillar of retirement benefits for public sector employees through a

funded defined contribution scheme. Government officers employed prior to 27th March 1997 are allowed to select what scheme they participate in i.e. Pillar I or Pillar II and all government officers appointed after 27th March 1997 will have their full pension provided through Pillar II. Consequently, all new government officers bear the investment risk of their retirement benefits. Two parallel systems concurrently operate and the pay-as-you-go type will remain until the last person retires in 2037 (Krongkaew, 2007).

Participants in the new defined contribution scheme currently contribute 3% of salary and the government matches this with an additional 3%. Limiting the level of contribution to 3% was found to be a barrier to saving for retirement and so, in December 2007, the Government Pension Act was reformed to allow members to contribute more to their pension. The minimum contribution is still set at 3% and this is matched by the government. However, now members can pay additional contributions of up to 15% of salary. In addition, the government also provides a tax incentive to increase the level of saving for retirement with contributions being tax deductible up to THB 300,000 per annum.

### ***Investment***

For the government and their appointed fund managers it is crucial to maintain an appropriate balance between profitability and the risk of investments in the pension portfolio. If the investment policy is too cautious then there may be insufficient returns to meet the pension liability. Alternatively if there is too much risk in the portfolio investment, returns will be too volatile.

The GPF investment policy is set by the Thai government. The investment sub-committee reviews the existing investment strategy and makes recommendations to the board of directors on the future investment strategy of the fund. According to ministerial rules (2003), the Government Pension Fund must be composed of more than 60% low-risk securities and less than 40% higher-risk securities. The low-risk securities include bank deposits, government bonds, debt instruments guaranteed by the Ministry of Finance

and investment grade bonds. The higher risk assets are composed of deposits in financial institutions, private sector debt, unit trusts and common stocks.

In 2006, the list of risky asset classes was expanded to include debt instruments issued by the government, state enterprises, international corporations, international financial institutions and overseas firms which are guaranteed by their government. The maximum investment allowed in these securities is 10% of pension fund assets in a single asset class up to a maximum of 30% of pension assets across all of these groups. Further to this the pension fund can now use a limited amount of derivatives and so the use of forward and futures contracts to hedge risk is now possible. As of 31st December 2006, the portfolio consisted of 58% Thai debt instruments, 12% capital market instruments, 6% global debt instruments, 9% global capital market instruments, 8% real estate and 7% alternative investments.

On 26th January 2007, the ministerial rules governing the investment policy of the Thai Government Pension Fund were further amended. The proportion of investment in capital market instruments, debentures or warrants was increased to a maximum of 35% of fund assets. The proportion of real estate investment was also increased to a maximum of 8% and the cap on overseas investment was increased from 15% to 25% of fund assets. Crucially the GPF now allows its members to choose their investment mix, the subject of the present paper.

#### **IV. Experimental Methodology**

Since the Thai Government Pension Fund Act was amended to provide various investment choices in 2010, fund members can now design their own individualised asset allocation through choosing the weights of

cash, fixed income, capital market instruments, and alternative investments in the pension portfolio. Our methodology is principally experimental through a detailed simulation of investment decisions by both Thai GPF members and financially knowledgeable Thai individuals who are not GPF members. Our study simulates how fund members design their asset allocation over a certain investment horizon and the impact of expected portfolio returns on their allocation in the next period. The investment choices we give are cash, Thai bonds, Thai stocks, foreign bonds, and foreign stocks.

MBA students who have undertaken a Masters level Financial Management or Investment course at Chulalongkorn University are used as a control sample of financially knowledgeable individuals. Elliot et al. (2007) suggest that MBA students can be a good proxy for non-professional investors. Clearly, we are implicitly assuming that MBA students acquire information similar to, but integrate the information in a different manner from, GPF members.

