Quantitative strategies to optimize Chinese A-share allocation

By Andrew Tong

In its 34th year, Risk and Reward provides a platform for Invesco's investment professionals to produce original research and investment strategy content. This Q4 2023 edition contains three additional articles. Contact your local Invesco representative for the full edition.

Numerous studies indicate significant inefficiencies in China's A-share market, and asset owners who want to exploit them have historically turned to fundamental active managers. In recent years, however, model-driven quantitative strategies have gained more attention. We compare the performance of the two styles, explain some of the differences and derive the optimal quant share in a multi-manager A-share portfolio.

Fundamental active managers are often credited with in-depth company and industry knowledge, while quantitative active managers are credited with stable performance – which is particularly relevant in volatile markets. Given the conceptual differences between the two styles, their excess returns are not highly correlated. Thus, additional diversification benefits can be garnered when they are combined.

We examined the performance differences between fundamental and quantitative strategies for Chines A-shares based on 12 years of mutual fund returns (December 31, 2010 to December 31, 2022). To ensure that the results are benchmark agnostic, the first step was to calculate every fund's active monthly returns against its own official benchmark. Then, we constructed return time series for a "median fundamental manager" and a "median quant manager" using the median active monthly returns for the two groups. This allows us to quantify and compare the return and risk of these two styles while accounting for the growing number of funds over the study period.

Performance compared

In our sample, the median quant manager outperformed the median fundamental manager (figure 1) and delivered positive active returns every year (figure 2). The median fundamental manager, on the other hand, experienced greater outperformance in some years and larger drawdowns in others. Furthermore, the share of quant managers with positive alpha is higher.

About risk: The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested.

The median quant manager outperformed the median fundamental manager.

Potential for higher risk-adjusted returns and more persistent alpha

For Chinese A-shares, quant managers' returns have historically been less volatile. In our analysis, the active risk (tracking error) of the median quant manager is less than half the active risk of the median fundamental manager (around 2% to 3% p.a. as compared to around 2% to 12% p.a.). Consequently, the median quant manager's information ratio (IR) is better (figure 3). The aggregate IR of the median quant manager is three times as high as that of the median fundamental manager.

We also gauged the persistence of outperformance, based on the average percentage of months a manager beats the benchmark every year. A higher percentage reflects a more even return stream. We find that the median quant manager shows greater persistence, outperforming the benchmark around 66% of the time.

Diversification benefits

Finally, we analyzed the correlation between the monthly active returns of the two median managers. Over the full study period, we find a relatively low correlation of 0.467, suggesting that the quant manager's alpha is relatively uncorrelated with that of the fundamental manager. Accordingly, adding quant funds to a fundamentally managed A-share portfolio may improve diversification effects.

The strengths of quant managers...

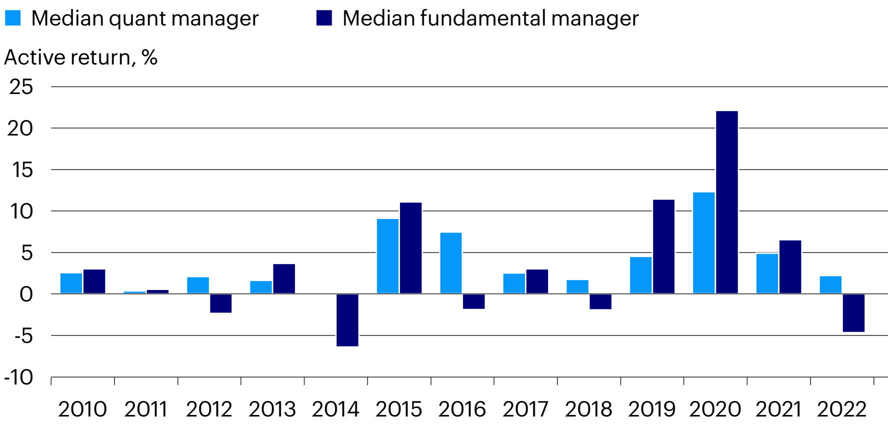
The relatively strong performance of quant managers may be attributed to their differentiated investment process

