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Goals-Based Portfolio Strategy (GPS) Investing*
SMARTER Investing to help investors achieve their financial goals

GOALS-BASED PORTFOLIO STRATEGY (GPS) INVESTING

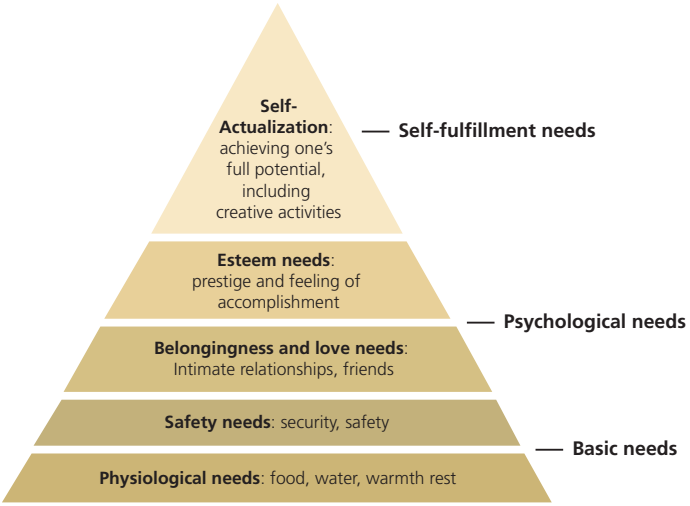
The Great Recession of 2008 was a defining moment seared in the consciousness of many investors. Up to that point, most investors had long forgotten that markets will correct and that sometimes they will do so quite savagely.

Pension funds, the so-called smart money, have largely avoided the pitfalls of reacting to short-term market movements (up or down) by taking a liability driven approach to investing. In other words, pension funds know, actuarially, how much they need to pay to pensioners each year for the next 20 – 30 years. The assets of the pension fund have to be invested in such a way as to (i) provide the cash flow necessary to pay the pensioners each year (with minimal encroachment on capital) and (ii) grow the capital base over the medium to long term so the fund's ability to meet its future obligations are not impaired.

GPS Investing is the pension fund liability driven model applied to individuals. And importantly for investors recovering from the Great Recession, it incorporates the findings of behavioural finance, that humans have biases and heuristics (i.e. mental shortcuts) that cannot be ignored without detrimental impact to investor returns and satisfaction.

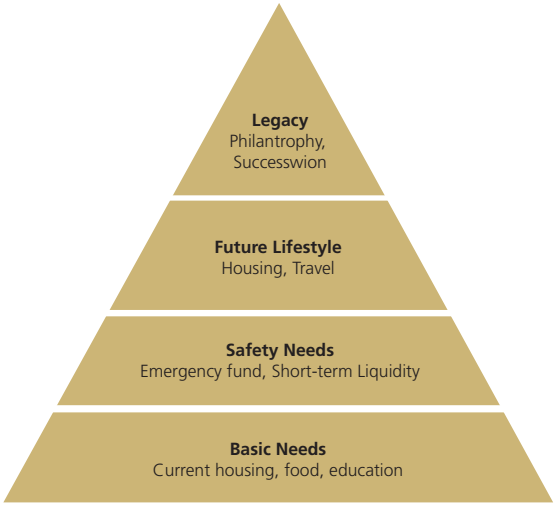
MASLOW WAS RIGHT

In 1953, Abraham Maslow put forward his theory on humans' Hierarchy of Needs. This hierarchy, illustrated below on the left, says that humans are wired to look after their basic needs first (food, shelter, security). Only once these basic needs are met do humans have the time, and the luxury, to worry about higher order needs like self-esteem and self-actualization. Conceptually, this makes sense. Refugees in war-torn countries are less likely to worry about self-actualization than about food, water, and basic safety. Higher income earners in the Western world are more likely to be concerned about self-esteem and self-actualization, because their lower order needs are met.



MASLOW'S HIERARCHY OF NEEDS

Maslow's Hierachy of Need: http://www.allthingsworkplace.com/2010/02/talent-the-misunderstanding-maslow-factor.html



THE INVESTOR'S HIERARCHY OF NEEDS

As Illustrated by Sam Sivarajan

For Illustration Purposes only

* Goals-Based Portfolio Strategy (GPS) investing is Manulife Private Wealth's approach to goals-based investing

Maslow's theory can be applied to investing as well as illustrated above right. For all individuals, the purpose of investing is to provide for their needs – current and future. The first lower order needs are basic needs – daily living expenses. Unless these can be comfortably funded from current income, individuals do not have the wherewithal, or the luxury, of thinking about investing.

With basic needs looked after, individuals can then start thinking about safety needs – like an emergency fund. When safety needs are met, they can then think about yet higher order needs – like funding retirement lifestyle, or leaving a legacy. But as long as individuals do not have a high degree of certainty about their ability to fund basic needs or safety needs, they will be half-hearted investors with respect to higher order needs.

