ANU Student Managed Fund

Asset allocation recommendation: Semester 1, 2024

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Contents

Glossary

AA – Asset Allocation
AAE – Active Australian Equities
AC – Australian Cash
AE – Australian Equities
AFI – Australian Fixed Income
AUD – Australian Dollar
DM – Developed Markets
DMH – Developed Markets, Hedged
DMU – Developed Markets, Unhedged
EM – Emerging Markets
ETF – Exchange Traded Fund
GDP – Gross Domestic Product
IRD – Interest Rate Differential
JPY – Japanese Yen
OECD - Organisation for Economic Co-operation and Development
PC – Portfolio Construction
PE – Price to Earnings
RBA – Reserve Bank of Australia
ROE – Return on Equity
SMF – Student Managed Fund
US – the United States
USD – US Dollar
VGAD – Vanguard MSCI Index International Shares (Hedged) ETF
VGS – Vanguard MSCI Index International Shares ETF

1 Asset allocation recommendation

The Asset Allocation (AA) team of the ANU Student Managed Fund (SMF) recommends maintaining the current target portfolio weights. Based on economic outlook analysis, the AA team has assessed the various asset classes currently held and believes that, within the fund's investment horizon, the current target weights are aligned with the fund's long-term objective, and the risks are tolerable.

1.1 Proposed target weights

This recommendation stems from our quantitative forecasts of asset classes, demonstrating minor variations in expected returns and risks. Notably, EM has not performed to expectation within the original investment thesis since its inception by the SMF, while DM has shown a strong surge over the past few months. However, the team believes that maintaining the current target weights is optimal for the Fund after discussing the potential opportunities and risks. In addition, the gradual easing of Australian economic policies continues to assist the Fund in benefiting from the relatively mature and stable growth of the domestic equity market and franking credits.

The proposed asset allocation presented in Figure 1, maintains the current target weightings of the assets in the AA portfolio, with the growth/defensive target weights at 80%/20%, in line with the reference portfolio. Additionally, the weight allocation between hedged developed market (DMH) and unhedged developed market (DMU) equities continues to adhere to the investment proposal from Semester 2 2023.

Figure 1: Portfolio Weights

Asset classes	Reference portfolio	Current target portfolio	Current actual portfolio	Optimal portfolio	Proposed portfolio
Australian Equity (AE)	60%	55%	53.86%	40%	55%
International Equity	20%	25%	26.54%	60%	25%
Hedged Developed Market (DMH)	10%	5%	6.19%	0%	5%
Unhedged Developed Market (DMU)	10%	10%	11.08%	0%	10%
Emerging Markets (EM)	0%	10%	9.28%	60%	10%
Australian Fixed Income (AFI)	15%	15%	13.20%	0%	15%
Australia Cash (AC) (including accruals)	5%	5%	6.40%	0%	5%
Total	100%	100%	100%	100%	100%

1.2 Key Metrics

Figures 2 and 3 depict the anticipated real returns for individual asset classes over 3-year and 10-year periods respectively. Figures 4 and 5 illustrate the fluctuations in real portfolio value and risk metrics over the same durations, incorporating distributions.

Figure 2: Asset class 3-year expected real returns under 11 scenarios

Scenarios				3-year expected real return (% p.a.)				
No.	Inflation	Output gap	Probability	AE	DM	EM	AFI	AC
1	High	High	3%	0.50	3.16	5.78	-0.88	1.93
2	High	Medium	16%	-3.42	-1.10	2.74	-0.49	1.65
3	High	Low	4%	-5.79	-3.18	0.82	0.32	1.33
4	Medium	High	11%	4.37	4.84	11.44	0.79	1.17
5	Medium	Medium	31%	-0.78	2.30	9.55	1.45	0.72
6	Medium	Low	15%	-2.42	-0.36	6.62	1.69	0.60
7	Low	High	2%	3.67	6.18	11.05	1.85	0.48
8	Low	Medium	4%	-1.75	4.01	10.04	2.74	0.34
9	Low	Low	9%	-4.65	0.78	7.06	2.88	0.22
10	Stagflation	Stagflation	2%	-19.17	-15.05	-13.62	-2.02	1.22
11	Crisis	Crisis	3%	-29.22	-19.95	-19.03	3.40	0.14
Probability-Weighted			100%	-2.56	0.44	6.27	1.17	0.89

Figure 3: Asset class 10-year expected real returns under 11 scenarios

Scenarios				10-year expected real return (% p.a.)				
No.	Inflation	Output gap	Probability	AE	DM	EM	AFI	AC
1	High	High	3%	4.73	3.53	7.15	0.55	2.50
2	High	Medium	16%	2.34	0.73	3.86	0.37	1.79
3	High	Low	4%	-1.16	-1.91	2.17	-0.26	1.15
4	Medium	High	11%	7.08	5.52	10.48	1.58	1.63
5	Medium	Medium	31%	4.61	3.31	7.98	1.25	0.92
6	Medium	Low	15%	3.64	1.36	6.10	1.08	0.50
7	Low	High	2%	9.00	6.54	10.78	2.54	0.63
8	Low	Medium	4%	5.57	3.97	8.34	2.06	0.22
9	Low	Low	9%	2.82	1.12	4.82	1.86	-0.10
10	Stagflation	Stagflation	2%	-5.66	-8.58	-3.62	-1.03	1.25
11	Crisis	Crisis	3%	-1.94	-4.76	-4.05	2.45	-0.04
Probability-Weighted			100%	3.71	2.06	6.25	1.14	0.98

Figure 4: Expected real portfolio value after 3 years (allowing for distributions)

Scenarios				Expected change in real portfolio value (% p.a.)		
No.	Inflation	Output gap	Probability	Reference portfolio	Optimal portfolio	Proposed portfolio
1	High	High	3%	-3.64	-0.99	-3.26
2	High	Medium	16%	-6.66	-4.23	-6.18
3	High	Low	4%	-8.32	-6.24	-7.81
4	Medium	High	11%	-0.90	3.73	-0.25
5	Medium	Medium	31%	-4.27	0.67	-3.43
6	Medium	Low	15%	-5.68	-1.63	-4.92
7	Low	High	2%	-0.93	3.23	-0.34
8	Low	Medium	4%	-4.33	0.58	-3.48
9	Low	Low	9%	-6.59	-2.23	-5.74
10	Stagflation	Stagflation	2%	-18.59	-19.62	-18.25
11	Crisis	Crisis	3%	-24.54	-26.56	-24.01
Probability-weighted			100%	**-5.68**	**-1.88**	**-4.98**
Year 3 real portfolio metrics						
Expected portfolio value				0.844	0.954	0.863
Probability of shortfall				100.00%	52.00%	100.00%
Expected shortfall				-15.58%	-6.82%	-13.68%
Expected utility				-0.3487	-0.1502	-0.2982

Note: Shortfall is measured relative to a target of maintaining the real value of the portfolio after distributions.

Figure 5: Expected real portfolio value after 10 years (allowing for distributions)

Scenarios				Expected change in real portfolio value (% p.a.)		
No.	Inflation	Output gap	Probability	Reference portfolio	Optimal portfolio	Proposed portfolio
1	High	High	3%	-0.91	1.41	-0.62
2	High	Medium	16%	-2.87	-1.39	-2.65
3	High	Low	4%	-5.50	-3.69	-5.15
4	Medium	High	11%	0.91	4.21	1.32
5	Medium	Medium	31%	-0.99	1.86	-0.60
6	Medium	Low	15%	-1.96	0.41	-1.62
7	Low	High	2%	2.32	5.13	2.60
8	Low	Medium	4%	-0.22	2.44	0.13
9	Low	Low	9%	-2.38	-0.61	-2.10
10	Stagflation	Stagflation	2%	-9.40	-8.73	-9.07
11	Crisis	Crisis	3%	-5.80	-7.44	-5.87
Probability-weighted			100%	**-1.75**	**0.52**	**-1.42**
Year 10 real portfolio metrics						
Expected portfolio value				0.853	1.087	0.882
Probability of shortfall				87.00%	34.00%	83.00%
Expected shortfall				-16.28%	-6.69%	-13.98%
Expected utility				-0.3721	-0.0702	-0.3082

Note: Shortfall is measured relative to a target of maintaining the real value of the portfolio after distributions.