For data collection process, we sent a link of web-based questionnaires to a random sample of GPF fund members and also invited the staff of various government departments to participate in simulated experiment. The simulation required permission to enter government departments to allow respondents access to separate laptop computers to undertake the experiment.<sup>1</sup> In total, we were able to gain 176 GPF members (test sample) and 77 financially knowledgeable individuals (control sample).

Each respondent was first asked to complete a questionnaire about his/her demographic characteristics and then participate in a computerized simulation to allocate an initial set of asset class weights for their investment portfolio. All participants were informed that high risk assets can generate high returns as well as have high variance.

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<sup>1</sup> These were the Ministry of Education, Ministry of Agriculture, Ministry of Commerce, Ministry of Finance, and the State Court.

Once initial asset allocations were complete, participants were given the portfolio return and value at the end of the investment horizon before making a second investment allocation decision for the next period. The investment horizon for an individual depended on his or her actual age and equalled the remaining years till retirement with a maximum period of 20 years. One period in the simulation is equivalent to one year.

At the end of the simulation exercise, respondents will have made a series of investment asset allocation decisions on the basis of the same calendar date information. That is, respondents with  $n$  years left to retirement were provided with the same returns information. It is this data that provides the basis of our empirical analysis.

## **V. Empirical Results**

Table 1 presents the demographic characteristics of both the GPF sample and the financially knowledgeable sample (control). By construction, both samples are very different. GPF members range in age across the whole employment spectrum whereas our control sample is focussed in the under forties demographic. It is possible that the relative youth of our control sample may be a differentiating factor that confounds our sample results and we attempt to control for this in our later analysis.

Consistent with our age distributions, fund members are more likely to be married. There are more females in the GPF sample and there are a small proportion of members who have studied to PHD level. Necessarily, our control sample is constructed against a likelihood of doctoral level qualifications because of

the Masters level respondents. Finally, the salary of fund members is, on average lower, than the control sample and the difference in distributions is statistically significant at the 5% level.

As part of the initial questionnaire survey, we asked a number of questions relating to the financial sophistication and risk tolerance of test and control participants. The responses are summarised in Table 2. By definition, the financially knowledgeable control sample will be financially informed. In contrast, the majority of fund members have very little or no financial experience at all.

We assessed the risk preferences of participants in three ways. One, we asked them directly how tolerant they were of financial risk. Two, they were presented with 6 questions from the TIAA-CREF risk questionnaire. Sundali and Guerrero (2009) note that TIAA-CREF is one of the largest financial services organizations in the United States and the largest retirement system in the world. Their fund members are some 2 million staff members of more than 8,000 colleges, universities, and related institutions. The questions were given to discover fund members' attitude toward risk, their desire for high investment returns, their attitude toward investment gains and losses, and the investment choices with which they were most comfortable. According to TIAA-CREF, the summation of these scores ranges from 0 to 100. The scores can reflect fund members' preferable portfolios: a conservative portfolio (0 – 26), a moderately conservative portfolio (27-48), a moderately aggressive portfolio (49 – 70) and an aggressive portfolio (71 – 100).

We also followed CFA (2010) and posed a number of questions relating to non-financial characteristics and experiences to reflect the investment-making styles of participants CFA (2010) proposed a hypothetical questionnaire which combines Bailard et al. (1986)'s approach and Berens (2006)'s analytical psychology. This scheme is typically employed by investment firms to indicate the client's personality type. The first fifteen questions address decision making style and the last fifteen questions identify investor risk

tolerance. The higher (lower) scores for decision making style represent decision-making primarily based on feeling (thinking), whereas the higher scores of risk tolerance represent less tolerance to risk. The total raw scores are scattered across two dimensions of decision making style and risk tolerance. Finally, four investment personality types are classified: methodical (more risk averse and decisions based primarily on thinking), cautious (more risk averse and decision based primarily on feeling), individualist (less risk averse and decision based primarily on thinking), and spontaneous (less risk averse and decision based primarily on feeling).