Figure 1
The median quant manager outperformed the median fundamental manager

(active return, cumulative, p.a.)	**2010 to 2022**
All managers (median)	3.33%
Median quant manager	3.86%
Median fundamental manager	3.13%

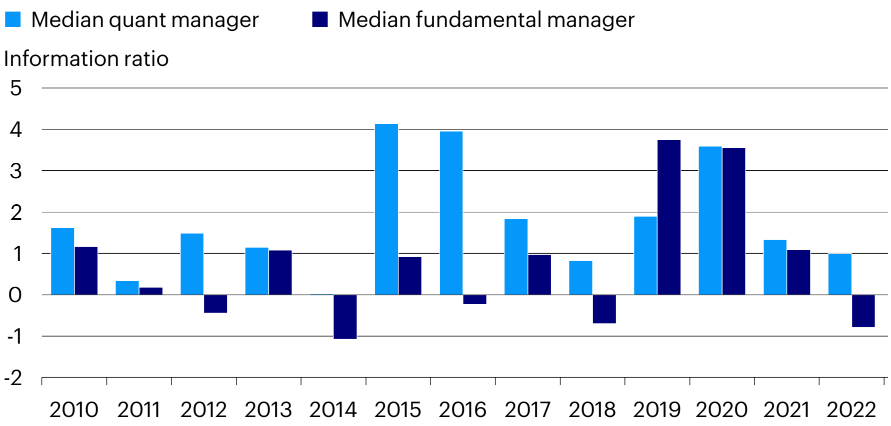
Sources: WIND, Invesco analysis. Mutual fund data from December 31, 2010 to December 31, 2022.
Past performance is no guarantee of future results.

Figure 2
The median quant manager outperformed the benchmark every year



Sources: WIND, Invesco analysis. Mutual fund data from December 31, 2010 to December 31, 2022.
Past performance is no guarantee of future results.

Figure 3
The median quant manager achieved a higher information ratio



Sources: WIND, Invesco analysis. Note: IR is calculated using median active return. Mutual fund data from December 31, 2010 to December 31, 2022. **Past performance is no guarantee of future results.**

Methodology

- Our sample covers 707 China-domiciled A-share mutual funds (as of December 31, 2022) that pursue either an active fundamental or active quantitative investment style.
- To avoid survivorship bias, the historical monthly returns of terminated funds are included in our sample.
- To allow benchmark-agnostic comparison, each fund's active return is calculated relative to its own official benchmark, which is usually a weighted composite of an equity index and the risk-free rate (for example, 95% x CSI300 Index + 5% x bank deposit interest).
- Fund returns are net of fees.
- Active risk or tracking error is the annualized standard deviation of active returns.

Quant managers' ability to analyze large datasets swiftly is a significant advantage in the A-share market.

and competitive edge in information processing. Most quantitative managers adopt a systematic process that minimizes the subjective biases of their portfolio managers. With such a disciplined risk approach, it is unsurprising that quant managers had highly repeatable performance.

Quant managers' ability to analyze large datasets swiftly is also a significant advantage in the A-share market – which now includes over 5,000 listed companies. While, due to resource constraints, most fundamental managers and brokerage firms limit their research to just a fraction of the entire stock universe, quant models can sift out asset mispricing from the entire market.

Market inefficiencies in China can arise from factor risk premia, retail trading behavioral bias and even top-down policy effects. Quant strategies can utilize these diversified alpha sources because of their capacity to more quickly process and analyze information.

... and the optimal quant allocation

So, what allocation to quant strategies would be optimal in an A-share portfolio? We examine this from the perspective of a hypothetical asset owner who has selected both a fundamental manager and a quant manager. To disentangle manager selection from weight allocation effects, we'll analyze two cases: one based on median-performance managers ("base case") and another based on top-quartile managers ("high performance case"). In both cases, we construct an efficient frontier plot representing 21 portfolios of varying manager weights (figure 4) and rebalance them every month. In each plot, F represents the portfolio that is 100% allocated to the fundamental manager, while Q represents the portfolio that is 100% allocated to the quant manager.

