

Efficiency of Japanese corporate investment in human capital and shareholder value

1 December 2020

Yasushi Ishikawa, Ph.D., Head of Equity Fund Management Department, Head of Alternative Investment Fund Management Department, and Joint Head of Global Multi Asset

Kyoji Hasegawa, Quantitative Analyst, Technology Fund Management Department



This report is an adaptation of Ishikawa and Hasegawa's *Efficiency of Japanese Corporate Investment in Human Capital and Shareholder Value*, which won the Security Analysts Association of Japan's Security Analysts Journal Prize in 2019.

(https://www.saa.or.jp/english/publications/2020_ishikawa_hasegawa.pdf)

Abstract

- Japan struggles with an aging and shrinking population and it is important for the country, both from an economic and social perspective, to improve its relatively low labour productivity by efficiently utilising its human resources.
- By estimating Japanese companies' efficiency of human capital investments, we argue based on empirical analysis that higher human capital efficiency leads to higher share price performance.
- Furthermore, our analysis indicates that this positive relationship is particularly enhanced among stocks of firms with lower labour productivity, which must be encouraging for Japanese companies which are lower in labour productivity relative to those of other developed countries.



Japan struggles with an aging and shrinking population...it is important for the country to improve its relatively low labour productivity by an efficient utilisation of its human resources.

Japanese companies and investment efficiency in human capital

In Japan, where the workforce is expected to decline as its population grows older and decreases, effectively utilizing limited human resources is an important theme for both individual companies and society as a whole.

Japan's labour productivity (defined as GDP/number of workers) ranks 21st among the 35 OECD member countries and bottom among the seven major developed countries (G7). This inefficiency has been attributed to persistent deflation and long but inefficient working hours which a significant portion of its workforce has been subject to.

It is essential for Japanese companies to create additional value that exceeds increases in labour costs—in other words, to improve labour productivity through efficient investment in human capital—in order to encourage companies to hire more workers and increase wages.

If this trend leads to an increase in consumption, it also raises the likelihood the economy making a break from deflation. We defined human capital investment efficiency as the sensitivity of changes in labour productivity to the change rate in the number of employees and investigated the relationship between human capital investment efficiency and shareholder value. Our research can be positioned broadly as an empirical study of the effectiveness of investments focused on the "S" component of ESG; that is, how corporate efforts to address the social issue of employment affects shareholder value.

Research on the relationship between general investments, such as capital investment, and stock returns has progressed significantly in recent years. These studies observed that companies whose investment is increasing, or is at a high level, have subsequently underperformed the market. It has been argued that this is because investors tend to underestimate the possibility of overinvestment by companies that are aggressively investing and expect such companies to grow faster, which can lead to the overvaluation of equity prices and subsequently cause them to underperform.

As for studies regarding the efficiency of investments, Cohen et al. [2013] defined the sensitivity of subsequent sales growth to research and development (R&D) expenditures as investment efficiency which they called "Ability", and observed that the efficiency of R&D investment has a positive relationship with subsequent stock returns in the US, Japan, the UK and Germany. Based on these results, they discussed the possibility that information on investment efficiency may be anomaly information that has not been fully priced into the market.

Ishikawa et al. [2017] applied a similar approach to capital investment, R&D and human capital investment to examine the relationship between investment efficiency and shareholder value (stock returns and ROE) at Japanese companies. They observed that high human capital investment efficiency has a positive effect on subsequent shareholder value, especially in labour-intensive companies with low sales per employee (i.e., low labour productivity).

Based on our earlier work (Ishikawa and Hasegawa, 2018), which examined the potential of ESG investment from the perspective of Creating Shared Value (CSV), we further advanced the study of the relationship between investment efficiency in human capital and shareholder value with a focus on improvements in labour productivity in this paper.

Human capital investment efficiency and stock returns

Efficiency of Japanese corporate investment in human capital

Companies with efficient human capital investment are those that, by increasing the number of employees, create additional value that exceeds the additional labour costs and therefore improve their labour productivity.