Interestingly, from Table 2, whereas participants' self-perceptions of their risk tolerance are roughly the same across both test and control samples, when subjected to the TIAA-CREF and CFA methodologies, they are very different. The TIAA-CREF questions suggest that fund members are significantly more risk-averse than their financially knowledgeable equivalents. In addition, GPF members are significantly more methodical in their approach to investment decision-making.

### ***Initial Investment Allocations***

Table 3 presents the initial asset allocation decisions of sample subjects disaggregated by a variety of demographics. A number of insights are provided from the data. First, consistent with our second hypothesis, female fund members tend to have a more conservative portfolio with a greater weighting in cash than males. Further, Male fund members have a larger weighting in domestic stocks than females. The second component of hypothesis 2 is that single female fund members will be more averse to risk than married female members. Table 3 shows that this is not the case for the general sample (both male and female). Married fund members have a stronger reliance on bonds than single members. This may be because married individuals also have dependents, which would cause them to reduce the risk tolerance. With respect to the other demographic characteristics we've highlighted in Table 3, there appears to be little discernible pattern across age groups, salary levels or education.

Table 4 explores the initial investment decisions of fund members further by disaggregating the sample into five self-identified risk categories ranging from least to most risk tolerant. Confirming the initial results in Table 2, fund members do not exhibit the expected pattern of asset allocation that is consistent with their own perception of their risk tolerance. Individuals with a low tolerance of risk are expected to have high levels of cash and a large weighting of their investment in bonds whereas highly risk tolerant members would have a higher proportion of their investment in stocks. Unlike the control sample, we do not see this pattern at all for GPF members, suggesting that general workers are unable to identify their own risk tolerance.

### ***Age and Investment Decisions***

Jaggia and Thossar (2000) show that younger investors will have a more aggressive investment portfolio with a greater weighting in riskier securities. We investigate this proposition for both test and control samples by measuring the relative asset class portfolio weights as a function of the number of years to retirement (i.e. length on investment period). If Jaggia and Thossar (2000) are correct, we would expect to see a shift in asset allocations as retirement age comes closer. An analysis of this kind on our GPF sample is a strong test of the investment length hypothesis because the majority of workers in the sample have little or no financial experience and will be acting more from instinct.

Figure 1 presents the dynamic portfolio compositions of both GPF members with one to twenty years to retirement. The figure clearly shows that GPF members make investment decisions that are consistent with Jaggia and Thossar (2000). There is very strong evidence of a shift from domestic stocks to cash and domestic bonds as retirement nears. A home bias in investments is also apparent from Figure 1 where foreign bonds and stocks are underweighted. The only exception is when retirement is more than 8 years away where investment in foreign bonds is unnaturally high. This apparently anomalous result may be down to sampling error or it may be a reflection of uncertainty in the long-term Thai economy.

Alternatively, the pattern may be because younger fund members are more financially sophisticated than older members.

The data underlying Figure 1 are presented in Table 5. To succinctly illustrate the shift in asset allocation between fund members with 20 years left to retirement and those with 1 year left to retirement, mean portfolio weightings (and differences between year 20 and year 1 portfolios) are given. Young fund members are heavily invested in domestic stocks with an average weighting of 32 percent and this falls to an average of 11.75 percent when only one year is left till retirement. Similarly, but in an opposite direction, cash and domestic bonds significantly increase from 5 and 15 percent to 32.75 and 37.96 percent respectively. Foreign bonds and stocks also fall from 28 and 20 percent to only 12.41 and 5.12 percent respectively.

### ***Reaction to New Information***

Table 6 shows the response of fund members in their asset allocation decisions to the arrival of new information in the market. We proxy new information as the change in market direction over the immediate past (either one or two years). Fund members have three decisions to make when prices go up or down: They can buy, sell or do nothing. Our fourth hypothesis does not predict which decision is likely to be made conditional on past market returns but there are a number of potential reactions that have been proposed in previous research.