Next, we will discuss how these figures serve as the basis for our investment recommendations and aid us in making our final decisions.

2 Rationale for the recommendation

The AA team recommends the SMF hold the current target weights as we believe this provides the Fund with growth at a level of risk that is in line with the Fund's risk profile. The asset allocation of 80% in growth assets and 20% in defensive assets is appropriate to assist the Fund in achieving its long-term return objective.

The defensive assets within the AA portfolio (15% AFI and 5% AC) provide a steady stream of cash which is less susceptible to fluctuations in the markets. We expect that the performance of AFI will improve in the next 2-3 years as interest rates have peaked.

The 80% weight in listed equities, spanning from the domestic to the international market including emerging countries, is the main source of return in the AA Portfolio. The Fund's high tolerance for risk allows it to benefit from long-term economic growth around the world with a certain level of diversification.

The AA team recommends maintaining AE at a 55% weighting, as no significant headwinds or tailwinds suggest a tactical tilt towards or away from AE. While the Australian market is currently at near all-time highs, there is still room for sustained growth over our 10-year investment horizon. The exposure to AE also provides distributions through dividends and franking credits which are a valuable source of returns for the SMF.

We propose maintaining the current DM exposure target of 15%, as this allocation maximises the potential for sustained, long-term growth in alignment with the Fund's objectives. Following this original investment thesis will facilitate greater diversification and allow the fund to benefit from the growth of strong economies internationally. This will be explored in further detail in section 3.2.3.

Within the DM holding, we also advocate maintaining a 10% exposure to DMU and 5% to DMH. This investment thesis is based on the foreseeable weakness of the Australian dollar (AUD) due to poor Chinese recovery and interest rate differentials (IRD). This will be further explored in section 3.2.4.

Despite some weak performance since being added to the fund in October of 2021, we recommend that the current target weight for EM be held at 10%. Holding the weighting at 10% will provide further regional diversification for the fund, with exposure to markets which we expect to provide strong long-term capital growth. EM's potential for long-term growth will be explored in detail in section 3.2.5.

In summary, our investment strategy maintains a focus on long-term horizons, and the AA team believes that leaving the current target weights unchanged provides us with balanced growth at acceptable levels of risk. We therefore do not see a need to change the current 80% growth and 20% defensive asset allocation. Within the growth assets, we believe our current target weights are best suited to provide growth for the fund while also hedging against permanent loss of value for the fund.

3 Foundations of the investment thesis

3.1 Scenario Modelling

The AA Investment Process involves delineating 3 and 10-year scenario projections and probabilities encompassing economic drivers and asset class inputs. The latter are then integrated into DCF-based asset models to derive wealth and return trajectories for each scenario. Presented below is a discussion highlighting the most notable deviations from historical data in the 3 and 10-year forecasts, which have influenced our modelling and consequent asset allocation proposals. Further details regarding the projections are available in the Appendices.

The AA team has updated the probabilities of the 11 scenarios as in Figure 6. The probability of the Medium inflation/Medium output gap scenario increased by 3 percent from last semester. This change is underpinned by the AA team's belief that inflation in Australia will be normalised to the target level in the long run, as a result of successful and committed monetary policy. The AA team also believes that the global output will be approaching its long-term equilibrium over 10 years and that there will be no extreme negative shocks like COVID-19 during this period.

Furthermore, the team has reduced the probabilities of High output gap and Low inflation scenarios from 19% to 16% and from 17% to 15%, respectively. We expect the outlook for Australian GDP growth to weaken due to lower household spending, reducing the probability of higher economic growth in the future. Additionally, despite the gradual decline in inflation, persistent systemic factors such as housing shortages, service price rises, and wage increases continue to sustain higher than before inflation. This suggests that the likelihood of low inflation could be reduced relative to last semester's expectations. The probabilities of Stagflation and Crisis, however, remain unchanged from last semester, as the team concludes that no significant changes are impacting these extreme scenarios compared to last semester.

Figure 6: Forecasted Scenario Probabilities

Scenario	GDP/Potential					
		High 1.015	Medium 0.995	Low 0.980	Stagflation 0.950	Crisis 0.935
Inflation	High 4.5%	3.0%	16.0%	4.0%		
	Medium 2.5%	11.0%	31.0%	15.0%		
	Low 1%	2.0%	4.0%	9.0%		
	Stagflation 7%				2.0%	
	Crisis 0%					3.0%

Figure 7: Historical Scenario Probabilities (1992 - Present)

Scenario	GDP/Potential			
Inflation		High 1.017	Medium 1.002	Low 0.989
	High 6.1%	6.2%	15.0%	1.8%

	Medium 3%	15.0%	25.7%	12.4%
	Low 1.6%	3.5%	9.7%	10.6%

3.2 Qualitative Adjustments

This section elaborates on how the qualitative adjustments are incorporated into the AA recommendations by the AA team.

3.2.1 PC Model Optimised AA Weightings

The AA team initiates its process by reviewing the optimised asset weights generated by the Portfolio Construction (PC) model. Subsequently, qualitative adjustments are applied to formulate recommended asset allocation. The PC model alone suggests a growth/defensive weighting of 100/0, with the growth component divided into 40% allocated to AE and 60% to EM. Allocating 40% to AE aligns with the lowest constraint on AE weights outlined in the SMF's Investment Policy Statement, facilitating the Active Australian Equities (AAE) team's ongoing individual stock analyses. It is important to emphasise that the model functions as a quantitative tool to guide asset allocation decisions, rather than dictating them outright. The subsequent discussion delineates the steps taken by the AA team to transition from the 'optimised' weights to the proposed allocation, incorporating the Team's qualitative judgement.

3.2.2 Australian Equity Weight

The AA team has determined that the Australian economic outlook remains largely consistent with our views that markets will normalise to historical levels of growth, and there are no compelling reasons to alter this asset weighting. From our macroeconomic analysis, we have not observed substantial shifts in the expected return of Australian assets or any risk of permanent loss of the Fund's value.

The AA team is confident in the long-term economic development of Australia and does not see substantial risks related to the economy. From our perspective, the economy will experience a soft landing in the near term, followed by a gradual economic recovery. For instance, household consumption has remained weak in recent years due to high living costs and interest rates, contributing to subdued economic growth that may take time to rebound. Additionally, China's weakened economic performance has contributed to a decline in commodity prices, posing a near-term threat to the Australian mining sector. Geopolitical tensions are adversely impacting the global economic environment, indirectly affecting the Australian economy. However, we believe that Australian economic conditions should normalise over the long term. The team expects that the inflation rate will return to its target level after 2026, prompting the Reserve Bank of Australia (RBA) to reduce the cash rate, which in turn will stimulate household consumption and encourage economic growth. Overall, the AA team views that the Australian economic outlook is positive in the long run, and the expected return of AE aligns with the Fund's long-term objective, while also providing notable distributions to the Fund.

3.2.3 DM Equity Weight

AA forecasts a relatively subdued outlook for DMs, estimating an annualised expected return of 2.06% over the 10-year investment horizon when compared to AEs and EMs of 3.71% and 6.25% respectively.

While acknowledging the potential risks these markets may encounter, we believe that corresponding long-term growth prospects warrant the maintenance of a 15% DM position for the Fund.

AA believes the US is best positioned to perform amidst high inflation and tight financial conditions compared to other markets. US households and corporations are entering the next 3 to-10-year period in a position of financial strength, where US household balance sheets are strong and corporates hold the highest levels of cash reserves in over two decades. Further, there have been promising indicators of a resurgence in manufacturing within the US recently and AA anticipates that this momentum could be sustained by factors like the clean energy transition and reshoring. We expect the US equity markets to benefit from this platform for economic growth.