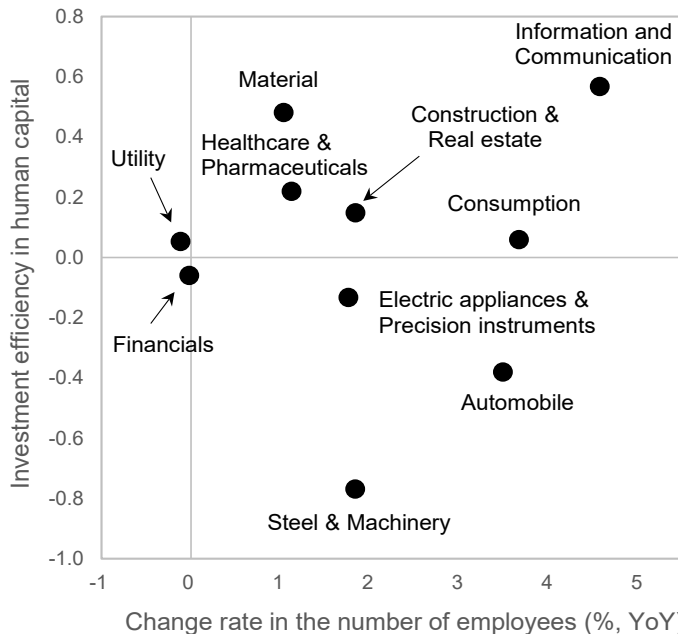
Labour productivity for individual companies is defined as value-added (= operating income + depreciation and amortization + labour costs) divided by labour costs. The idea is to calculate the value that is added purely by the company by rebating the cost of sales activities, and then evaluate how many times the amount of labour costs the value-added is equivalent to.

Our analysis of the time-series average of the median labour productivity for the TOPIX 500 constituents from March 2002 to February 2018 showed that the industries with the highest human capital investment efficiency was information and communication, material, and healthcare & pharmaceuticals. Conversely, the industry with the lowest human capital investment efficiency is steel & machinery, followed by automobile and electric appliances & precision instruments. Information and communication, which represents the "new economy", appears to show high investment efficiency, while heavy industries, such as steel & machinery and automobile, which represent the "old economy", appear to show low investment efficiency.

Exhibit 1 shows scatter plots between human capital investment efficiency and the change rate in the number of employees by industry, which is based on the time-series average for the median within each industry (we used 10 industry categories based on the Tokyo Stock Exchange's 33 industries).

“ Companies with efficient human capital investment are those that, by increasing the number of employees, create additional value that exceeds the additional labour costs and therefore improve their labour productivity.

Exhibit 1. Human capital investment efficiency and change in number of employees in major Japanese firms by industry



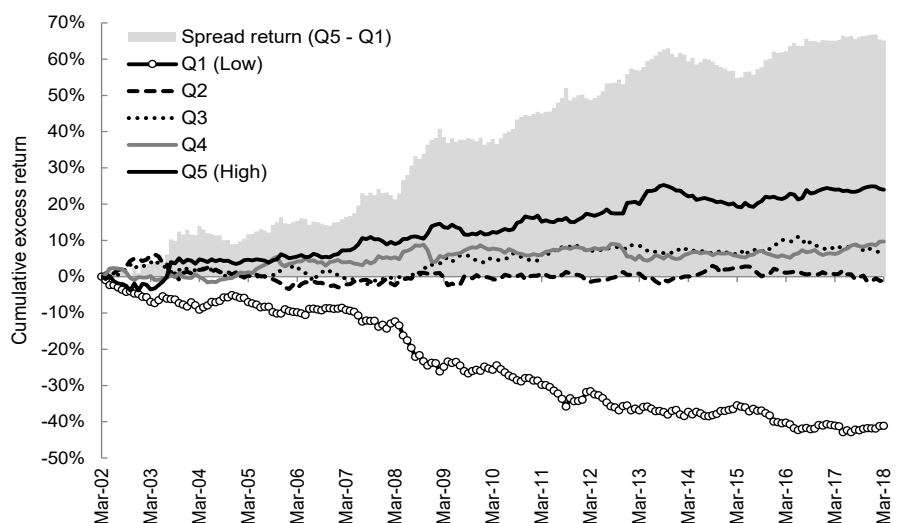
Note: The analysis period is from April 2002 to March 2018, and the universe is the TOPIX 500 constituents. The time series average of the median price within each industry calculated on a monthly basis is shown.