Brooks et al (2004) among others have shown that investors react asymmetrically to new information, with negative news eliciting a much stronger response than good news. However, other research (Taffler, 2009; Frazzini, 2006; Ikenberry and Ramnath, 2002) has found that many investors lack confidence in assessing to news events and, as a result, there is an under reaction to news in certain investor

groups. Finally, this same underconfidence may lead investors to overreact to new information and respond in an emotional way to any news.

The results in Table 6 show that in most cases, fund members are significantly more sensitive to bad news than good news. In our simulations, there does not appear to be very strong evidence that members underreact to new information with a much greater percentage of members either buy or selling the asset class after market movements. Surprisingly, financially knowledgeable people are much more likely to maintain a passive portfolio. For every asset class, more financially knowledgeable individuals choose to do nothing in response to market movements than buyers and sellers together. This is not the case with fund members who exhibit very strong evidence of asymmetrically reacting to bad news over good news.

### ***Performance of Fund Member Decisions***

In this section, we consider the performance of fund members in their investment decisions. The underlying rationale for allowing workers the choice to determine their own portfolio allocations and savings amount is that choice will increase their personal utility. The subtext is also that the investment flexibility will offset a lower expected investment performance that arises due to lack of financial expertise.

In Table 7, the mean return, standard deviation and Sharpe ratios of fund member portfolios, disaggregated by different demographic characteristics. We first consider the overall sample of fund members and compare their performance with the control sample of financially informed investors.

Both mean return is lower and risk is higher for the GPF sample suggesting that performance is, indeed, inferior for fund members. An examination of Sharpe ratios shows that there is no performance difference between male and female or between married and single fund members. Interestingly,

investment performance worsens as fund members age and near retirement and is not dependent on salary or educational attainment.

Hypothesis 5 also predicts that female fund members will have lower risk portfolios, and single female fund members will have lowest risk of all. Table 7 presents this information. Without considering marital status, there is no difference in the risk of male and female workers. However, when considering gender conditional on marital status we see quite clearly that single female workers have lowest risk portfolios with a standard deviation of .3552.

## **VI. Conclusions**

This paper finds that emerging market workers have very different investment functions from workers in developed markets. We examine a number of distinct aspects of investment decision-making for retirement by Thai Government Pension Fund Members. In a variety of ways, the fundamentally different social demographics of workers that are common in emerging markets emerge as central factors in the investment decision. There is a very clear misunderstanding of risk tolerance in fund members with their self-assessment markedly different from professional risk profiling judgments. However, in itself, this is not particularly problematic to regulators if fund members still make rational and value-maximizing investment decisions.

Consistent with their responsibilities in emerging markets, females have more conservative investment portfolios than males with a greater weighting of the pension portfolio in cash and domestic bonds. In particular, single females have an even more conservative portfolio. We find that younger workers focus their attention on stocks compared to older workers who have a higher weighting in low risk

securities. In all cases, a definite home bias exists in fund member investment portfolios, with the exception of young workers (less than 31 years old).

With respect to investment decisions over time, fund members shift their asset allocation from high risk securities to low risk securities as they age. In general, fund members exhibit an asymmetric reaction to negative changes in asset class performance, which is in contrast to our control sample of financially informed individuals who tend to hold a passive portfolio to market movements. Finally, and most important, GPF fund member investment performance is inferior, in terms of return and risk, with Sharpe ratios significantly lower than the control sample of financially knowledgeable individuals.

The literature on the savings and investment decisions of pension fund members has focused almost wholly on developed market workers. This paper has shown that extending the results of previous research to emerging market environments is not sensible. Because it is the first of its kind, our study is necessarily exploratory in nature. Future work should investigate further the determinants of investment decision-making in emerging markets, particularly in relation to gender and marital status in emerging societies. In addition, the role of children on investment decisions is also of importance given the crucial role they play in retirement for elderly relatives.