This was played out repeatedly in the post-2008 era. Many individuals checked out of the market because their portfolios were too exposed to the market. Even when the bulk of the portfolio was not needed for another five or more years but a small portion of the portfolio was needed for the next 1 -2 years, this was perceived as a threat to the individuals' certainty about their ability to fund their basic needs. As a result, the individuals' panicked and exited completely.

WHY GOALS-BASED PORTFOLIO STRATEGY (GPS) INVESTING?

This is where GPS Investing can help. Each goal – e.g. children's education, retirement lifestyle, saving for a vacation property – differs in material respects such as time horizon, ability to take risk, goal priority (is it a "must-have" or a "nice-to-have"). Therefore, it makes little sense to ask individuals about their goals and then recommend one balanced portfolio to cater to all these different goals. Yet that is how traditional investment advice has operated so far. And that is one reason why so many individuals panicked post-2008 and did exactly the wrong thing at the wrong time – cash out at the bottom of the market.

Why? Everyone knows Warren Buffett's sage advice - "Be fearful when others are greedy. And greedy when others are fearful."[1] Or more simply yet, "buy low" and "sell high". While everyone knows this, these adages assume that the investor is Mr. Spock (the coldly logical alien of Star Trek fame) and not human. Investment decisions are choices under uncertainty and that means that individuals have to deal with and evaluate conflicts and trade-offs.

[1] http://www.forbes.com/sites/greatspeculations/2014/02/04/where-to-get-greedy-now-that-others-are-fearful/#78589f6370f0

Lola Lopes conceptualized this conflict in her SP/A Theory. Lopes suggested that individuals have Security / Potential (SP) and Aspirational (A) investment goals. In her theory, the way individuals approach risky choices is determined by dispositional factors (i.e. underlying personality traits) as well as situational factors (i.e. the current environment and financial need). So an individual may be dispositionally risk-averse but situationally risk-seeking (Lopes, 1987)[2]. As explained in Sivarajan[3], Lopes' first factor is a dispositional variable regulating the motivation for security (i.e. the investor's desire to avoid levels of wealth below a certain threshold) versus potential (i.e. the individual's desire to maximize their wealth). The second factor is a situational variable that reflects an individual's current level of aspiration (i.e. the investor's desire to reach a specific goal, e.g. $1 M of wealth), which is a function of both immediate needs of the individual and their current opportunity set. In Lopes' theory of choice under uncertainty, these two factors move together – sometimes in concert and sometimes in conflict – creating a more robust theory of risk-taking.

[2] Lopes, 1987
[3] Sivarajan, S. 2015. p. 10

INVESTOR BIASES

Humans are also prone to biases and tend to use heuristics (i.e. mental shortcuts) to process large volumes of information. Daniel Kahneman won the Nobel Prize for his work in behavioural finance, the study of the impact of psychological, emotional and cognitive factors on the financial decisions of individuals (Tversky had passed away before the awarding of the Nobel Prize[4]). Kahneman and Tversky's research identified several anomalies in investor behavior that were inconsistent with traditional portfolio theory.

[4] Kahneman and Tversky, 1979

For example, Kahneman and Tversky conducted experiments where individuals were asked to choose between gambles. In one such experiment, subjects had the choice of either (i) gaining $3000 for certain or (ii) an 80% chance of gaining $4000 or 20% chance of ($)0[5]. Kahneman and Tversky found that most individuals preferred the certain outcome to the uncertain outcome. However, when the gamble was changed to a loss situation (i.e. (i) losing $3000 for certain or (ii) an 80% chance of losing $4000 or 20% chance of $0), then most individuals reversed their preferences so that they chose the gamble instead of the sure outcome. Kahneman and Tversky labeled this **loss aversion** and found that individuals weigh losses in wealth twice as heavily as gains in wealth.

[5] Note: Kahneman and Tversky's original work had participants in Israeli universities and the currency used was the Israeli Shekel. For ease of reference, $ is used here.

Anchoring is another bias to which humans are prone. Here a certain number serves as the anchor or benchmark against which things are measured even when that anchor has no further relevance. Think, for example, about the purchase price of XYZ stock at $20 per share. $20 becomes the anchor, meaning that most investors are reluctant to sell at $15 a share even if that might be the best decision based on current information (not the information available when the original purchase decision was made).

Hindsight bias (commonly known as the "I knew it all along" phenomena) is the tendency to view an event as predictable – after it has happened – even though there was no objective basis for predicting the event beforehand. A perfect example was the Great Recession of 2008 – while factors were there beforehand that indicated a correction was likely there was little objective evidence that indicated the sort of massive pullback that occurred across virtually all asset classes. This didn't stop many professional and amateur investors from engaging in hindsight bias.

Heuristics, or mental shortcuts, also play a role. The **availability heuristic**, for example, states that humans evaluate the likelihood or desirability of events based on how frequently they see or hear about it. So, for instance, people often were looking for a way to invest in Bitcoin in 2014 simply because it was always in the news.