Investment efficiency and stock returns

Next, we examined the relationship between human capital investment efficiency and stock returns through a grouping analysis of TOPIX 500 constituents from April 2002 to March 2018. At the end of each month, companies were divided into five quintiles based on their human capital investment efficiency levels standardized within each industry, and five equally-weighted baskets were constructed. The quintile with the highest human capital investment efficiency significantly outperformed, while the quintile with the lowest human capital investment efficiency significantly underperformed.

Exhibit 2. Grouping analysis by investment efficiency in human capital

Cumulative excess returns of quintiles by investment efficiency in human capital (industry neutral)



(annualized)	Q1 (Low)	Q2	Q3	Q4	Q5 (High)	Q5 - Q1 (High-Low)
Excess return	-2.57%	-0.07%	0.42%	0.61%	1.50%	4.07%
Tracking error	2.85%	2.65%	2.35%	2.39%	2.84%	4.12%
Information ratio	-0.90	-0.02	0.18	0.25	0.53	0.99
(t-value of excess return)	(-3.59)***	(-0.10)	(0.71)	(1.01)	(2.10)**	(3.94)***

Note: The analysis period is April 2002 to March 2018, and the universe is the TOPIX 500 constituents. Top chart shows cumulative excess returns of equal-weighted quintiles based on investment efficiency in human capital, relative to the equal-weighted universe (TOPIX 500). The quintiles are rebalanced monthly. The bottom table shows the performance summary where *, ** and *** indicate the significance at 10%, 5% and 1% in the t-value of excess returns.

Stock selection, labour productivity level and human capital investment efficiency: Their impact on shareholder value

Labour productivity and stock returns

Next, we examined how the level of labour productivity itself is related to subsequent stock returns and the impact it has on the relationship between human capital investment efficiency and shareholder value.

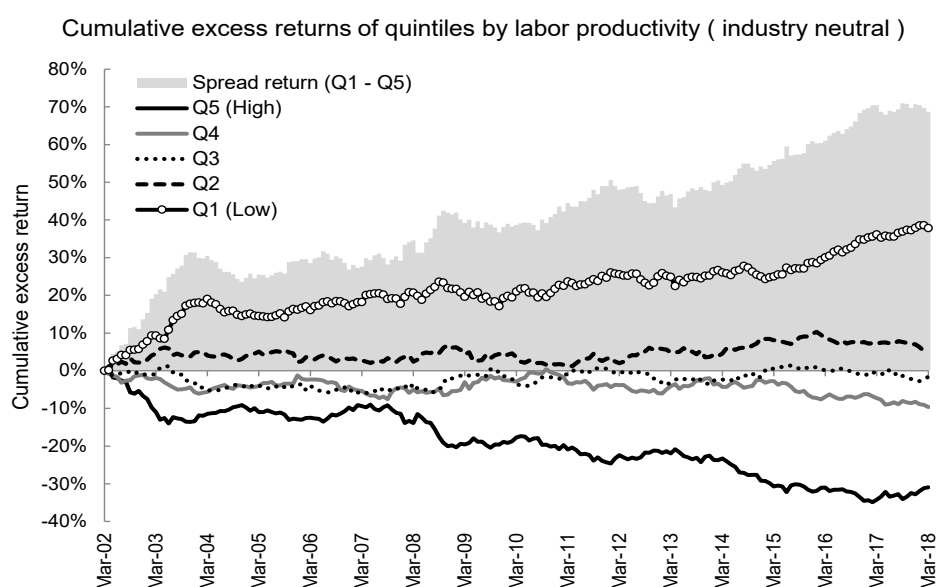
We based our analysis on the knowledge from prior studies, which suggest that stocks of companies with lower productivity subsequently show higher returns. We again used the TOPIX 500 as the universe, covering a period from April 2002 to March 2018. We constructed five equally-weighted quantile baskets at the end of each month based on the standardized level of labour productivity within each industry. Our analysis showed that the basket with the lowest labour productivity produced significantly positive excess