**Table 1 Demographic characteristic between fund members and financial knowledgeable people**

The table reports the distribution of fund member sample and comparative sample by their demographic characteristics including gender, status, age, income, and education background. P-value of Chi-square test is in the parenthesis.

	Fund members	%	Control Sample	%	Chi-square
I. Gender					
Female	109	61.93	36	46.75	5.0442
Male	67	38.07	41	53.25	(0.0247)
II. Status					
Single	100	57.47	56	72.73	8.1649
Married	74	42.53	20	25.97	(0.0169)
Widow/Divorce/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	(0.0004)
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	(<.0001)
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	(<.0001)
Master Degree	86	48.86	12	21.82	
PhD	21	11.93	0	0	

**Table 2 Investment profile between fund members and financial knowledgeable people**

The table reports the distribution of fund member sample and comparative sample by their investment profile including investment experience, self-identified risk tolerance, risk preference which is measured by six questions which follow TIAA-CREF, and decision making style which is reflected by their personality types in non-investment decision. P-value of Chi-square test is in the parenthesis.

	Fund members	%	Control Sample	%	Chi-square
I. Investment experience					
Not at all	63	38.89	2	2.6	41.169
Very little	37	22.84	21	27.27	(<.0001)
Some	53	32.72	41	53.25	
Much	6	3.7	12	15.58	
Very much	3	1.85	1	1.3	
II. Self-identified risk tolerance					
Not at all	3	2.07	0	0	7.0222
Very little	31	21.38	10	13.89	(0.1347)
Some	93	64.14	45	62.5	
Much	16	11.03	14	19.44	
Very much	2	1.38	3	4.17	
III. Risk preference measured by TIAA-CREF					
	10				
A conservative portfolio	3	57.87	14	18.18	49.1783
A moderately conservative portfolio	52	29.21	26	33.77	(<.0001)
A moderately aggressive portfolio	22	12.36	31	40.26	
An aggressive portfolio	1	0.56	6	7.79	
IV. Investment decision making style					
Methodical	53	29.78	6	7.79	22.8466
Cautious	60	33.71	45	58.44	(<.0001)
Individualist	20	11.24	3	3.9	
Spontaneous	45	25.28	23	29.87	

**Table 3 Initial asset allocation by demographics**

The table presents the asset allocation in the first investment period by sample characteristics. The respondents are offered specific historical returns of five asset classes and THB 1,000 to allocate into these five asset classes: cash, Thai stocks, Thai bonds, foreign bonds, and foreign bonds. Sample characteristics include gender, status, age, income and education. P-value of F-test is in the parenthesis.