The **representative heuristic** is another common one at play. For example, you have met Scott, a very shy and introverted man. What is the likelihood that he is a bank teller or an exotic dancer? In answering such questions, individuals typically evaluate the probabilities by the degree to which the first category (shy and introverted) is representative of the second category (shyness may be more representative of bank tellers than of exotic dancers). But the danger with this heuristic is the tendency to neglect base rates (for example, there are likely far more bank tellers than exotic dancers in a certain sample).

As Kahneman and Tversky note, "These heuristics are highly economical and usually effective, but they lead to systematic and predictable errors. A better understanding of these heuristics and of the biases to which they lead could improve judgments and decisions in situations of uncertainty" (Tversky and Kahneman, 1974, p. 1131).

SMARTER GOALS MEANS SMARTER INVESTING

In the corporate setting, individuals are regularly asked to set business goals. For those goals to be effective, individuals are called on to make sure that the goals are SMART(ER). SMARTER is an acronym for the key criteria in setting goals that are effective:

- **S**pecific – target a specific area for improvement or specific result to be achieved
- **M**easurable – quantify or an ability to identify progress towards the desired end result
- **A**ccountable – specify who will do it or who is responsible for which element
- **R**ealistic – state what results can be achieved given available resources
- **T**ime-related – specify by when the result can be achieved
- **E**valuated – regular appraisal of a goal to assess the extent to which it has been achieved
- **R**eviewed – reflection and adjustment of your approach or behaviour to reach a goal.

SMARTER goals are how you use your GPS system in your car. It is also a good way to approach your investment objectives.

	Car Trip	Investment Objectives
Specific	Drive to New York City	Save for Retirement
Measurable	600 km distance	$2M to be accumulated for retirement
Accountable	Driver and / or second driver	Investor and / or advisor
Realistic	Drivable distance given the vehicle, passengers, and time frame	Achievable target $ amount given initial portfolio, additional savings, and time frame
Time related	When does driver need to be in New York City? For meeting, event, etc.	When does the investor want to retire?
Evaluated	Progress is regularly evaluated to determine whether the driver needs to speed up / slow down, can afford a break, etc.	Progress is regularly evaluated to determine whether the investor needs to save more / can afford to spend more, take more risk, etc.
Reviewed	The road and environment is regularly evaluated (weather, construction, detours, etc.) and corrections made to the journey plan as necessary while keeping the end goal (New York City) in sight.	The market conditions and economic environment are regularly evaluated and corrections made to the investment strategy as necessary while keeping the end goal (Retirement) in sight.

For Illustration Purposes only

GOALS-BASED PORTFOLIO STRATEGY (GPS) INVESTING IN PRACTICE

One of the key biases identified in behavioural finance is the concept of mental accounting. In their behavioural life-cycle hypothesis[6], Shefrin and Thaler (1988) suggest that individuals mentally "bucket" assets as belonging to one of three buckets: current income, current wealth or future income. Individuals are viewed as treating these buckets as largely non-fungible with different marginal propensities to consume from each account. "(s)ome mental accounts, those considered 'wealth', are less tempting than those which are considered 'income'" (Shefrin and Thaler, 1988, p. 610).

[6]Sivarajan, S. 2015

Incorporating the Security / Potential concept from Lopes' SP/A Theory together with the mental accounting framework from Shefrin and Thaler (1988), Shefrin and Statman (2000) propose an alternative to traditional portfolio theory, namely Behavioural Portfolio Theory. They suggest that this approach results in portfolios that may accord better with the way investors think and behave.

Both Brunel (2011) and Chhabra (2008) have embraced this approach, labeling it goals-based investing. Intuitively, managing individual portfolios with separate risk preferences for each goal makes sense. Indeed, it accords with Lopes' finding that individual's risk preferences vary across domains (i.e. business investments versus personal investments). Extending that logic to different goals of a particular individual does not require a huge leap of faith (Sivarajan, 2015, p. 24).

DYNAMIC GOALS-BASED PORTFOLIO STRATEGY INVESTING IN PRACTICE

Brad and Linda Anderson are both 50 years old and plan to retire in 15 years. They are comfortable financially, but their investments are scattered across four institutions and their strategy is not optimized to meet their goals. Brad is currently a Partner at an international management consultant firm and Linda is a Senior Manager at a major financial institution. They don't have any dependents.

The Andersons' investible assets total $1,287,000, spread across TFSAs, RRSPs, spousal RRSPs, and non-registered (NR) accounts. Their "Before" portfolio also shows their allocation in dollar and percentage terms across all five institutions, as well as their overall asset mix.