Also, we believe that the US market in particular is best positioned to capitalise on the evolution of AI. This growth prospect is not captured by the historical data-based PC Model analysis. AI facilitates task automation, process optimisation, and informed decision-making, thereby increasing productivity. We expect AI-adopting companies to outperform others over our investment horizon, with US firms poised to adopt AI faster and more effectively than those in EMs. The economic potential of this technology has already driven equity markets to new highs, led by Nvidia, a key provider of specialised chips crucial for AI models. Given the limited availability of ASX-listed companies directly benefiting from AI, AA intends to maintain its exposure to DMs to capitalise on this trend.

Finally, the Japanese Nikkei 225 has achieved record highs this year accompanied by a lift out of negative rates due to welcome inflationary pressures and the first signs of economic growth since the 1980s bubble indicating broader economic growth within DMs other than the US. Also, despite the Russia-Ukraine war affecting Europe and the UK, the team believes these markets are poised to leverage benefits from AI-associated productivity growth.

However, the team is wary of risks surrounding DMs currently and potentially over our investment horizon. Firstly, uncertainty looms regarding both the outcome of this year's US election and international geopolitical dynamics. For example, a Republican victory in the US could lead to global trade shocks via tariffs, immigration restrictions, industry reshoring, and further tax cuts under Donald Trump. While initially welcomed by markets, these factors could contribute to long-term volatility and inflationary pressures which would erode the returns that DMs have historically provided to the Fund.

Next, tensions between Iran and Israel raise concerns about Middle East destabilisation, potentially impacting supply chains and increasing costs for companies in DMs. Also, it is unclear how the divergence between the Chinese and US economy will play out over our investment horizon.

Finally, the US equity market is currently overvalued, and the AA team acknowledges the possibility of a correction occurring over the investment horizon. When comparing the total market capitalisation to long-run equilibrium levels of the US market, it is overvalued. However, the AA team attributes a majority of the current valuation to big technology names and believes their performance could be sustainable over our investment horizon due to diversified cash flows and strong economic moats, so we do not view the overvaluation as a reason to reduce our exposure to DMs.

Ultimately, the AA team is confident that the US equity market is poised for more growth than our forecasts and has already shown resilience in trying financial conditions. As such, we do not wish to reduce the Fund's 15% exposure to DMs (approx. 72% of which is US exposure), even amidst uncertainties for the asset class. This allocation provides diversification and exposure to the biggest companies in the world. AA therefore believes that any less exposure would be counter-productive to the Fund's objective for long-term steady growth.

3.2.4 Allocation between DMH and DMU

The AA team recommends maintaining a 10% DMU and 5% DMH weighting in the fund's portfolio. There were several reasons for favouring DMU over DMH.

The AA team continues to anticipate the weakness of AUD relative to the US dollar (USD). First and foremost, the Federal Reserve's interest rate hikes have been more pronounced than those of the RBA, further increasing the IRD between these two currencies. The relatively stronger USD makes US dollar-denominated assets more appealing as safe-haven investments thereby reducing the demand for the AUD overseas. Secondly, Australia's economic dependence on China is well-documented, with the relationship between Australian commodity prices and the strength of the AUD. China's predicted economic recovery has not materialised as expected, with pain points in the housing sector flowing on and impacting the expected recovery in demand for Australian iron ore, further delaying the appreciation of the AUD.

We also recommend maintaining our 5% holding in DMH as we acknowledge the benefits of still diversifying our exposure. In our analysis carried out in Figure 29, despite our forecast of the sustained weakness of the AUD, there are times when the hedged exposure performance is better than the unhedged exposure. With this in mind and while the AA team do believe the AUD will have sustained weak performance, we acknowledge it is important to diversify to benefit from times when the hedged holdings outperform the unhedged exposures.

Due to this, the AA team recommends maintaining the hedge ratio in DM, as the Fund will not only get the diversification benefit of investing in DM but will also receive some exposure to the foreign currency market, predominantly through the USD and Japanese Yen (JPY). The USD in times of uncertainty is also considered a haven for currency, and the IRD also works in favour of the AUD. The Bank of Japan has also recently raised Japan's interest rates above zero for the first time since 2016, which we believe could be a potential tailwind for the appreciation of the JPY long term.

3.2.5 EM Equity Weight

Despite recent underperformance, and ongoing potential downside risks facing some major emerging economies, the long-term fundamentals that underpinned the original investment thesis remain. The AA team projects EM to have the highest probability-weighted expected return over the 10-year investment horizon of 6.25% in annualised terms in annualised terms. There is no substantial shift in the expected return of EM, and hence, the AA team will hold the 10% target weighting in EM unchanged.

As part of the introduction of EM as an asset class in 2021, the SMF attributed the higher expected returns for the asset class to 'risk premia' related to factors including short-term volatility. Much of this short-term volatility is being played out in the current environment, particularly the recent weakness of the Chinese economy. Current challenges to the Chinese economy include geo-political tensions, subdued domestic consumption, a high youth unemployment rate and a falling stock market. Despite these, AA maintains that China still provides benefits for the Fund and is consistent with the long-term return objective, particularly through its reduction of idiosyncratic risk. Whilst the 5-year annualised return for the MSCI EM index excluding China has had materially higher returns of 4.7%, compared to 1.3% when China is included, it has also had a higher standard deviation of 20.1% compared to 18.9% (Figure 24).

The MSCI index itself has also become more diversified, which has reduced the significance of China's weighting within EM and hence mitigated any excessive short-term volatility or political risks. At its peak in 2020, China accounted for 43% of the EM index weighting, whereas now, it is weighted at a more modest 25.83%. Since the index functions as a value-weighted index, it automatically weights each constituent based on its valuation ratio. This recent underperformance of China saw the MSCI take out 66 Chinese stocks and add 5 new Indian equities in February of 2024. The narrowing of the gap between China and India is one example of how Chinese weakness may be effectively balanced against the growth of other EM.

Additionally, we believe that India is better positioned than China to capture and drive future EM growth. India's large domestic market is less exposed to global trade flows meaning it is less volatile to global weakness and uncertainty than other emerging markets. India also has a relatively stable political base, where the implementation of policy reforms and regulatory measures has created an environment that is more attractive for business and foreign investors.

The weighting of other emerging economies, as seen in Figure 25, has become more significant recently. The economies of Taiwan, South Korea and Brazil are dominant emerging markets with upside growth opportunities and together account for 35% of EM. Taiwan, for example, has a 'quasi-monopoly' on semiconductor chips, one of the most sophisticated microprocessor markets globally. As global trade demand recovers to pre-pandemic levels and Taiwan itself undergoes unilateral changes to its trade patterns, Taiwan is well positioned to capture gains from any global recovery. This is particularly important given the position of Taiwan Semiconductor Manufacturing Group as the largest constituent in the MSCI EM Index, accounting for 8.33% as of March 2024. South Korea also offers growth prospects as an emerging market due to its advantage in the high-tech industry and its role in the production and supply chains of electric vehicles.

Therefore, the outlook and expected performance for EM are relatively consistent with the AA team's original investment thesis. The current weakness and underperformance should be seen as 'short-term volatility' that has not affected the underlying fundamentals and longer-term growth opportunities that are positioned to help the Fund achieve its longer-term objectives.

3.2.5 Defensive Asset Weights

The AA team forecasts that the defensive portfolio, comprised of AFI and AC, would underperform the growth portfolio over the prediction periods. However, we propose that the SMF should maintain the defensive asset weights at their strategic level (15% AFI and 5% AC), considering liquidity risk, diversification benefits, and the macroeconomic outlook.

Liquidity risk is one of the primary concerns for SMF. Therefore, the team tends to maintain an adequate cash reserve for distributions (4.5% p.a). The defensive portfolio would likely outperform during crisis and stagflation scenarios, leading us to seek a reduction in overall exposure to these extreme situations. Additionally, from our macroeconomic analysis, we believe our exposure to AFI will see a recovery in both capital as well as the distributions paid out from the holding. This is in line with our interest rate forecast which is largely in line with consensus and we believe rate cuts will start taking place in early 2025 and reach RBA target levels in 2026.