The base case

In the base case, we assume that the asset owner cannot forecast manager performance – implying that the selected managers can be approximated by the two median managers. Since, over the full study period, the median quant manager (Portfolio Q) achieves a higher return with lower risk, the overall information ratio of this manager is also higher. Therefore, the efficient frontier is a monotonic decreasing function, favoring a 100% allocation to the quant manager (figure 5).

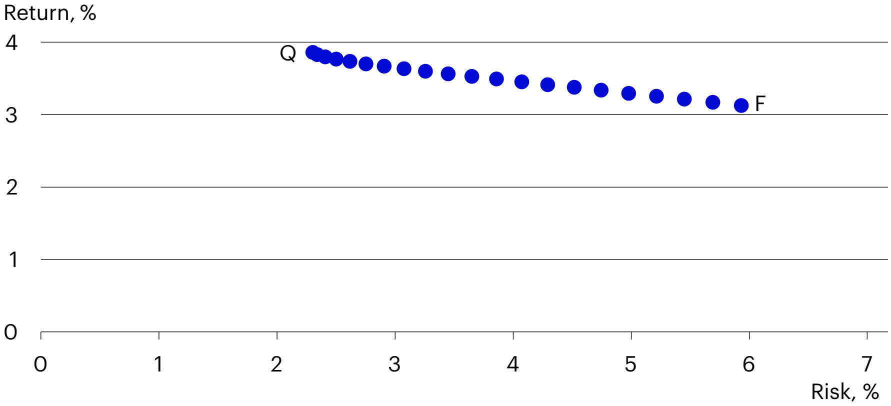
Even though the median fundamental manager achieved a higher return in most years, the higher drawdowns associated with this manager lead to lower returns overall, and a very high tracking error.

Figure 4
Hypothetical portfolio weights

Portfolio	Quant manager	Fundamental manager
P1 (F)	0%	100%
P2	5%	95%
P3	10%	90%
P4	15%	85%
P5	20%	80%
P6	25%	75%
P7	30%	70%
P8	35%	65%
P9	40%	60%
P10	45%	55%
P11	50%	50%
P12	55%	45%
P13	60%	40%
P14	65%	35%
P15	70%	30%
P16	75%	25%
P17	80%	20%
P18	85%	15%
P19	90%	10%
P20	95%	5%
P21 (Q)	100%	0%

Source: Invesco analysis.
For illustrative purposes only.

Figure 5
Base case: The median quant manager achieves higher returns with lower risk
Efficient frontier (base case)



Sources: WIND, Invesco analysis. Annualized cumulative monthly median returns from December 31, 2010 to December 31, 2022. **Past performance is no guarantee of future results.**

Figure 6

Base case: Larger allocations to the median quant manager tend to improve the information ratio

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21
2010	1.17	1.24	1.32	1.41	1.51	1.62	1.75	1.89	2.05	2.21	2.38	2.52	2.63	2.66	2.62	2.51	2.35	2.16	1.97	1.79	1.63
2011	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.25	0.25	0.26	0.28	0.29	0.30	0.31	0.32	0.33	0.33	0.34
2012	-0.44	-0.42	-0.39	-0.36	-0.33	-0.29	-0.25	-0.21	-0.16	-0.10	-0.03	0.04	0.13	0.23	0.35	0.48	0.64	0.83	1.03	1.26	1.49
2013	1.08	1.09	1.11	1.12	1.14	1.15	1.17	1.18	1.20	1.22	1.23	1.25	1.26	1.27	1.28	1.28	1.28	1.26	1.24	1.20	1.15
2014	-1.08	-1.07	-1.06	-1.06	-1.04	-1.03	-1.02	-1.00	-0.98	-0.96	-0.93	-0.89	-0.85	-0.80	-0.74	-0.66	-0.57	-0.45	-0.31	-0.15	0.02
2015	0.92	0.96	1.00	1.05	1.10	1.16	1.22	1.30	1.38	1.47	1.58	1.71	1.86	2.04	2.25	2.51	2.82	3.17	3.56	3.93	4.14
2016	-0.23	-0.18	-0.13	-0.07	-0.01	0.07	0.15	0.25	0.36	0.48	0.63	0.80	1.01	1.25	1.53	1.87	2.27	2.72	3.19	3.63	3.96
2017	0.97	1.00	1.04	1.08	1.12	1.16	1.21	1.26	1.31	1.37	1.42	1.48	1.55	1.61	1.67	1.73	1.78	1.82	1.84	1.85	1.84
2018	-0.70	-0.65	-0.60	-0.55	-0.49	-0.42	-0.36	-0.28	-0.20	-0.12	-0.04	0.05	0.14	0.24	0.33	0.42	0.51	0.59	0.68	0.75	0.82
2019	3.76	3.77	3.77	3.77	3.77	3.75	3.73	3.69	3.64	3.57	3.49	3.39	3.27	3.14	2.99	2.82	2.65	2.46	2.28	2.09	1.90
2020	3.56	3.58	3.60	3.62	3.64	3.66	3.68	3.70	3.72	3.73	3.75	3.76	3.77	3.77	3.77	3.76	3.75	3.72	3.69	3.65	3.59
2021	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.21	1.23	1.25	1.27	1.29	1.30	1.32	1.33	1.34	1.34	1.35	1.34	1.34	1.33
2022	-0.79	-0.76	-0.74	-0.70	-0.67	-0.63	-0.59	-0.54	-0.48	-0.42	-0.35	-0.27	-0.18	-0.07	0.05	0.18	0.33	0.49	0.66	0.83	0.99