Brian & Linda Anderson (Before GPS Investing)

	Exp. Return	Institution 1	Institution 2	Institution 3	Institution 4	Institution 5
Cash and Money Market	1.0%	10%				
Canadian Fixed Income	2.0%	20%	30%	10%	30%	35%
Global Fixed Income	3.5%	10%	30%	10%	30%	20%
Canadian Equities	6.5%	30%	40%	35%	20%	45%
US Equities	5.8%	30%		30%	20%	
International Equities	7.5%			15%		
Emerging Markets Equities	9.5%					
Total		**100%**	**100%**	**100%**	**100%**	**100%**

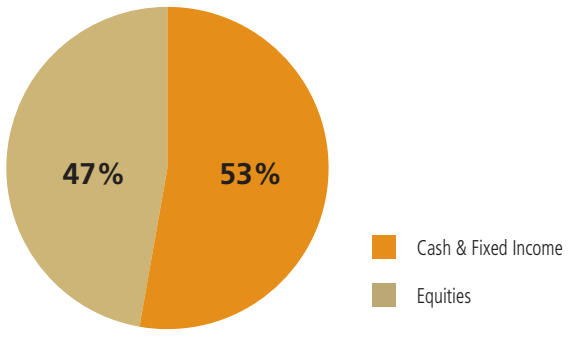
Asset Mix - By Account

	Brian			Linda			
	TFSA	**RRSP**	**NR**	**TFSA**	**RRSP**	**SRSP**	**NR**
Institution 1		$135,000			$80,000	$50,000	
Institution 2	$45,000		$375,000	$45,000			
Institution 3		$30,000	$22,000				
Institution 4		$25,000			$40,000		
Institution 5			$40,000				$400,000

Asset Mix - By Institution

	Institution 1	Institution 2	Institution 3	Institution 4	Institution 5	Overall	
Cash and Money Market	$26,500	$0	$0	$0	$0	$26,500	2.06%
Canadian Fixed Income	$53,000	$139,500	$5,200	$19,500	$154,000	$371,200	28.84%
Global Fixed Income	$26,500	$139,500	$5,200	$19,500	$88,000	$278,700	21.66%
Canadian Equities	$79,500	$186,000	$18,200	$13,000	$198,000	$494,700	38.44%
US Equities	$79,500	$0	$15,600	$13,000	$0	$108,100	8.40%
International Equities	$0	$0	$7,800	$0	$0	$7,800	0.61%
Emerging Markets Equities	$0	$0	$0	$0	$0	$0	0.00%

Before GBI: Anderson Family Consolidated Asset Mix



Note: For Illustration Purposes Only

Brian and Linda have three main goals to fund:

1. Retirement (long term): The Andersons would like to accumulate $2,200,000 in fifteen years while dedicating $1,050,000 of their assets to this goal. Brian and Linda feel they can contribute at least $7,000 a year over the next fifteen years.
2. Vacation property purchase (short term): The Andersons would like to dedicate $165,000 to the goal with the objective of preserving capital to fund a cottage purchase in less than 3 years.
3. Legacy fund for future generations (long term): Brian and Linda would like to leave something behind for their adult children upon their death and want to invest $72,000 with a long-term objective of maximizing returns.

Taking a GPS investing approach, the accounts and goals can be structured as follows:

Brian & Linda Anderson (GPS Investing)