The AFI exposure is invested 100% into a government bond fund and due to this, it has seen weak performance for the last 18 months. The rising of interest rates put great downward pressure on the price of the fund leading to capital deprecation of the holding. During this period, we also observed

lower than historical averages of distribution being paid out by the fund, this was in large part due to four consecutive quarters of no distribution being paid out by the ETF. Despite this poor performance, we believe that rate cuts will start to take place later in the year, and long term we will see a recovery of both the value of the holding but also the distribution paid out. However, these predicted returns would be lower than those of the growth asset class over 10 years. In summary, the AA team maintains the view that defensive assets should remain at their strategic level. Given the lower probability of extreme economic events and potential return paths, there is no plausible reason to increase the weights of these assets.

3.3 Conclusion

The AA team recommends maintaining the current target weights across the portfolio. This recommendation is based on our quantitative forecasts of asset classes, which illustrate no significant deviations in expected returns and risks. Additionally, qualitative macroeconomic analysis supports this position, further reinforcing the investment thesis.

Appendices

Appendix A: The Introduction of the PC Model

The asset allocation investment process (AA-IP) is based on the belief that long-term returns are intimately tied to two factors: **cash flow fundamentals** and **pricing.** Thus, the AA-IP is based on forming distributions of cash flow projections and terminal asset prices over a long horizon (10 years[1]), which enables the estimation of expected portfolio outcomes as well as shortfall risk relative to the target. The primary model for the asset allocation investment process is the PC model. A brief introduction to the model is provided below.

The model comprises four components: (i) Scenario Analysis, (ii) Forming Asset Model Inputs, (iii) Asset Models, and (iv) Portfolio Construction

a. Scenario Analysis

Figure 8: Scenarios

Inflation: CPI	Economic Activity: GDP/Potential		
	High	Medium	Low
High	1	2	3
Medium	4	5	6
Low	7	8	9
	10: Crisis State	11. Stagflation	

The scenario analysis establishes the economic states, which helps create **possible distributions** of accumulated wealth and hence return paths for each asset class.

This process ultimately generates 11 future economic states, based on high/medium/low intersections of the two macro drivers, GDP/Potential (output gap) and inflation, plus 'Crisis' and 'Stagflation' states to capture tail risk (Figure 8). The expected wealth path of each asset class is determined as the probability weighted outcome of all of the economic scenarios.

b. Forming asset model inputs

The AA team forecasts the key parameter inputs required for forecasting expected return for each asset class over 10-year horizon across the 11 economic states along with qualitative adjustments. The medium term forecast over a horizon of 3 year enables the team to add granular details into the forecasts. (Figure 9).

c. Asset Models

Real wealth paths of each asset class are generated using asset models widely used in the industry as in Figure 19, which serve as the main inputs for the portfolio construction process in part 4.

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[1] 10 years is enough to capture any mean reversion in asset prices.

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d.   Portfolio constructions

The portfolio construction phase aims to set asset weights by balancing return and risk in line with the objectives of the SMF. The PC model adopts a reference-dependent utility function that is parameterised to reflect the risk appetite of the SMF and generates a candidate portfolio by **maximising the expected utility**. A few constraints are set to arrive at the optimal weights consistent with the investment policy of SMF. AA team makes subjective adjustment to the model output before determining the portfolio target weights.

Appendix B: Years 3 and 10 Asset Model Assumptions, Inputs and Forecasts

Inflation

Figure 9: Australian Inflation Targets

Scenario	Year 3 Inflation	Year 10 Inflation
High	3.5%	4.5%
Medium	2.75%	2.5%
Low	2.25%	1.0%
Stagflation	5.0%	7.0%
Crisis	1.5%	0.0%

GDP/Potential

Figure 10: Australian GDP/Potential Targets

| Scenario	Year 3 GDP/Potential	Year 10 GDP/Potential
High	0.998	1.015
Medium	0.994	0.995
Low	0.984	0.980
Stagflation	0.975	0.950
Crisis	0.96	0.935

Appendix C: Asset model inputs

Australian Equities

Figure 11: Return on Equity (ROE) of Australian Equities
Historical Data and Future Targets
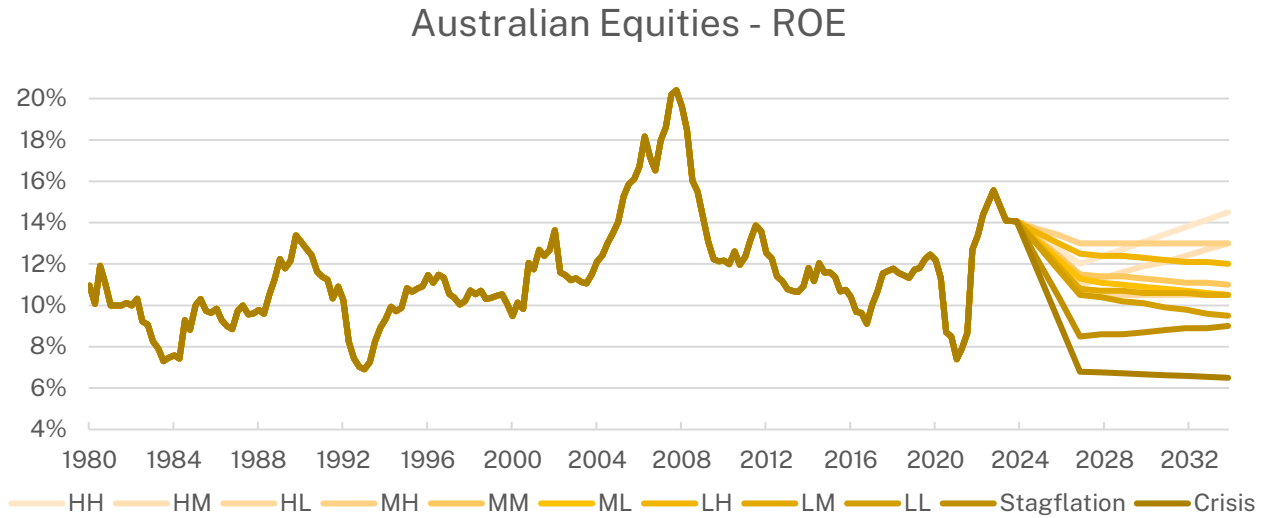
Australian Equities - ROE

Source: Eikon and AA forecast. Note: Historical data is reported on ROE and forecasts are ROE on existing operations.

Figure 12: Price to Earnings (PE) ratio of Australian Equities
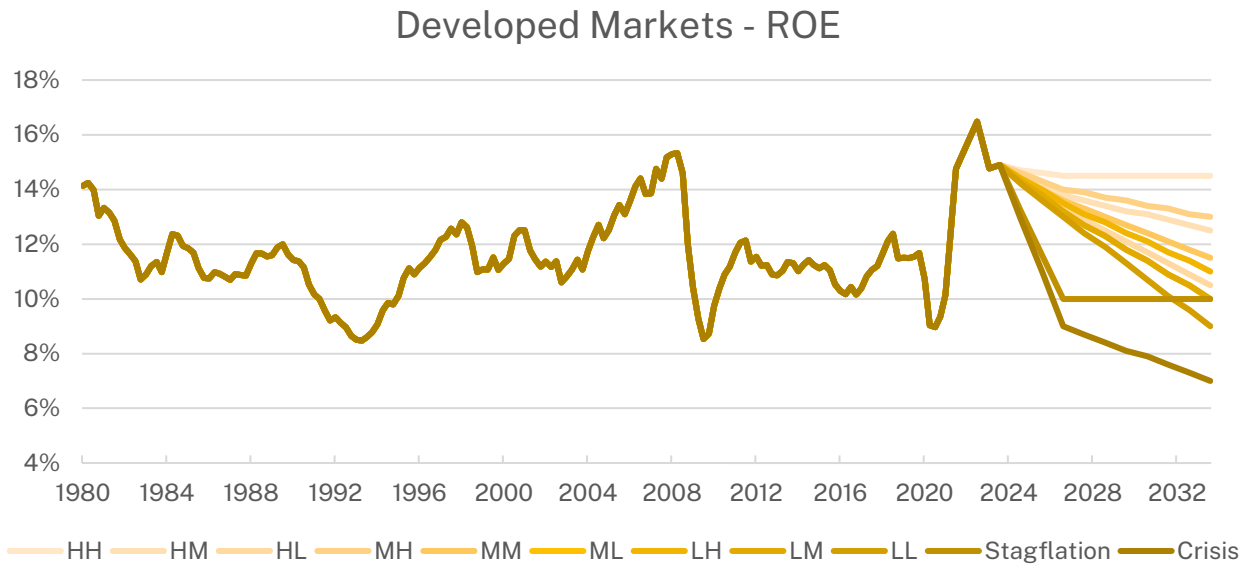Historical Data and Future Targets