Sources: WIND, Invesco analysis. **Past performance is no guarantee of future results.**

Therefore, in most years, larger allocations to the quant manager lead to a higher information ratio (figure 6).

The high performance case

In the high performance case, we assume that the asset owner can forecast manager returns fairly accurately and only selects managers from the top performance quartiles of both investment styles. We therefore construct return time series for a "top-quartile fundamental manager" and a "top-quartile quant manager". Rather than median monthly returns of the full sample, we now use the top 25th percentile monthly return – and then follow the same procedure as in the base case. Again, we construct 21 hypothetical portfolios with varying weights allocated to the two managers (figure 7).

Unlike the base case, there is now a clear trade-off between risk and reward (figure 7). Over the full study period, Portfolio F, which is 100% invested in the fundamental manager, has the highest return but also comes with the highest risk. As the portfolio allocation shifts to the quant manager (towards the bottom left of the efficient frontier), portfolio return and risk decrease monotonically until we reach Portfolio Q, which has the lowest return but also the lowest risk.

Despite the higher returns, a 100% allocation to the top-quartile fundamental manager would be optimal in less than half of the years – because a balanced allocation to both managers is more likely to lead to a higher information ratio and satisfy the overall portfolio objectives (figure 8).

Conclusion

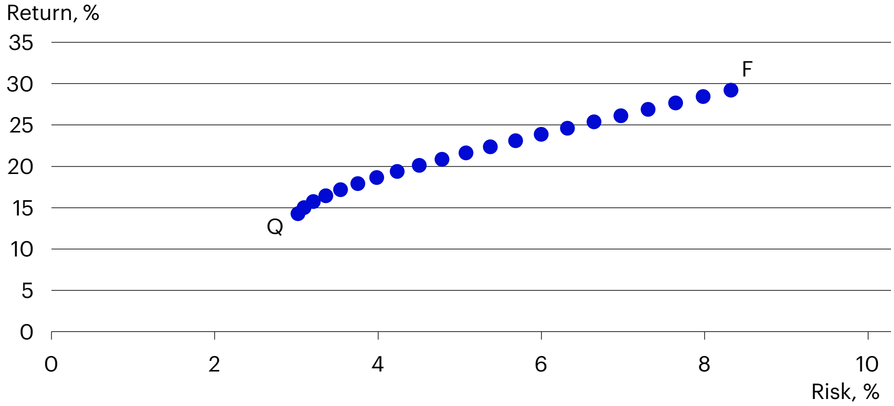
We have analyzed the long-term performance of actively managed fundamental and quantitative portfolios of Chinese A-shares. In our sample, the median quant manager achieves higher active performance and a higher information ratio. Although the median fundamental manager's active return is higher in most years, this is offset by larger and more frequent drawdowns.