stock returns, while the basket with the highest labour productivity produced significantly negative excess stock returns.

On the other hand, since lower labour productivity is equivalent to higher labour distribution, lower labour productivity can be interpreted as a reflection of companies actively returning profits to employees. In this case, the tendency for companies with lower labour productivity having higher stock returns can be said that companies more proactive in returning profits to their employees tend to have higher stock returns. In the Japanese market, it has been observed that companies with strong reputations for human capital utilisation (Saito and Ito [2017]) and higher job satisfaction among employees (Yamada et al. [2017]) tend to have higher stock returns, which is consistent with the observation here if higher labour distribution is associated with a stronger reputation for human capital utilisation and higher employee job satisfaction.

“
...since lower labour productivity is equivalent to higher labour distribution, lower labour productivity can be interpreted as a reflection of companies actively returning profits to employees.

Exhibit 3. Grouping analysis by labour productivity



(annualized)	Q 1 (Low)	Q 2	Q 3	Q 4	Q 5 (High)	Q1 - Q5 (Low-High)
Excess return	2.36%	0.35%	-0.10%	-0.60%	-1.93%	4.29%
Tracking error	2.99%	2.41%	2.34%	2.50%	3.02%	4.85%
Information ratio	0.79	0.15	-0.04	-0.24	-0.64	0.89
(t-value of excess return)	(3.15)***	(0.58)	(-0.09)	(-0.74)	(-2.55)**	(3.53)***

Note: The analysis period is April 2002 to March 2018, and the universe is the TOPIX 500 constituents. Top chart shows cumulative excess returns of equal-weighted quintiles based on labor productivity, relative to the equal-weighted universe (TOPIX 500). The quintiles are rebalanced monthly. The bottom table shows the performance summary where *, ** and *** indicate the significance at 10%, 5% and 1% in the t-value of excess returns.

The impact of labour productivity and investment efficiency in human capital on shareholder value

Further analysis revealed that companies with lower levels of labour productivity tended to have higher subsequent stock returns. In particular, we found that companies with low labour productivity and high human capital investment efficiency generate significant positive excess returns accompanied by improvements in ROE, and conversely, companies with high labour productivity and low human capital investment efficiency generate significant negative excess returns accompanied by deterioration in ROE.

Our grouping analysis period was from September 2002 to August 2018; we divided the universe into three independent groups based on the levels of labour productivity and

human capital investment efficiency (taking into account industry neutrality), constructed a total of nine equally-weighted baskets, and examined their features.

Exhibit 4 measures, among other things, the one-year forward change in ROE relative to the universe (top right table), along with the one-year excess return (top left table) for the nine baskets constructed by the annual rebalancing.

We found that the group with the highest labour productivity and the lowest investment efficiency in human capital significantly underperformed, while the group with the lowest labour productivity and the highest investment efficiency in human capital significantly outperformed.