Australian Equities - PE
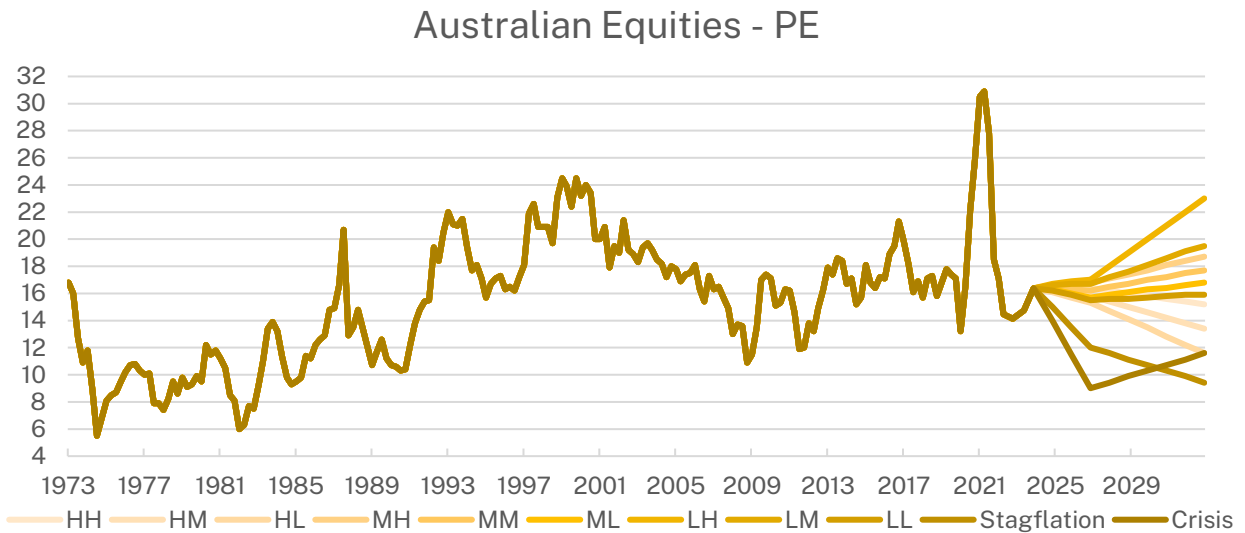
Source: Eikon and AA forecast

Figure 13: Return on Equity (ROE) of International Equities
Historical Data and Future Targets

Developed Markets - ROE

Legend: HH, HM, HL, MH, MM, ML, LH, LM, LL, Stagflation, Crisis

Source: Eikon and AA forecast. Note: Historical data is reported on ROE and forecasts are ROE on existing operations.

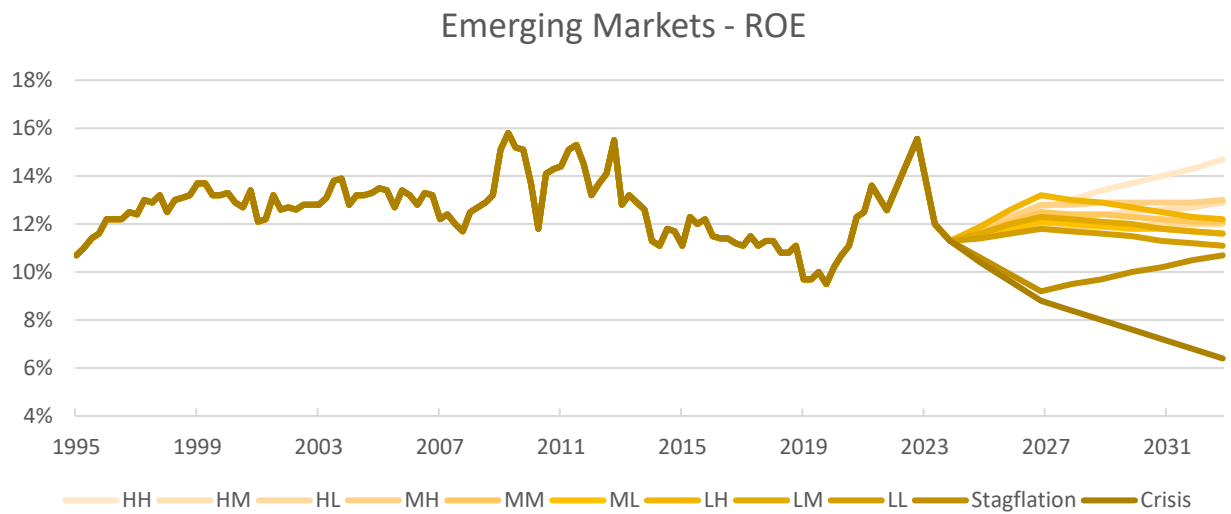**Figure 14: Price to Earnings (PE) ratio of International Equities**
Historical Data and Future Targets

Developed Markets - PE

Legend: HH — HM — HL — MH — MM — ML — LH — LM — LL — Stagflation — Crisis
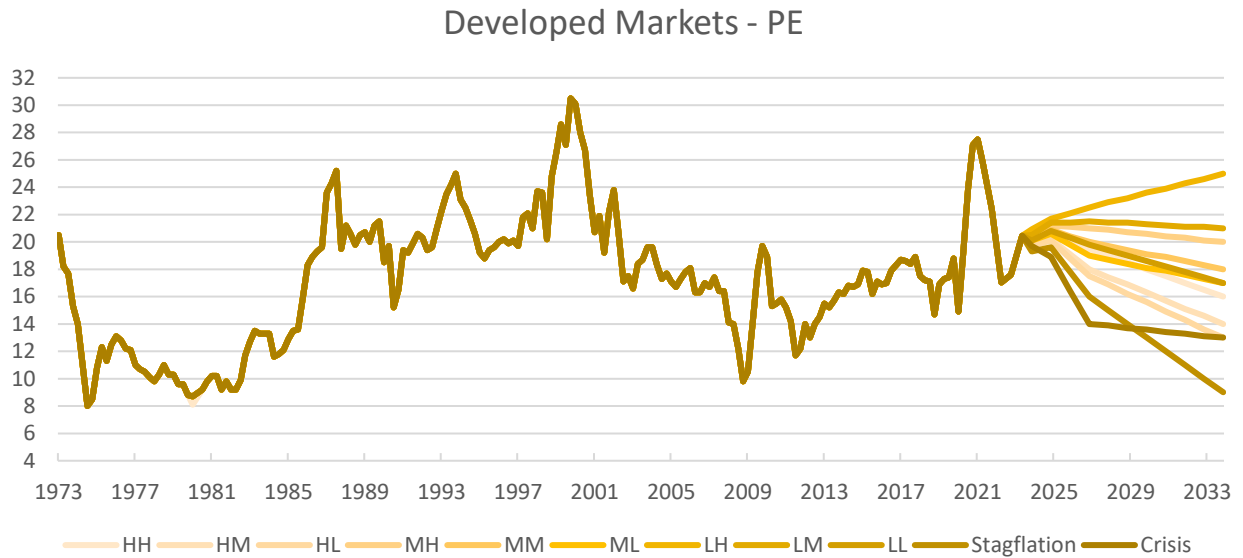
Source: Eikon and AA forecast