We then provide a dual-case framework to help investors determine their optimal

Figure 7

High performance case: A trade-off between risk and reward

Efficient frontier (high performance case)



Sources: WIND, Invesco analysis. Annualized cumulative monthly median returns from December 31, 2010 to December 31, 2022. **Past performance is no guarantee of future results.**

Figure 8
High performance case: A balanced allocation tends to improve the information ratio

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21
2010	3.61	3.68	3.76	3.84	3.92	4.01	4.10	4.19	4.28	4.37	4.46	4.53	4.59	4.63	4.65	4.63	4.57	4.47	4.33	4.15	3.94
2011	2.67	2.74	2.83	2.92	3.03	3.14	3.27	3.42	3.58	3.76	3.97	4.20	4.46	4.73	5.01	5.28	5.49	5.58	5.52	5.27	4.87
2012	2.76	2.80	2.84	2.88	2.93	2.99	3.04	3.10	3.17	3.24	3.32	3.41	3.50	3.60	3.70	3.81	3.91	4.01	4.08	4.13	4.13
2013	3.80	3.84	3.88	3.92	3.98	4.03	4.09	4.16	4.24	4.33	4.42	4.53	4.65	4.78	4.92	5.08	5.23	5.36	5.45	5.45	5.30
2014	2.64	2.72	2.81	2.90	3.01	3.12	3.24	3.37	3.52	3.67	3.84	4.01	4.19	4.37	4.53	4.67	4.77	4.80	4.76	4.63	4.43
2015	4.00	4.06	4.14	4.22	4.31	4.42	4.54	4.68	4.84	5.03	5.25	5.51	5.83	6.20	6.65	7.19	7.81	8.47	9.02	9.16	8.62
2016	3.29	3.41	3.53	3.67	3.82	3.98	4.15	4.33	4.52	4.74	4.96	5.20	5.46	5.73	6.02	6.31	6.61	6.90	7.17	7.41	7.60
2017	7.22	7.29	7.35	7.41	7.47	7.52	7.56	7.58	7.59	7.58	7.55	7.49	7.40	7.28	7.12	6.92	6.69	6.43	6.14	5.83	5.50
2018	5.70	5.86	6.02	6.17	6.33	6.47	6.61	6.73	6.83	6.90	6.94	6.95	6.91	6.83	6.71	6.55	6.35	6.13	5.89	5.63	5.37
2019	9.29	9.40	9.50	9.61	9.71	9.81	9.90	9.97	10.02	10.04	10.01	9.93	9.79	9.57	9.27	8.89	8.43	7.90	7.32	6.71	6.08
2020	7.57	7.59	7.60	7.62	7.64	7.67	7.69	7.72	7.75	7.78	7.81	7.83	7.86	7.87	7.88	7.88	7.86	7.81	7.74	7.62	7.45
2021	5.68	5.68	5.68	5.67	5.67	5.66	5.65	5.64	5.62	5.59	5.55	5.51	5.45	5.38	5.29	5.18	5.05	4.90	4.72	4.53	4.30
2022	4.07	4.15	4.23	4.33	4.43	4.54	4.66	4.79	4.94	5.09	5.26	5.44	5.63	5.82	6.01	6.18	6.31	6.38	6.34	6.19	5.92

Sources: WIND, Invesco analysis. **Past performance is no guarantee of future results.**

“

We believe that long-term investors should not ignore the diversification benefit of lower-risk quant strategies.

allocation to a quant strategy. In the case of a hypothetical investor who cannot forecast manager performance, we find that a higher allocation to the quant strategy better satisfies the overall return and risk objectives. On the other hand, if the investor has a consistently strong forecasting ability, there is a trade-off between return and risk. Then, on average, return objectives are better satisfied through higher allocation to the fundamental manager, while risk objectives can be better achieved through higher allocation to the quant manager. However, the gradient of the trade-off function varies significantly each year, suggesting that higher-risk portfolios are not consistently well compensated. Hence, we believe that long-term investors should not ignore the diversification benefit of lower-risk quant strategies, which can smooth out their portfolio return streams and improve the portfolio information ratio.

About the author

Andrew Tong
Senior Portfolio Manager, Invesco China A Investments
Invesco Quantitative Strategies
Andrew Tong is the co-manager of Invesco China A-Shares Quant Equity Fund and has long-standing experience in factor modeling and portfolio construction.