Exhibit 4. Grouping analysis independently sorted by labour productivity and investment efficiency in human capital

Annual rebalancing base under industry neutral (Sep 2002 – August 2018)

Annualized excess returns (vs. universe)	Investment efficiency in HC			3 - 1 (High - Low)	1-year forward ROE change (vs. universe)	Investment efficiency in HC			3 - 1 (High - Low)
	1 (Low)	2	3 (High)			1 (Low)	2	3 (High)	
Labor productivity 1 (Low)	0.61% (0.62)	1.02% (1.43)	2.20% ** (2.15)	1.58% (1.65)	Labor productivity 1 (Low)	1.54% * (2.10)	0.85% ** (2.57)	1.73% ** (2.66)	0.18% (0.19)
2	-0.74% (-1.18)	0.27% (0.29)	0.73% (0.96)	1.46% (1.48)	2	-1.02% ** (-2.27)	-0.14% (-0.46)	0.12% (0.46)	1.13% * (2.08)
3 (High)	-2.43% ** (-2.58)	-1.33% (-0.95)	-0.30% (-0.41)	2.14% ** (2.65)	3 (High)	-1.37% *** (-3.71)	-0.85% * (-1.99)	-0.54% (-1.44)	0.83% * (1.79)
3 - 1 (High - Low)	-3.05% * (-1.78)	-2.35% (-1.27)	-2.49% (-1.65)		3 - 1 (High - Low)	-2.91% *** (-3.27)	-1.70% ** (-2.67)	-2.27% *** (-3.03)	

Investment efficiency in HC	Investment efficiency in HC			3 - 1 (High - Low)	Chg of employee # (% YoY)	Investment efficiency in HC			3 - 1 (High - Low)
	1 (Low)	2	3 (High)			1 (Low)	2	3 (High)	
Labor productivity 1 (Low)	-19.36 *** (-5.57)	-0.24 (-0.68)	14.93 *** (16.35)	34.29 *** (9.66)	Labor productivity 1 (Low)	2.06 *** (3.75)	1.96 *** (3.95)	1.61 *** (3.13)	-0.45 (-1.04)
2	-17.00 *** (-5.62)	-0.03 (-0.09)	14.25 *** (16.94)	31.25 *** (10.70)	2	2.95 *** (6.06)	4.43 *** (9.01)	2.73 *** (5.51)	-0.22 (-0.62)
3 (High)	-41.77 *** (-6.87)	-0.06 (-0.14)	33.57 *** (20.78)	75.34 *** (11.55)	3 (High)	3.57 *** (6.00)	6.30 *** (9.84)	3.77 *** (9.53)	0.20 (0.43)
3 - 1 (High - Low)	-22.41 *** (-5.47)	0.18 (0.93)	18.64 *** (9.51)		3 - 1 (High - Low)	1.51 ** (2.76)	4.34 *** (9.69)	2.16 *** (6.69)	

Note: Based on annual rebalancing at the end of August, the universe (TOPIX 500) are divided into three independent groups by labor productivity (industry-adjusted) and investment efficiency in human capital (industry-adjusted) independently, and total of nine groups are constructed. The top panels show the annualized excess return on the universe (equally weighted) over the next year, and the one-year ROE change (vs. universe) for each group. The bottom panels show the time-series average of human capital investment efficiency and change rate of the number of employees (year-on-year). The analysis period is from September 2002 to August 2018. Numbers in parentheses indicate t-values, where *, ** and *** are significant at 10%, 5% and 1%, respectively.

We can see that the higher (lower) ROE of companies with higher (lower) labour productivity tend to revert to the mean and deteriorate (improve) in one year. In particular, the ROE of companies with high labour productivity and low human capital investment efficiency have deteriorated the following year with high significance, while companies with low labour productivity and high human capital investment efficiency have improved their ROE in the following year with high significance.