Emerging Markets

Figure 15: Return on Equity (ROE) of Emerging Markets
Historical Data and Future Targets

Emerging Markets - ROE

Legend: HH — HM — HL — MH — MM — ML — LH — LM — LL — Stagflation — Crisis

Source: Eikon and AA forecast

Figure 16: Price to Earnings (PE) ratio of Emerging Markets
Historical Data and Future Targets

Emerging Markets - PE
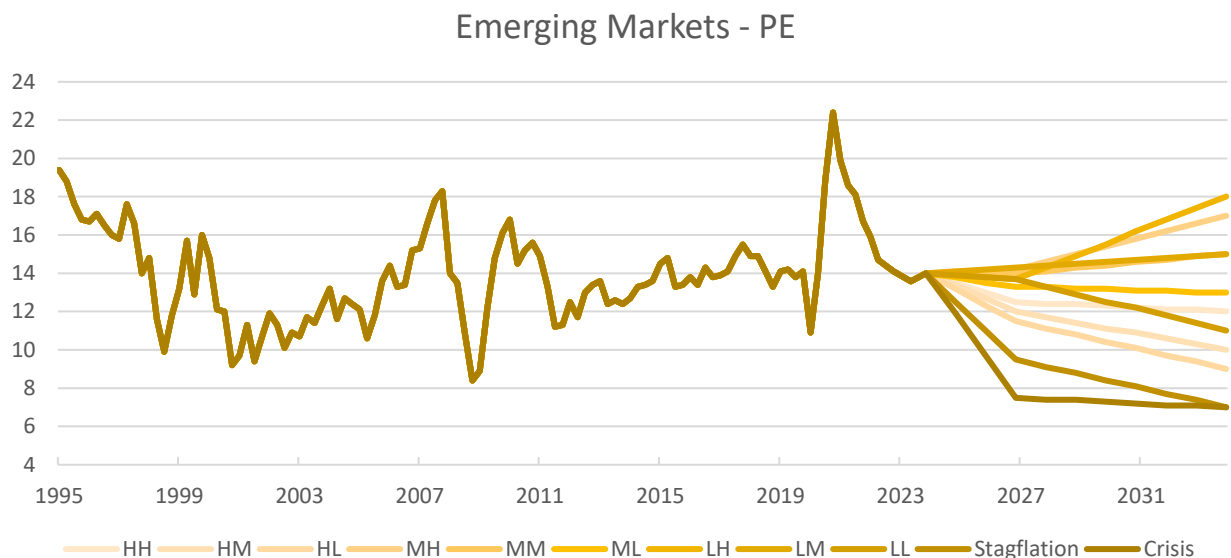
Source: Eikon and AA forecast

Australian Fixed Income

Figure 17: 7-Year Bond Yield
Historical Data and Future Targets

## Australian Fixed Income - 7 year bond yield

Notes: This chart shows history from 1992 as this is considered the most representative period. A proxy for 7-year bond yields is formed by interpolating between 5-year and 10-year government bond yields as reported by the RBA.

Figure 18: Australian Official Cash Rate
Historical Data and Future Targets

Australian Official Cash Rate

Legend: HH, HM, HL, MH, MM, ML, LH, LM, LL, Stagflation, Crisis
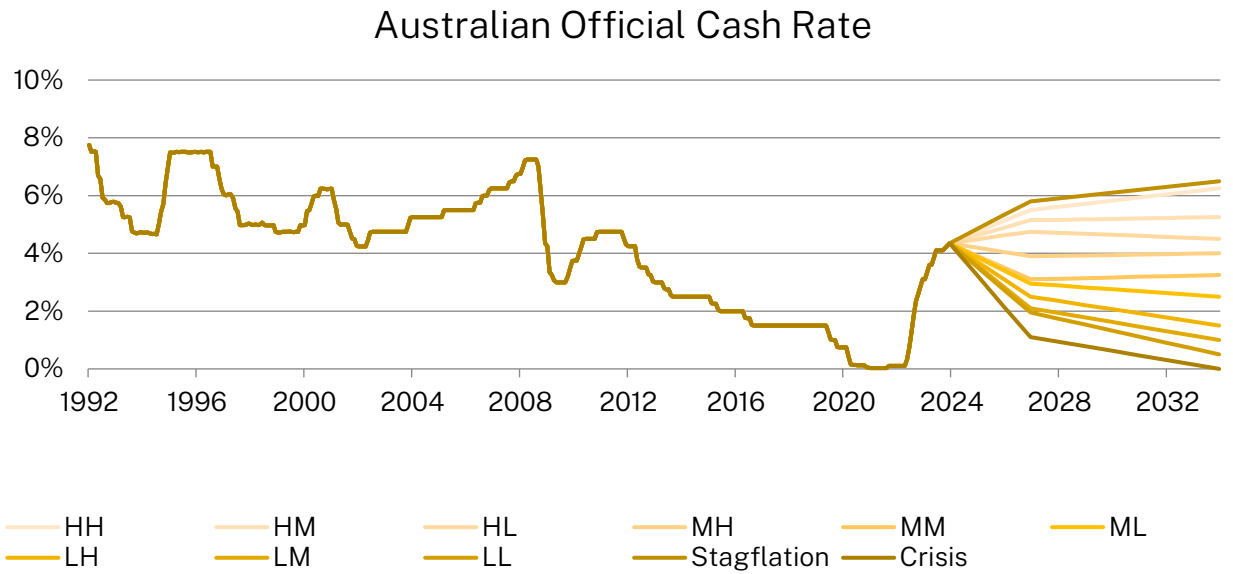
Note: This chart shows history from 1992 as this is considered the most representative period. Cash rate data is sourced from the RBA
.