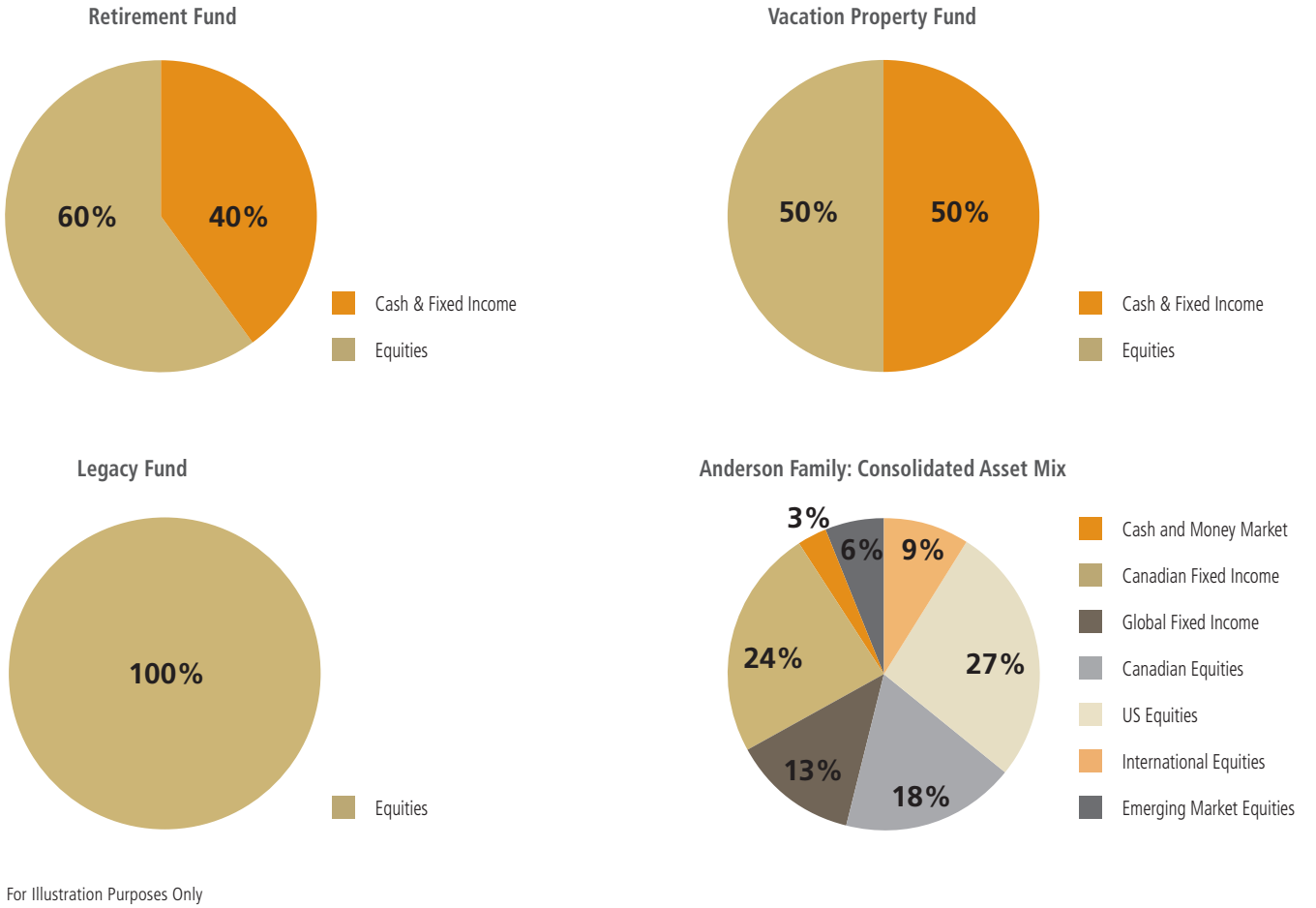
	Exp. Return	Retirement	Vacation Property	Legacy
Cash and Money Market	1.0%	2%	5%	2%
Canadian Fixed Income	2.0%	25%	25%	0%
Global Fixed Income	3.5%	13%	20%	0%
Canadian Equities	6.5%	17%	16%	37%
US Equities	5.8%	29%	15%	31%
International Equities	7.5%	8%	14%	15%
Emerging Markets Equities	9.5%	6%	5%	15%
Total		**100%**	**100%**	**100%**

	Brian			Linda			
	TFSA	**RRSP**	**NR**	**TFSA**	**RRSP**	**SRSP**	**NR**
Retirement	$45,000	$190,000	$300,000	$45,000	$120,000	$50,000	$300,000
Vacation Property			$115,000				$50,000
Legacy			$22,000				$50,000

	Retirement	Vacation Property	Legacy	Overall
Cash and Money Market	$21,000	$8,250	$1,440	2%
Canadian Fixed Income	$262,500	$41,250	$0	24%
Global Fixed Income	$136,500	$33,000	$0	13%
Canadian Equities	$178,500	$26,400	$26,640	18%
US Equities	$304,500	$24,750	$22,320	27%
International Equities	$84,000	$23,100	$10,800	9%
Emerging Markets Equities	$63,000	$8,250	$10,800	6%
Expected Return on Portfolio	4.9%	**4.7%**	6.8%	5.0%

	Retirement	Vacation Property	Legacy
Cash & Fixed Income	40%	50%	0%
Equities	60%	50%	100%

Note: For Illustration Purposes Only



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It is important to note that in the example above, the expected returns are forecasted returns using capital market and macro-economic estimates. The reality is that actual returns are deemed to be normally distributed around that expected return. So, if the expected return is 3.9%, there is a 68% likelihood (1 standard deviation on either side of the expected return) that the actual return is between -2.8% and 10.6%; there is a 95% likelihood (2 standard deviations around the expected return) that the actual return is between -9.5% and 17.3%. Thus, the nature of expected returns is that it is a target; as such calibration will be required annually as actual returns are realized.

The investing strategy described above takes a straightforward linear approach. It assumes that Brian and Linda are comfortable with having the same risk (or volatility of returns) in their portfolio over the entire period to goal date. While that may be fine for Brian and Linda, other "flight" paths are also possible as described below.

DYNAMIC GOALS-BASED PORTFOLIO STRATEGY INVESTING – DE-RISKING THE PORTFOLIO

For the example above, we have an asset allocation designed for Brian and Linda's retirement goal. In summary, they currently have $1,050,000 and need a sum of $2,200,000 in fifteen years' time. The required rate of return to achieve this retirement goal is 4.6% p.a. Based on current capital markets' estimates of risk, return and correlation, the best asset allocation to achieve this target return is 60% equity, 40% fixed income. It is important to note that the target return of 4.6% p.a. is a return based on investing directly in the various asset classes (i.e. the benchmarks themselves – which it is not possible to invest in). Portfolio mandates for each asset class (e.g. a Canadian equity mandate, a US equity mandate, etc.) need to be selected. These mandates, if properly chosen, are expected to outperform their asset class benchmark over a market cycle.