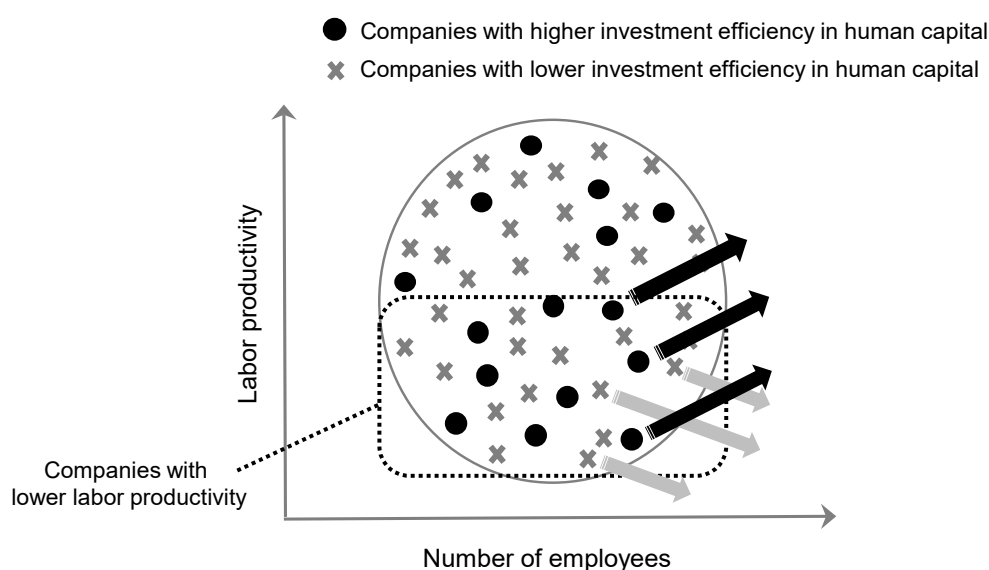
These observations suggest that companies with low labour productivity and high human capital investment efficiency have more room to improve their ROE and can therefore increase shareholder value by efficiently increasing the number of employees (see Exhibit 5).

On the other hand, the lower right-hand corner of Exhibit 4 shows the average change rate in the number of employees in each basket (year-on-year), where the change rate in

the number of employees is significantly positive for all groups, but the change rate in the number of employees also tends to increase as labour productivity increases.

Given these results, it can be stated that companies with lower labour productivity and higher investment efficiency in human capital (positive efficiency on average) tend to increase shareholder value by increasing employees efficiently. Conversely, companies with higher labour productivity and lower investment efficiency in human capital (negative efficiency on average) tend to damage shareholder value by increasing employees inefficiently. In particular, the high degree of damage to shareholder value found in the latter group of companies could be due to the high pace of employee growth despite the high degree of negative investment efficiency in human capital.

Exhibit 5. Interaction between labour productivity and human capital investment efficiency



Conclusion

We examined the effect of investment efficiency in human capital on shareholder value in Japan, mainly stock returns, by defining this efficiency as the sensitivity of the change in labour productivity to the prior change rate in the number of employees. Companies with higher efficiency in investing in human capital tended to have higher subsequent returns. Furthermore, companies with lower levels of labour productivity tended to have higher subsequent stock returns. In particular, we found that companies with low labour productivity and high human capital investment efficiency generate significant positive excess returns accompanied by improvements in ROE, and conversely, companies with high labour productivity and low human capital investment efficiency generate significant negative excess returns accompanied by deteriorations in ROE.

We observed that positive contributions from efficient investment in human capital have a greater significance for companies with lower labour productivity. This is an encouraging result for Japanese companies, which are under pressure to improve their labour productivity by investing efficiently in a limited labour force, with Japan's labour productivity being one of the lowest among the major industrialized countries.

Finally, we also observed that companies that have experienced a significant decline in labour productivity as a result of reducing the number of their employees are also identified to be highly efficient in their human capital investment.

Important information: This document is prepared by Nikko Asset Management Co., Ltd. and/or its affiliates (**Nikko AM**) and is for distribution only under such circumstances as may be permitted by applicable laws. This document does not constitute personal investment advice or a personal recommendation and it does not consider in any way the objectives, financial situation or needs of any recipients. All recipients are recommended to consult with their independent tax, financial and legal advisers prior to any investment.

