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The Role of Sub-Sector REITs in Mixed-Asset Portfolios in Japan

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Abstract

In this paper, I assess the significance, risk-adjusted performance, and portfolio diversification benefits of sub-sector REITs in Japan and their strategic role in a mixed-asset portfolio over 2010–2015. I track the performance of seven sub-sector REITs and compare them with shares, bonds, unlisted property funds, and listed property companies in Japan. The results show that non-traditional REIT sectors, such as hotel and industrial REITs, provide the best risk-adjusted returns among the sub- sector REITs over 2010–2015 and have relatively low correlations with other assets, including shares, bonds, unlisted property funds, and property companies. The findings of this study facilitate additional property investment strategies for many fund managers, institutional investors, and pension funds that have invested or plan to invest in REITs market in Japan.

1. Introduction

Real estate investment trusts (REITs) have played a significant role as property investment vehicles in Asia-Pacific over last 15 years. Asia-Pacific is the second biggest REIT region globally, with a total market capitalization of over USD 304 billion (EPRA 2015a).

Exhibit 1 presents the size of the global REIT market and, as of September 2015, it was over USD 1,521 billion in total market capitalization, with over 697 REITs in 23 countries. There were 226 REITs in over nine countries in the Asia-Pacific region, accounting for

20.01% of the global REIT market, exceeded only by the Americas (66.58%). Australia is the second biggest REIT market, next only to the United States (#1); Japan (#3), Singapore (#7), and Hong Kong (#8) were listed in the top 10 REIT markets in the world (EPRA 2014, 2015a). Since 2016, Japan has been competing with Australia for being the largest REIT market in the Asia-Pacific region.

Exhibit 1: Size of the global REITs market

Region	No of REITs	Market Cap (USD M)	Global REITs Market (%)
Europe	128	182,945	12.03%
Americas	310	1,012,917	66.58%
Asia-Pacific	**226**	**304,364**	**20.01%**
Africa	33	21,102	1.39%
Global	697	1,521,327	100%

Source: Author's compilation from EPRA (2015a, 2014) and local stock exchanges

* EPRA REITs survey data in 2015 were used for most countries, but 2014 EPRA survey data or local stock exchange data were used for a few countries, such as Mexico, Singapore, France and the UK, where the information was not clear in 2015 survey.

Exhibit 2: FTSE EPRA/NAREIT index sector breakdown: 2015

	Developed Market			Emerging Market		
Sector	**No of REITs**	**Market Cap (USD M)**	**Weight %**	**No of REITs**	**Market Cap (USD M)**	**Weight %**
Diversified	96	346,637	27.0%	91	84,099	59.3%
Health Care	21	94,044	7.3%	1	425	0.3%
Industrial	23	67,953	5.3%	5	6,831	4.8%
Industrial/Office Mixed	10	25,114	2.0%	2	585	0.4%
Lodging/Resorts	20	45,112	3.5%	2	726	0.5%
Office	54	156,669	12.2%	2	525	0.4%
Residential	31	170,763	13.3%	30	37,189	26.2%
Retail	63	321,511	25.0%	17	11,466	8.1%
Self-Storage	6	58,067	4.5%	-	-	-
Totals	324	**1,285,870**	100%	150	**141,846**	100%

Source: Author's compilation from FTSE Russell (2015)

Exhibit 2 shows the decomposition of the FTSE EPRA / NAREIT index, dividing the market by developed and emerging markets. As of December 2015, although the diversified sector is the major portion of the market, sector-specific real estate investments are very active in the developed countries. The developed markets show well-distributed sector portfolios throughout the sub-sectors, but the emerging markets have skewed its distribution to diversified (59.3%), residential (26.2%), retail (8.1%), and industrial (4.8%). This is due to the lack of quality assets and transparency issues in emerging markets. However, it also shows the great potential of the sub-sector real estate markets in the emerging market once the real estate investment market becomes mature and transparent.