Brian and Linda, in this scenario, are comfortable earning their target rate of return (and incurring the associated risk) for the entire 15 year time period. What if, however, Brian and Linda are of the view that they can afford to take more risk earlier in the investing period when they are still earning an income and have more time to recover from a bad year in the markets? That they would rather front-end the risk? This is a relatively easy tweak to make to change the trajectory.

At this point, it should be noted that a phased strategy may not be practical for all clients or all situations. Taking greater risk at the beginning or the end of the investing period may not be feasible for many clients depending on their personal circumstances. As discussed earlier, the fact that actual returns will, by definition, differ from expected returns necessitates annual discussions with an investor to re-calibrate their portfolios. That is, in and of itself, one of the greatest advantages of GPS investing. Think of it as similar to a GPS that has the final destination plugged in but makes mid-course corrections that are suggested as the journey progresses.

That being said, at times it may make sense to take a phased approach to GPS Investing. Let us take the same facts as before but instead of looking at a linear strategy, the investment period is divided into three phases – 1, 2, and 3 – each of which is 1/3 of the time horizon or 5 years.

De-risking a Goals-Based Portfolio Strategy Investing Portfolio through a Phased Approach

	Total Period	Phase 1	Phase 2	Phase 3
Time Horizon	15	5	5	5
Starting amount	1,050,000	1,050,000	1,475,000	1,850,000
Ending amount	2,200,000	1,475,000	1,850,000	2,200,000
% of End Goal Reached	100%	67%	84%	100%
Additional contributions for Period	7,000	15,000	5,000	0
Required Return for period	4.6%	5.8%	4.3%	3.5%

For illustration purposes only

Note: For simplicity purposes, the time value of money is not considered in determining the additional contributions: thus $7000 annually for the Total Period is considered equivalent to the $15,000 annually in Phase 1 and $5,000 annually in Phase 2

For the total period, Brian and Linda are assumed to contribute $7,000 a year for the full 15 years and, as a result, will need to achieve an annual net return of 4.6% to achieve their retirement goal. Obviously, markets don't move in a linear fashion. Some years will generate returns greater than 4.6%, others less than 4.6% - however, over a market cycle (5 – 7 years typically) if the portfolio averages 4.6% per annum, Brian and Linda should be on track.

However, if Brian and Linda want to have lower risk in their portfolio as they get closer to retirement, then a phased / graduated approach may make sense. In this case, the 15-year time period is broken down into 3 phases of 5 years each. Brian and Linda started at 47% of their retirement goal (i.e. $1,050,000) and have determined that they want to reach 67% of their goal (or $1,475,000) in Phase 1. They also feel able to contribute more in Phase 1 ($15,000) to have the money "work" longer for them. As a result, their required rate of return for Phase 1 is 5.8%. This will require a more aggressive asset allocation than the 4.6% return for the Total Period portfolio. Brian and Linda need to be comfortable taking that extra risk, but they also have time on their side (i.e. between 10 and 15 years) if they choose to be more aggressive in Phase 1.

During Phase 1, Brian and Linda's retirement portfolio should be reviewed every year. Leaving everything as is may be tempting – especially if the portfolio returns are above expectation. However, there is a risk. Stocks or sectors that have periods of above average performance tend to have periods of below average performance. This is known as mean reversion. As financial economist Robert Shiller noted, " … there is a sort of regression to the mean (or to longer-run past values) for stock prices: what goes up a lot tends to come back down, and what goes down a lot tends to come back up" (Shiller, 2015, p. 202). Successful contrarian investor David Dreman agrees, "(l)ong-term returns of stocks (the "base rate") are far more likely to be established again. If returns are particularly high or low, they are likely to be abnormal"(Dreman, 2008, p. 230).

Thus, there is significant risk in relying on past returns. Even using the base rate, as Dreman refers to, is not without inherent danger. The base rate for stock returns in the 1990s is different than the expected base rate over the next 10 years. As a result, capital market return assumptions need to be regularly revisited and incorporated into the asset allocation equation if the portfolio is to be adequately de-risked. As economist Andrew Ang points out "… long-run investors should actively divest from asset classes, or even stocks, that have done well and they should increase weights in asset classes or stocks that have low prices". This rebalancing process, Ang suggests, "buys assets that have declined in price, which have high future expected returns. Conversely, rebalancing sells assets that have risen in price, which have low future expected returns" (Ang, 2012, p. 14 – 15).

At least once a year, the capital market assumptions should be updated to reflect current economic forecasts and new asset allocations and expected returns for each of those allocations identified. Brian and Linda's investment counselor, in consultation with Brian and Linda, should then rebalance their retirement portfolio to the new asset allocation that will generate the target return of 5.8% for Phase 1. Depending on market conditions, this may require taking less equity risk or more equity risk, and the final decision will be made by Brian and Linda together with their investment counselor.