With contributions from Monica Uttam, Thought Leadership and Insights, Asia Pacific
This is an abridged version of the whitepaper “What is the optimal allocation to quant strategies for China A-share investors?”, May 2023.

Investment risks

The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested. When investing in less developed countries, you should be prepared to accept significantly large fluctuations in value. Investment in certain securities listed in China can involve significant regulatory constraints that may affect liquidity and/or investment performance.

Important information

This publication is intended only for Professional Clients and Financial Advisers in Continental Europe (as defined below); for Qualified Clients/Sophisticated Investors in Israel, for Professional Clients in Dubai, Ireland, the Isle of Man, Jersey and Guernsey, and the UK; for Sophisticated or Professional Investors in Australia; for wholesale investors (as defined in the Financial Markets Conduct Act) in New Zealand; for Professional Investors in Hong Kong; for Institutional Investors and/or Accredited Investors in Singapore; for certain specific sovereign wealth funds and/or Qualified Domestic Institutional Investors approved by local regulators only in the People's Republic of China; for certain specific Qualified Institutions and/or Sophisticated Investors only in Taiwan; for Qualified Professional Investors in Korea; for certain specific institutional investors in Brunei; for Qualified Institutional Investors and/or certain specific institutional investors in Thailand; for certain specific institutional investors in Malaysia; for certain specific institutional investors in Indonesia; for qualified buyers in Philippines for informational purposes only; for Qualified Institutional Investors in Japan; and for one-on-one Institutional Investors in the USA. This document is restricted to investors who are (i) Accredited Investors as such term is defined in National Instrument 45-106, and (ii) Permitted Clients as such term is defined in National Instrument 31-103. It is not intended for and should not be distributed to, or relied upon, by the public or retail investors. By accepting this document, you consent to communicate with us in English, unless you inform us otherwise.

The publication is marketing material and is not intended as a recommendation to invest in any particular asset class, security or strategy. Regulatory requirements that require impartiality of investment/investment strategy recommendations are therefore not applicable nor are any prohibitions to trade before publication. The information provided is for illustrative purposes only, it should not be relied upon as recommendations to buy or sell securities.

For the distribution of this document, Continental Europe is defined as Austria, Belgium, Bulgaria, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Romania, Spain, Sweden and Switzerland.

All articles in this publication are written, unless otherwise stated, by Invesco professionals. The opinions expressed are those of the author or Invesco, are based upon current market conditions and are subject to change without notice. This publication does not form part of any prospectus. This publication contains general information only and does not take into account individual objectives, taxation position or financial needs. Nor does this constitute a recommendation of the suitability of any investment strategy for a particular investor. Neither Invesco Ltd. nor any of its member companies guarantee the return of capital, distribution of income or the performance of any fund or strategy. Past performance is not a guide to future returns. This publication is not an invitation to subscribe for shares in a fund nor is it to be construed as an offer to buy or sell any financial instruments. As with all investments, there are associated inherent risks. This publication is by way of information only. This document has been prepared only for those persons to whom Invesco has provided it. It should not be relied upon by anyone else and you may only reproduce, circulate and use this document (or any part of it) with the consent of Invesco. Asset management services are provided by Invesco in accordance with appropriate local legislation and regulations. Certain products mentioned are available via other affiliated entities. Not all products are available in all jurisdictions.

Canada: In Canada this document is restricted to investors who are (i) Accredited Investors as such term is defined in National Instrument 45-106, and (ii) Permitted Clients as such term is defined in National Instrument 31-103.

Israel: This document may not be reproduced or used for any other purpose, nor be furnished to any other person other than those to whom copies have been sent. Nothing in this document should be considered investment advice or investment marketing as defined in the Regulation of Investment Advice, Investment Marketing and Portfolio Management Law, 1995 ("the Investment Advice Law"). Investors are encouraged to seek competent investment advice from a locally licensed investment advisor prior to making any investment. Neither Invesco Ltd. nor its subsidiaries are licensed under the Investment Advice Law, nor does it carry the insurance as required of a licensee thereunder.