	Fund members					Financial Knowledgeable people				
	Cash	Thai stocks	Thai bonds	Foreign stocks	Foreign bonds	Cash	Thai stocks	Thai bonds	Foreign stocks	Foreign bonds
<b>I. Gender</b>										
Female	30.55	12.04	36.42	6.40	14.59	17.36	19.58	25.69	16.94	20.42
Male	27.09	17.27	38.03	5.60	12.01	14.27	26.37	22.45	17.72	19.18
F value	15.11	13.28	12.29	28.58	5.98					
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(-0.0029)					
<b>II. Status</b>										
Single	30.10	14.89	34.03	6.28	14.70	13.22	22.88	23.94	17.26	22.70
Married	28.04	12.70	41.01	6.01	12.23	22.00	24.75	24.75	17.50	11.00
Widow/Divorce/Separate	n.a.	n.a.	n.a.	n.a.	n.a.	30.00	10.00	10.00	20.00	30.00
F value	9.46	6.33	9.9	18.58	6.06					
	(<.0001)	(0.0004)	(<.0001)	(<.0001)	(-0.0005)					
<b>III. Age</b>										
< 31 years	31.03	17.31	29.88	6.95	14.83	10.76	24.92	24.50	16.84	22.97
31 – 40 years	23.24	16.39	39.07	6.48	14.81	24.17	17.22	21.31	20.93	16.37
41 – 50 years	33.33	7.95	42.31	5.00	11.41	19.44	28.33	21.67	16.67	13.89
> 50 years	30.74	11.48	39.44	6.11	12.22	26.25	18.75	35.00	8.75	11.25
F value	8.21	6.4	8.1	14.26	4.07					
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(-0.0033)					
<b>IV. Income</b>										
< THB 20,000	30.34	14.30	34.06	6.53	14.77	n.a.	n.a.	n.a.	n.a.	n.a.
THB 20,000 - 40,000	26.70	12.95	40.45	6.25	13.66	13.82	19.71	27.06	13.53	25.88
THB 40,000 - 60,000	27.14	9.52	44.29	4.29	14.76	10.17	25.86	23.45	20.69	19.83
THB 60,000 - 80,000	41.67	28.33	25.00	5.00	0.00	17.50	15.00	18.75	27.50	21.25
> THB 80,000	16.67	26.67	36.67	10.00	10.00	22.60	23.75	23.35	14.69	15.61
F value	7.04	4.05	6.68	11.74	3.76					
	(<.0001)	(0.0015)	(<.0001)	(<.0001)	(-0.0027)					
<b>V. Education</b>										
Certificate/Diploma	15.00	5.00	35.00	0.00	45.00	n.a.	n.a.	n.a.	n.a.	n.a.
Bachelor Degree	32.01	9.61	39.90	5.57	12.91	13.67	23.61	23.68	17.28	21.77
Master Degree	29.24	15.29	35.12	5.81	14.53	22.94	21.76	25.00	17.65	12.65
PhD	21.67	23.81	35.95	9.52	9.05	n.a.	n.a.	n.a.	n.a.	n.a.
F value	8.44	7.87	6.51	15.06	6.08					
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(-0.0001)					
<b>VI. Gender &amp; Status</b>										
Single female	32.09	13.85	32.73	6.05	15.27	15.58	18.65	26.54	15.58	23.65
Married female	28.77	9.81	40.38	6.89	14.15	21.11	23.33	25.00	20.56	10.00
F value	6.89	5.88	6.18	11.33	3.17					
	(0.0014)	(0.0035)	(0.0027)	(<.0001)	(0.0450)					

**Table 4 Self-identified risk tolerance and initial asset allocation**

The table presents the asset allocation in the first investment period by risk tolerance which is identified by the respondents themselves. The respondents are offered specific historical returns of five asset classes and THB 1,000 to allocate into these five asset classes: cash, Thai stocks, Thai bonds, foreign stocks, and foreign bonds. There are five levels of risk tolerance from 1 (the lowest) to 5 (the highest). P-value of F-test is in the parenthesis.

	1 (Lowest)	2	3	4	5 (Highest)	F value	
Fund members							
Cash	61.67	28.87	30.70	23.44	12.50	8.35	(<.0001)
Thai stocks	10.00	10.32	15.51	23.75	2.50	5.62	(<.0001)
Thai bonds	28.33	42.26	33.74	31.56	45.00	5.42	(0.0001)
Foreign stocks	0.00	5.32	6.40	9.38	5.00	11.65	(<.0001)
Foreign bonds	0.00	13.23	13.66	11.88	35.00	2.60	(0.0261)
Control Sample							
Cash	0.00	26.50	14.33	13.94	5.00		
Thai stocks	0.00	17.50	21.89	29.03	50.00		
Thai bonds	0.00	31.50	25.41	19.78	6.67		
Foreign stocks	0.00	9.00	16.37	20.69	36.67		
Foreign bonds	0.00	15.50	21.99	16.56	1.67		

**Table 5 Mean percentage allocation to each asset class**

The table shows the average percentage of investment to each asset class in the first period and the final period, as well as over the investment horizon. Five asset classes: cash, Thai stocks, Thai bonds, foreign bonds, and foreign bonds.