At the start of Year 6, Brian and Linda are entering Phase 2 of their retirement goal. At the start of Phase 2, Brian and Linda should have approximately $1,475,000 accumulated in their retirement portfolio. The exact amount will depend on market conditions and portfolio returns (and whether Brian and Linda were able to make their planned contributions, didn't make any withdrawals, actual tax bills, etc.) and will be factored into the Phase 2 strategy by the investment counselor. Assuming that Brian and Linda have $1,475,000 and still want to achieve 84% of their target retirement goal by the end of Phase 2, they will need a required rate of return of 4.3% per annum for Phase 2. This also assumes that Brian and Linda reduce their annual contributions to $5,000 a year. During Phase 2, the same annual rebalancing takes place to reflect new capital market assumptions and new recommended asset allocations but this time calibrated around a target net return of 4.3%.

At the beginning of Year 11, Brian and Linda are entering Phase 3 of their retirement goal and they should have approximately $1,850,000 accumulated in their retirement portfolio. Assuming that Brian and Linda have $1,850,000, they will need a required rate of return of 3.5% per annum for Phase 3. This also assumes that Brian and Linda stop contributing annually in Phase 3. During this phase, the same annual rebalancing takes place to reflect new capital market assumptions and new recommended asset allocations, but this time calibrated around a target net return of 3.5%.

Time remaining to goal date is a key consideration. If, for example, it is the beginning of Phase 2 and Brian and Linda require a revised target rate of return that necessitates significantly increased equity market risk, then it might be advisable for Brian and Linda to consider options other than taking on the increased equity risk – for example extending the goal date, injecting additional funds to the portfolio, etc. Ang (2012, p. 24) agrees:

"(t)he interaction between the investor's horizon and the time-varying asset return properties is crucial. This makes sense: an asset that has a low return today but will mean-revert gradually back over many years to a high level is unattractive to someone with a short horizon. Only a long-horizon investor can afford the luxury to wait. Similarly, some assets or strategies can be very noisy in the short run, but over the long run volatility mean-reverts, and the risk premiums of these assets manifest reliably only over long periods. Such strategies are also unattractive for short-run investors, but investors with long horizons can afford to invest in them."

However, if the original GPS Investment strategy at Time 0 reflected a long enough time horizon (i.e. two or more market cycles, so mean reversion can properly play out), used reasonable forward-looking capital market estimates and the goal was realistic, the probability of suddenly requiring significantly greater equity market risk late in the investing period is relatively low. This is the benefit of regularly revised forward-looking capital market estimates (instead of relying on historical long run base rates). In addition, looking at the time horizon in phases and setting "milestones" for each phase allows for market cycles to play themselves out and for investors to remain relatively insulated from the negative impact of mean reversion on their portfolio. Choosing portfolio mandates that have a track record of beating their benchmark and protecting the downside in down markets will also help in this process.

Selling out of winners crystallizes capital gains and creates tax liabilities – which explains why some investors are reluctant to rebalance. It is also behaviourally hard to put into practice. Two common biases are the **disposition effect** – the reluctance to realize losses by selling losing stocks – and the **endowment effect** - the reluctance to realize gains by selling winning stocks on the assumption that the prices will continue to climb. These behavioural biases are not unique to individual investors; sophisticated institutional investors are equally prone. Ang distinguishes the diverging performance of CalPERS (the California Public Employees' Retirement System) and the Norwegian Sovereign Wealth Fund (the NSWF) during the Great Recession as one partly attributable to rebalancing. CalPERS did not rebalance, the NSWF did. In the period 2008 -2009, CalPERS lost $70 billion[7]. Because CalPERS acted pro-cyclically instead of counter-cyclically (which rebalancing implicitly does), it sold equities when equity prices were low (and expected future returns were high); when markets rebounded, CalPERS wasn't able to benefit from rising prices.

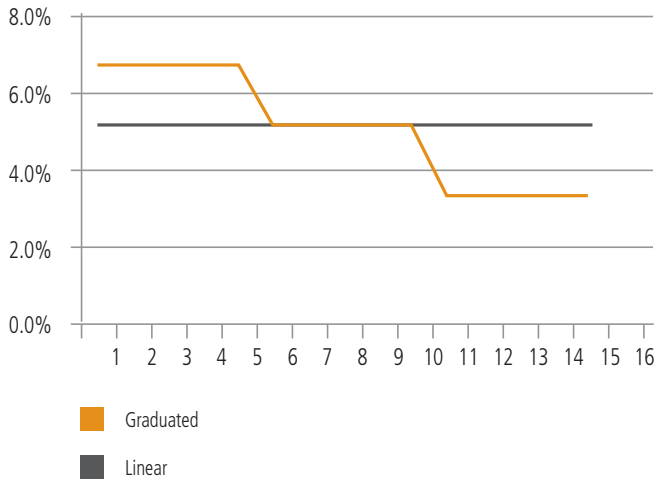
Ang credits the fact that the NSWF had a documented rebalancing rule for allowing it to avoid the emotions and the second-guessing that are common in periods of market volatility. In an interview with the Wall Street Journal, Ang was quoted[8]:

"Rebalancing is the simplest, and yet one of the most powerful, ways of buying low and selling high," Mr. Ang says. "The beauty of a good rebalancing policy is that it is automatic. Buying when prices are going through the floor is very difficult. Selling when prices continue to rise through the stratosphere is equally hard. Rebalancing forces you to do both."