This publication is issued:

– In **Australia** by Invesco Australia Limited (ABN 48 001 693 232), Level 26, 333 Collins Street, Melbourne, Victoria, 3000, Australia which holds an Australian Financial Services Licence number 239916. This document has been prepared only for those persons to whom Invesco has provided it. It should not be relied upon by anyone else. Information contained in this document may not have been prepared or tailored for an Australian audience and does not constitute an offer of a financial product in Australia. You may only reproduce, circulate and use this document (or any part of it) with the consent of Invesco. The information in this document has been prepared without taking into account any investor's investment objectives, financial situation or particular needs. Before acting on the information the investor should consider its appropriateness having regard to their investment objectives, financial situation and needs.
  This document has not been prepared specifically for Australian investors. It:
  - may contain references to dollar amounts which are not Australian dollars;
  - may contain financial information which is not prepared in accordance with Australian law or practices;
  - may not address risks associated with investment in foreign currency denominated investments; and - does not address Australian tax issues.

– In **New Zealand** by Invesco Australia Limited (ABN 48 001 693 232), Level 26, 333 Collins Street, Melbourne, Victoria, 3000, Australia which holds an Australian Financial Services Licence number 239916. This document is issued only to wholesale investors (as defined in the Financial Markets Conduct Act) in New Zealand to whom disclosure is not required under Part 3 of the Financial Markets Conduct Act. This document has been prepared only for those persons to whom it has been provided by Invesco. It should not be relied upon by anyone else and must not be distributed to members of the public in New Zealand. Information contained in this document may not have been prepared or tailored for a New Zealand audience. You may only reproduce, circulate and use this document (or any part of it) with the consent of Invesco. This document does not constitute and should not be construed as an offer of, invitation or proposal to make an offer for, recommendation to apply for, an opinion or guidance on Interests to members of the public in New Zealand. Applications or any requests for information from persons who are members of the public in New Zealand will not be accepted.

– In **Austria** and **Germany** by Invesco Asset Management Deutschland GmbH, An der Welle 5, 60322 Frankfurt am Main, Germany.

– In **Continental Europe** by Invesco Management S.A., President Building, 37A Avenue JF Kennedy, L-1855 Luxembourg, regulated by the Commission de Surveillance du Secteur Financier, Luxembourg.

– In **Jersey**, **Guernsey**, the **Isle of Man**, **Israel** and the **UK** by Invesco Asset Management Limited, Perpetual Park, Perpetual Park Drive, Henley-on-Thames, Oxfordshire, RG9 1HH, United Kingdom. Authorised and regulated by the Financial Conduct Authority.

– In **Dubai** Invesco Asset Management Limited, Index Tower Level 6 - Unit 616, P.O. Box 506599, Al Mustaqbal Street, DIFC, Dubai, United Arab Emirates. Regulated by the Dubai Financial Services Authority.

– in **Hong Kong** by INVESCO HONG KONG LIMITED 景順投資管理有限公司, 45/F Jardine House, 1 Connaught Place, Central, Hong Kong.

– In **Japan** by Invesco Asset Management (Japan) Limited, Roppongi Hills Mori Tower 14F, 6-10-1 Roppongi, Minato-ku, Tokyo 106-6114; Registration Number: The Director-General of Kanto Local Finance Bureau (Kin-sho) 306; Member of the Investment Trusts Association, Japan and the Japan Investment Advisers Association.

– in **Singapore** by Invesco Asset Management Singapore Ltd, 9 Raffles Place, #18-01 Republic Plaza, Singapore 048619.

– in **Switzerland** by Invesco Asset Management (Schweiz) AG, Talacker 34, 8001 Zurich, Switzerland.

– In **Taiwan** by Invesco Taiwan Limited, 22F, No.1, Songzhi Road, Taipei 11047, Taiwan (0800-045-066). **Invesco Taiwan Limited is operated and managed independently.**

– In **Canada** by Invesco Canada Ltd., 120 Bloor Street East, Suite 700, Toronto, Ontario, M4W 1B7.

– In the **US** by Invesco Advisers, Inc., 1331 Spring Street NW, Suite 2500, Atlanta, GA 30309.

www.invesco.com

II-GIRR-BRO4-4-E GL3239556/GL3242029 11/23