Appendix D: Graphs Related to the Defensive Portfolio
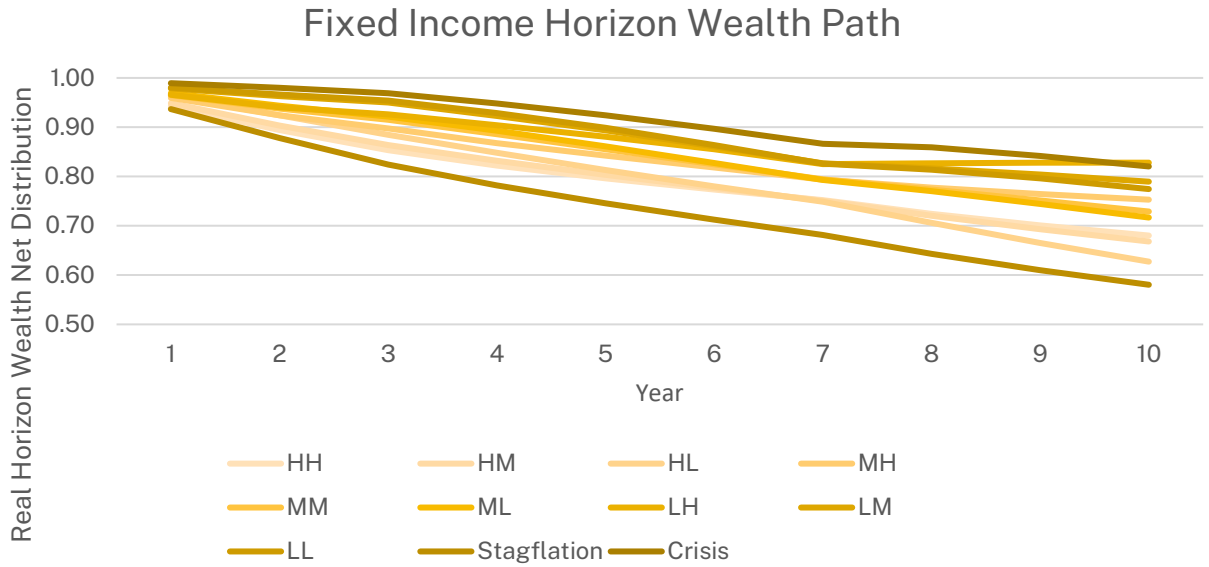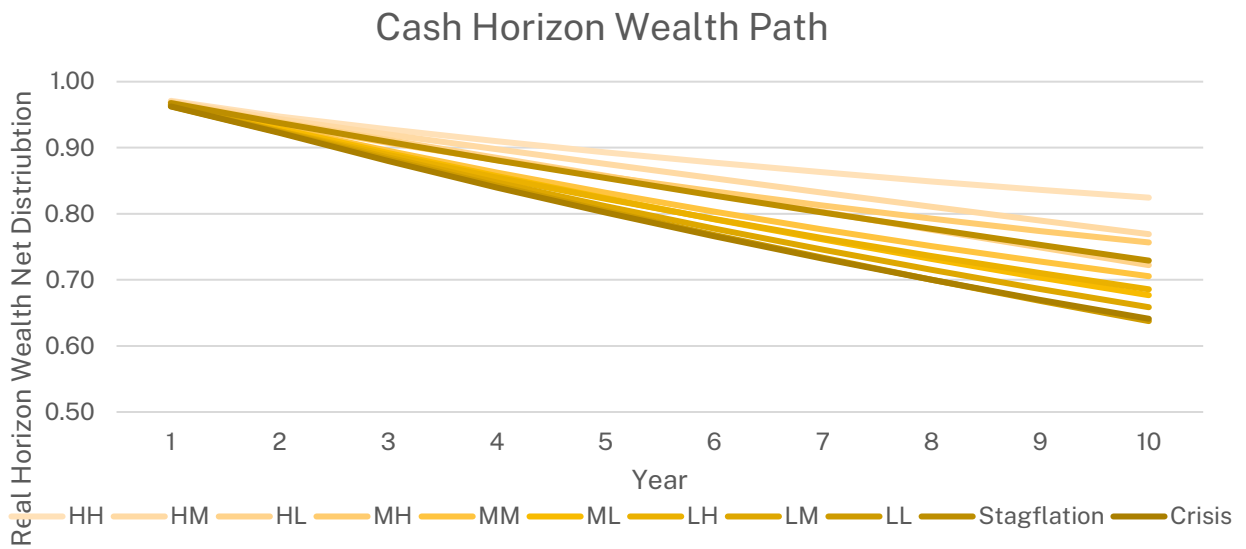
Figure 19: Fixed Income Wealth Path

Fixed Income Horizon Wealth Path

Figure 20: Cash Wealth Paths

Cash Horizon Wealth Path

Appendix E: Nominal Horizon Asset Returns

Figure 21: 3-Year Nominal Horizon Asset Returns under 11 scenarios

Scenarios			Year 3 Expected Nominal Horizon Return under 11 Scenarios (% p.a.)				
No.	Inflation	Growth / potential	Probability	Australian Equities (AE)	Developed Markets (DM)	Emerging Markets (EM)	Australian Fixed Income (AFI)	Australian Cash (AC)
1	High	High	3%	3.99	6.74	9.45	2.56	5.46
2	High	Medium	16%	-0.07	2.33	6.31	2.96	5.17
3	High	Low	4%	-2.52	0.18	4.32	3.79	4.84
4	Medium	High	11%	7.56	8.03	14.84	3.87	4.26
5	Medium	Medium	31%	2.16	5.33	12.80	4.46	3.71
6	Medium	Low	15%	0.48	2.60	9.78	4.71	3.59
7	Low	High	2%	6.54	9.13	14.13	4.67	3.27
8	Low	Medium	4%	0.84	6.75	12.93	5.44	2.98
9	Low	Low	9%	-2.14	3.44	9.87	5.59	2.86
10	Stagflation	Stagflation	2%	-15.56	-11.26	-9.76	2.35	5.74
11	Crisis	Crisis	3%	-27.71	-17.74	-17.30	5.61	2.27
Probability-Weighted			100%	0.76	3.73	9.84	4.25	3.97

Figure 22: 10-Year Nominal Horizon Asset Returns under 11 scenarios

| Scenarios			Year 10 Expected Nominal Horizon Return under 11 Scenarios				
No.	Inflation	Growth / potential	Probability	Australian Equities (AE)	Developed Markets (DM)	Emerging Markets (EM)	Australian Fixed Income (AFI)	Australian Cash (AC)
1	High	High	3%	8.81	7.56	11.32	4.46	6.49
2	High	Medium	16%	6.32	4.65	7.90	4.27	5.75
3	High	Low	4%	2.69	1.90	6.14	3.62	5.09
4	Medium	High	11%	10.01	8.41	13.50	4.36	4.41
5	Medium	Medium	31%	7.45	6.11	10.91	4.00	3.66
6	Medium	Low	15%	6.45	4.12	8.98	3.82	3.23
7	Low	High	2%	11.08	8.57	12.89	4.50	2.55
8	Low	Medium	4%	7.54	5.90	10.36	3.96	2.09
9	Low	Low	9%	4.73	3.01	6.78	3.76	1.76
10	Stagflation	Stagflation	2%	-0.35	-3.43	1.81	4.54	6.96
11	Crisis	Crisis	3%	-0.87	-3.40	-3.01	3.56	1.04
Probability-Weighted			100%	6.90	5.25	9.66	4.04	3.97

Appendix F: Detailed Portfolio Weights

Figure 23: Portfolio Weights – Detailed Breakdown

Asset Weights	Reference target portfolio	Proposed portfolio	Deviation vs. reference
GROWTH ASSETS			
Active Australian Equities Portfolio	50%	50%	0%
Australian Equities in AA Portfolio	10%	5%	-5%
Total Australian Equities	**60%**	**55%**	**-5%**
Developed Markets, Hedged	10%	5%	-5%
Developed Markets, Unhedged	10%	10%	0%
Emerging Markets, Unhedged	0%	10%	+10%
Total International Equities	**20%**	**25%**	**+5%**
Total Growth Assets	**80%**	**80%**	**0%**
DEFENSIVE ASSETS			
Australian Fixed Income	15%	15%	0%
Australian Cash	5%	5%	0%
Total Defensive Assets	**20%**	**20%**	**0%**
TOTAL	**100%**	**100%**	**0%**

Appendix G: Graphs and Tables Related to EM

Figure 24: 5-year annualised return & risk (%)
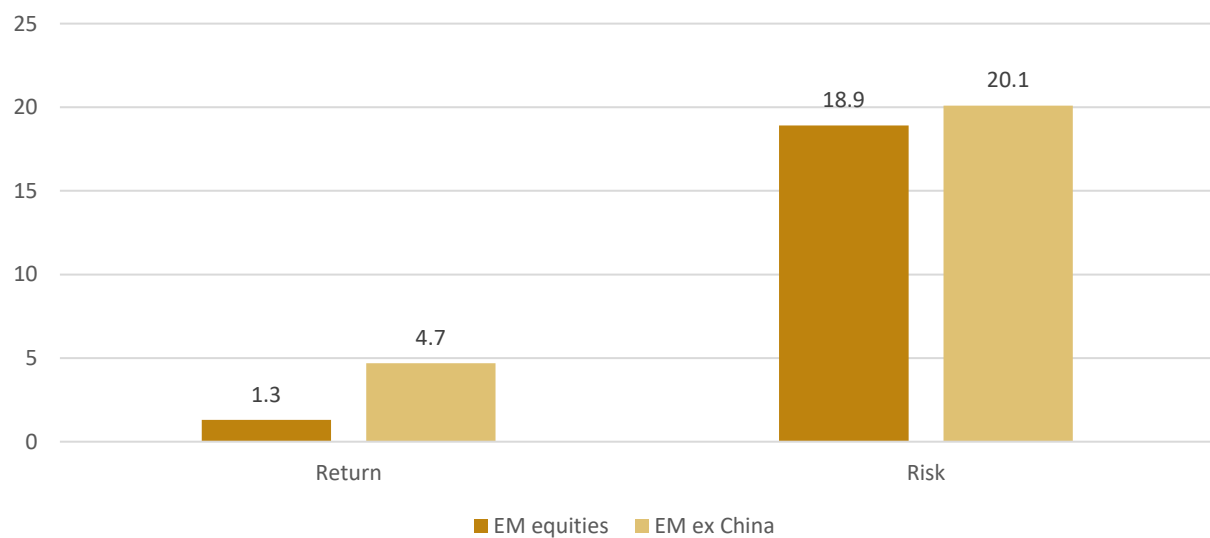
Source: MSCI, UBS Asset Management