[7] Robinson, E., and M. Marois, Cleaning Up CalPERS, Bloomberg, Sep 9, 2010.
[8] Brett Arends, Wall Street Journal, "How to Rebalance Your Portfolio" June 27, 2014, http://www.wsj.com/articles/how-to-rebalance-your-portfolio-1403895865

The GPS Investing approach described here allows not only for annual rebalancing, it also updates capital market assumptions at least annually, which is critical in a period of substantial economic and political volatility. As well, by managing milestones over phases, a de-risked trajectory is put in place that is appealing to most risk-averse investors. It is also worth pointing out, certainly for Brian and Linda's retirement goal, that either trajectory is relatively conservative. In other words, there is no requirement that Brian and Linda accumulate the full $2,200,000 by age 65 because it would be inadvisable for them to fully cash out at age 65. Given expected longevity (approximately age 83 for Brian and 85 for Linda) and low interest rates for the foreseeable future, Brian and Linda will need equity market exposure well into their 70s. As such, difficult market conditions that prevent Brian and Linda from achieving $2.2M on retirement date is not debilitating. An appropriate decumulation strategy needs to be put in place that will allow for retirement funding. This decumulation strategy will likely consist of 3 phases as well: Phase 1 (still accumulating but also actively spending on travel, etc.) Phase 2 (minimal accumulation but actively spending locally), and Phase 3 (no accumulation, perhaps incurring additional medical expenses).

GPS Investing – Alternative Trajectories



THE IMPORTANCE OF A GOOD PROCESS

Sivarajan (2015, p. 15) notes that investors are typically regret averse. Regret affects people's choices in two distinct ways: (i) post-decisional regret – regret leading to individuals attempting to undo a prior decision to mitigate **experienced** regret and (ii) pre-decisional regret – an individual chooses so as to avoid or minimize the regret they believe that may result from a particular decision (**anticipated** regret). Anticipated regret has led many to the view that this leads to risk aversion, "Concern about regret that may follow a bad decision promotes extreme risk-aversion" (Kardes, 1994, p. 448 as cited in Zeelenberg et al., 1996, p. 149).

But, as pointed out in Sivarajan (2015, p. 16), regret can be divided into two forms: (i) decision outcome regret - regret associated with an outcome that is poor compared to the alternatives; and (ii) decision process (or self-blame) regret - regret associated with the justifiability of the process used to arrive at the decision. Outcomes are rarely in one's control while process usually is. For example, who wins a particular hockey game on any given day is an outcome that can rarely be accurately predicted. On any given day, even a bad team can beat a good team. However, the training, the rigour, and the players (i.e. the process) of a good team means that more often than not the good team will win. A lucky outcome cannot mask a bad process; and an unlucky outcome does not indict a good process. Research suggests that focusing individuals on minimizing decision process regret rather than decision outcome regret may help them make better decisions in repetitive decision scenarios.

This view is supported by research that found that both experienced regret and anticipated regret (Reb and Connolly, 2005 as cited in Reb, 2008, p. 171) of a bad outcome are "reduced by a high-quality decision process" (Reb, 2008, p. 179). In his study, Reb (2008) tested participants in decision-making under either a control or a regret condition; in the latter condition, anticipated regret was increased by making salient the potential to experience regret as a result of the decision. His conclusions support his original hypothesis that increased regret salience leads to more careful decision processing (Reb, 2008, p. 179).

In a traditional approach to investing, a target asset allocation is chosen and the portfolio is rebalanced to the target asset allocation if necessary. In a static GPS Investing strategy, a target rate of return is chosen to achieve a desired goal and rebalancing occurs to an asset allocation that is expected to generate that target return. This rebalancing is done annually and reflects updated capital market assumptions. In a dynamic GPS Investing strategy, the goal is broken down into phases and milestones and rebalancing occurs in two ways: The first is an annual rebalancing to an asset allocation that is expected to generate the milestone's target return. The second rebalancing occurs at the end of each milestone and the beginning of the next milestone to a more conservative asset allocation so as to de-risk the portfolio as the investor gets closer to goal date.

The GPS Investing approach, as outlined here, allows investors to offset behavioural biases. As noted by Sivarajan (2012, p. 78), "(g)oals-based investing incorporates an understanding of human behaviour". It also allows the investor to proactively adjust to prevailing market conditions and have confidence in the decision-making process. Taken together, this approach is one that allows human investors, with emotions and biases, to confidently and methodically invest in order to reach their financial goals.

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