	Cash	Thai stocks	Thai bonds	Foreign stocks	Foreign bonds
I. Initial investment					
Fund members	5.00	32.00	15.00	20.00	28.00
II. Final investment					
Fund members	32.75	11.75	37.96	5.12	12.41
III. Overall					
Fund members	27.11	17.13	31.84	9.67	14.25

**Table 6 Reaction to the market movements**

The table shows the percentage of respondents by the way they react, i.e. buy, sell, or do nothing, to market movement over the investment horizon. Five asset classes: cash, Thai stocks, Thai bonds, foreign bonds, and foreign bonds. Market direction is determined by the actual market returns in the last period and the last two periods. We classify the market direction into four groups: up in the last period, down in the last period, up and up in the last two periods; and down and down in the last two periods.

	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												
Fund 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%
Financial Knowledgeable people	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	108.93	(<.0001)		74.83	(<.0001)		64.12	(<.0001)		14.74	(0.0006)	
II. Thai bonds												
Fund 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%
Financial Knowledgeable people	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	132.88	(<.0001)		86.87	(<.0001)		29.40	(<.0001)		7.11	(0.0286)	
III. Foreign stocks												
Fund 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%
Financial Knowledgeable people	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	16.52	(0.0003)		63.79	(<.0001)		6.09	(0.0475)		16.52	(0.0003)	
IV. Foreign bonds												
Fund 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%
Financial Knowledgeable people	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	53.50	(<.0001)		51.37	(<.0001)		9.88	(0.0072)		17.68	(0.0001)	

**Table 7 Portfolio return and risk by respondent's characteristics**

The table reports the average of expected returns and standard deviation over the investment horizon by sample characteristics. Sample characteristics include gender, status, age, income and education.

	Fund members			Financial Knowledgeable people		
	E(R)%	Stdev	Sharpe ratio	E(R)%	Stdev	Sharpe ratio
Total sample	6.3452	0.9978		7.1932	0.9105	
<b>I. Gender</b>						
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 value	39.38		4.73			
	(<.0001)		(0.0096)			
<b>II. Status</b>						
Single	6.3134	0.3717	0.0542	7.2751	0.5548	0.0536
Married	6.1828	0.4575	0.0412	6.8445	0.6543	0.0389
Widow/Divorce/Separate	n.a.	n.a.	n.a.	6.6980	0.3413	0.0703
F value	25.44		4.25			
	(<.0001)		(0.0060)			
<b>III. Age</b>						
< 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 value	27.18		2.88			
	(<.0001)		(0.0233)			
<b>IV. Income</b>						
< THB 20,000	6.3578	0.3628	0.0567	n.a.	n.a.	n.a.
THB 20,000 - 40,000	6.2250	0.4655	0.0414	7.2624	0.5700	0.0520
THB 40,000 - 60,000	5.9502	0.4091	0.0403	7.2954	0.4481	0.0668
THB 60,000 - 80,000	6.1051	0.6370	0.0283	7.4591	0.9484	0.0333
> THB 80,000	6.8790	0.3966	0.0650	6.8938	0.6672	0.0389
F value	15.19		4.05			
	(<.0001)		(0.0015)			
<b>V. Education</b>						
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 value	21.00		3.40			
	(<.0001)		(0.0100)			
<b>VI. Gender &amp; Status</b>						
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 value	20.46		3.47			
	(<.0001)		(0.0089)			

**Figure 1 Asset allocation over the remaining years (time horizon)**

The figure exhibits the average percentage of investment to each asset class over the investment horizon. The respondents are asked to decide the allocation of the given fund to five asset classes in the simulation periods, which are the number of years prior to retirement. One simulation period equals one year. The maximum simulation periods are 20 years. Five asset classes are cash, Thai stocks, Thai bonds, foreign bonds, and foreign stocks.