This document is for information purposes only and is not intended to be an offer, or a solicitation of an offer, to buy or sell any investments or participate in any trading strategy. Moreover, the information in this document will not affect Nikko AM's investment strategy in any way. The information and opinions in this document have been derived from or reached from sources believed in good faith to be reliable but have not been independently verified. Nikko AM makes no guarantee, representation or warranty, express or implied, and accepts no responsibility or liability for the accuracy or completeness of this document. No reliance should be placed on any assumptions, forecasts, projections, estimates or prospects contained within this document. This document should not be regarded by recipients as a substitute for the exercise of their own judgment. Opinions stated in this document may change without notice.

In any investment, past performance is neither an indication nor guarantee of future performance and a loss of capital may occur. Estimates of future performance are based on assumptions that may not be realised. Investors should be able to withstand the loss of any principal investment. The mention of individual securities, sectors, regions or countries within this document does not imply a recommendation to buy or sell.

Nikko AM accepts no liability whatsoever for any loss or damage of any kind arising out of the use of all or any part of this document, provided that nothing herein excludes or restricts any liability of Nikko AM under applicable regulatory rules or requirements.

All information contained in this document is solely for the attention and use of the intended recipients. Any use beyond that intended by Nikko AM is strictly prohibited.

Japan: The information contained in this document pertaining specifically to the investment products is not directed at persons in Japan nor is it intended for distribution to persons in Japan. Registration Number: Director of the Kanto Local Finance Bureau (Financial Instruments firms) No. 368 Member Associations: The Investment Trusts Association, Japan/Japan Investment Advisers Association.

United Kingdom and rest of Europe: This document is communicated by Nikko Asset Management Europe Ltd, which is authorised and regulated in the United Kingdom by the Financial Conduct Authority (the FCA) (FRN 122084). This document constitutes a financial promotion for the purposes of the Financial Services and Markets Act 2000 (as amended) (FSMA) and the rules of the FCA in the United Kingdom, and is directed at professional clients as defined in the FCA Handbook of Rules and Guidance.

United States: This document may not be duplicated, quoted, discussed or otherwise shared without prior consent. Any offering or distribution of a Fund in the United States may only be conducted via a licensed and registered broker-dealer or a duly qualified entity. Nikko Asset Management Americas, Inc. is a United States Registered Investment Adviser.

Singapore: This document is for information to institutional investors as defined in the Securities and Futures Act (Chapter 289), and intermediaries only. Nikko Asset Management Asia Limited (Co. Reg. No. 198202562H) is regulated by the Monetary Authority of Singapore.

Hong Kong: This document is for information to professional investors as defined in the Securities and Futures Ordinance, and intermediaries only. The contents of this document have not been reviewed by the Securities and Futures Commission or any regulatory authority in Hong Kong. Nikko Asset Management Hong Kong Limited is a licensed corporation in Hong Kong.

Australia: This document is issued in Australia by Nikko AM Limited (ABN 99 003 376 252, AFSL 237563). It is for the use of wholesale clients, researchers, licensed financial advisers and their authorised representatives only.

New Zealand: This document is issued in New Zealand by Nikko Asset Management New Zealand Limited (Company No. 606057, FSP22562). It is for the use of wholesale clients, researchers, licensed financial advisers and their authorised representatives only.

Kingdom of Bahrain: The document has not been approved by the Central Bank of Bahrain which takes no responsibility for its contents. No offer to the public to purchase the Strategy will be made in the Kingdom of Bahrain and this document is intended to be read by the addressee only and must not be passed to, issued to, or shown to the public generally.

Kuwait: This document is not for general circulation to the public in Kuwait. The Strategy has not been licensed for offering in Kuwait by the Kuwaiti Capital Markets Authority or any other relevant Kuwaiti government agency. The offering of the Strategy in Kuwait on the basis a private placement or public offering is, therefore, restricted in accordance with Decree Law No. 7 of 2010 and the bylaws thereto (as amended). No private or public offering of the Strategy is being made in Kuwait, and no agreement relating to the sale of the Strategy will be concluded in Kuwait. No marketing or solicitation or inducement activities are being used to offer or market the Strategy in Kuwait.