Figure 25: Weights by region within iShares MSCI EM ETF

Region	Weight (%)
China	25.38
India	17.89
Taiwan	17.67
South Korea	12.28
Brazil	5.06
Saudi Arabia	4.24
South Africa	2.82
Mexico	2.67
Indonesia	1.78
Thailand	1.52
Malaysia	1.34
United Arab Emirates	1.19

Source: BlackRock. Note: The cash and other are not listed.

## Appendix H: Macro Driver Assumptions and Inputs

Figure 26: Inflation Paths

Scenario	Historical level (1992-present)	Historical probability (1992-present)	Forecast level	Forecast probability
High	6.1%	23.0%	4.5%	24%
Medium	3.0%	53.1%	2.5%	54%
Low	1.6%	23.9%	1.0%	17%
Stagflation			7.0%	2%
Crisis			0.0%	3%

Figure 27: GDP/Potential Paths

Scenario	Historical level (1992-present)	Historical probability (1992-present)	Forecast level	Forecast probability
High	1.017	24.8%	1.015	19%
Medium	1.002	50.4%	0.995	49%
Low	0.989	24.8%	0.980	27%
Stagflation			0.950	2%
Crisis			0.935	3%

Figure 28: Historical inflation vs output gap (1970 – present)

Inflation vs. Output Gap
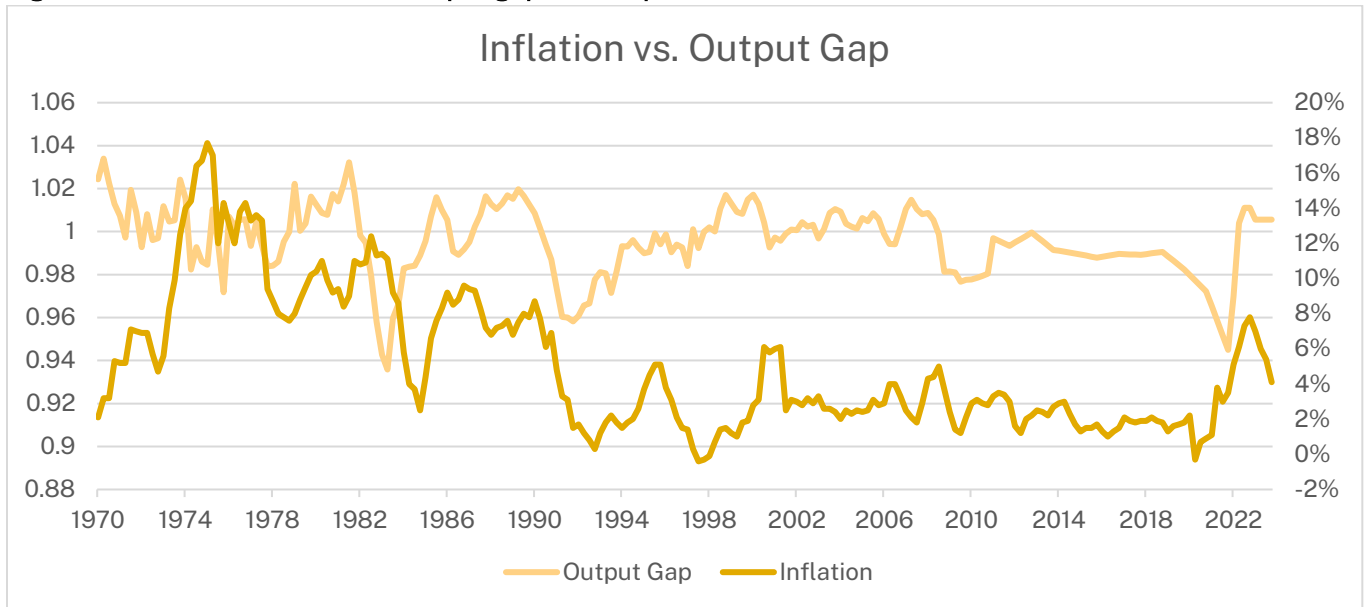
Note: This chart shows the history of Australian inflation and output gap (GDP/Potential) commencing in 1970 when data for some asset class inputs became available. Inflation data is sourced from the RBA , and output gap data is sourced from the OECD and CEIC.

Figure 29: Relative Performance WE Hedged vs WE Unhedged
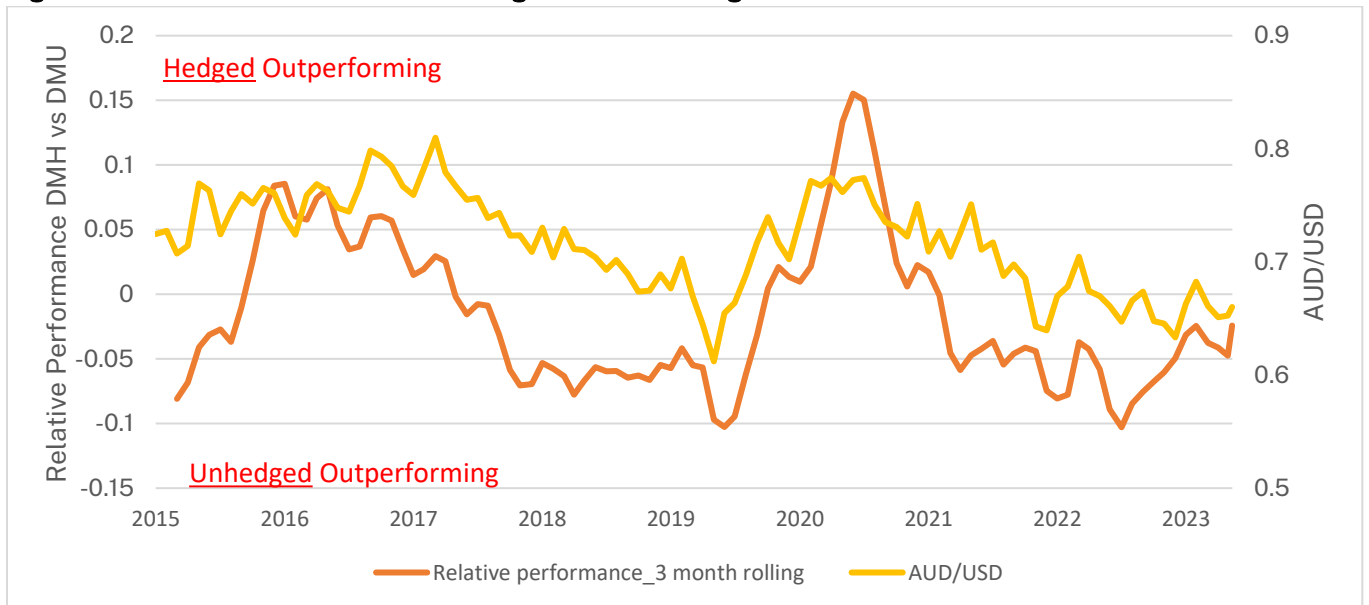
Source: FactSet

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