Kingdom of Saudi Arabia: This document is communicated by Nikko Asset Management Europe Ltd (Nikko AME), which is authorised and regulated by the Financial Services and Markets Act 2000 (as

amended) (FSMA) and the rules of the Financial Conduct Authority (the FCA) in the United Kingdom (the FCA Rules). This document should not be reproduced, redistributed, or sent directly or indirectly to any other party or published in full or in part for any purpose whatsoever without a prior written permission from Nikko AME.

This document does not constitute investment advice or a personal recommendation and does not consider in any way the suitability or appropriateness of the subject matter for the individual circumstances of any recipient. In providing a person with this document, Nikko AME is not treating that person as a client for the purposes of the FCA Rules other than those relating to financial promotion and that person will not therefore benefit from any protections that would be available to such clients.

Nikko AME and its associates and/or its or their officers, directors or employees may have or have had positions or material interests, may at any time make purchases and/or sales as principal or agent, may provide or have provided corporate finance services to issuers or may provide or have provided significant advice or investment services in any investments referred to in this document or in related investments. Relevant confidential information, if any, known within any company in the Nikko AM group or Sumitomo Mitsui Trust Holdings group and not available to Nikko AME because of regulations or internal procedure is not reflected in this document. The investments mentioned in this document may not be eligible for sale in some states or countries, and they may not be suitable for all types of investors.

Oman: The information contained in this document neither constitutes a public offer of securities in the Sultanate of Oman as contemplated by the Commercial companies law of Oman (Royal decree 4/74) or the Capital Markets Law of Oman (Royal Decree 80/98), nor does it constitute an offer to sell, or the solicitation of any offer to buy non-Omani securities in the Sultanate of Oman as contemplated by Article 139 of the Executive Regulations to the Capital Market law (issued by Decision No. 1/2009). This document is not intended to lead to the conclusion of any contract of whatsoever nature within the territory of the Sultanate of Oman.

Qatar (excluding QFC): The Strategies are only being offered to a limited number of investors who are willing and able to conduct an independent investigation of the risks involved in an investment in such Strategies. The document does not constitute an offer to the public and should not be reproduced, redistributed, or sent directly or indirectly to any other party or published in full or in part for any purpose whatsoever without a prior written permission from Nikko Asset Management Europe Ltd (Nikko AME). No transaction will be concluded in your jurisdiction and any inquiries regarding the Strategies should be made to Nikko AME.

United Arab Emirates (excluding DIFC): This document and the information contained herein, do not constitute, and is not intended to constitute, a public offer of securities in the United Arab Emirates and accordingly should not be construed as such. The Strategy is only being offered to a limited number of investors in the UAE who are (a) willing and able to conduct an independent investigation of the risks involved in an investment in such Strategy, and (b) upon their specific request.

The Strategy has not been approved by or licensed or registered with the UAE Central Bank, the Securities and Commodities Authority or any other relevant licensing authorities or governmental agencies in the UAE. This document is for the use of the named addressee only and should not be given or shown to any other person (other than employees, agents or consultants in connection with the addressee's consideration thereof).

No transaction will be concluded in the UAE and any inquiries regarding the Strategy should be made to Nikko Asset Management Europe Ltd.

Republic of Korea: This document is being provided for general information purposes only, and shall not, and under no circumstances is, to be construed as, an offering of financial investment products or services. Nikko AM is not making any representation with respect to the eligibility of any person to acquire any financial investment product or service. The offering and sale of any financial investment product is subject to the applicable regulations of the Republic of Korea. Any interests in a fund or collective investment scheme shall be sold after such fund is registered under the private placement registration regime in accordance with the applicable regulations of the Republic of Korea, and the offering of such registered fund shall be conducted only through a locally licensed distributor.