Many real estate fund managers and institutional investors now consider more targeted asset classes and sub-sectors as it is becoming very difficult to find attractive assets with the potential to meet their target returns. Over the last few years, there has been a significant increase in sub-sector investment activities across the global real estate universe. Traditional REIT sectors, such as office and retail, have gradually been losing their market share and non-traditional REIT sectors, such as hotel, healthcare, logistics, and other specialty sectors, have grown significantly and increased their market positions (CBRE 2015). Sub-sector REITs provide investors with good liquidity, diversification benefits, and strong income returns via attractive dividends while being managed by professional real estate managers with strong corporate governance.

Japan introduced REITs in 2001, being the first in Asia. As of March 2016, there were 53 REITs listed on the Japan Stock Exchange with a market capitalization of USD 102.4 billion, the highest in Asia-Pacific. Japan's commercial real estate market was estimated at USD $2.7 trillion in 2011, with 10.1% of global market share, the second highest worldwide and first in the Asia-Pacific region. Given the significant size of the commercial real estate market as the second largest globally and REIT market as the largest in the Asia-Pacific region, as well as the potential development of sub-sector real estate investments, it is important to investigate the significance and performance of sub-sector REITs in Japan and their roles in a mixed asset portfolio.

However, many early stage real estate studies in Japan focused on direct real estate or real estate companies. Maroney and Naka (2006) examined the diversification benefits of Japanese real estate for a 40-year period using a spanning test from Japanese investors' viewpoints. They found that all types of real estate in Japan delivered good diversification benefits in mixed-asset portfolios, but there were some limitations to the study, such as tax issues, costs, and excluding rental income from the analysis.

A number of studies on Japan REITs (J-REITs) have been published. Kutsuna, Dimovski and Brooks (2008) examined the IPOs of 40 Japanese REITs to find the relation between the final offer and price movement, particularly on the first day of listing. Su, Huang and Pai (2010) discussed and compared the characteristics of J- REITs with U.S. REITs. They found that the "hybrid" characteristics of REITs have features that are similar to both stocks and bonds. Ong, Ooi and Kawaguichi (2011), Ooi, Ong and Neo (2011) and Guojie and Michayluk (2015) conducted studies on REIT mergers and acquisitions (M&As) and their return characteristics in Japan.

One of most recent empirical analyses of J-REITs was done by Newell and Peng (2012). They assessed the risk-adjusted performance and diversification benefits of J- REITs over 2001–2011. At the time of the research, it was the largest REIT market in Asia and fifth largest in the world. Monthly total returns from the S&P J-REIT total return index, as well as the corresponding stock, bond, and property companies' indices were used for the analysis. Over the sample period, J-REITs provided the best risk-adjusted performance (based on the Sharpe ratio), followed by J-Bonds, J- Property Companies, and J-Stocks. A portfolio including J-REITs, stocks, and bonds outperformed all other portfolios without J-REITs, suggesting the significant role of J-REITs in mixed-asset portfolios. The risk-adjusted performance of J-REITs was even better in the post-GFC period.

More recently, Shimizu et al. (2015) investigated a new method to estimate commercial property price indexes using J-REIT data. They found that the price of REITs could be useful to tract the commercial price. However, no empirical analysis on sub-sector REITs and their characteristics has been found.

Based on the literature review, real estate market analysis, and the significance of sub-sector REITs, four research questions are raised:

1. What are the risk and return characteristics of each sub-sector REIT in Japan and how are these characteristics distinguished from overall REITs in Japan?
2. What is the risk-return performance of sub-sector J-REITs compared to stocks, bonds, property companies, unlisted property funds, and overall REITs?
3. Which sub-sector REITs in Japan can provide the biggest benefits to local and international investors in mixed-asset portfolios?
4. What are the optimal levels of sub-sector REITs in Japan in domestic and international contexts?

To assist in answering the above research questions, the following hypothesis is proposed: Sub-sector REITs in Japan have their own investment characteristics, which are distinguished from overall benchmark REITs, and as a result, the particular sector can provide more benefits to investors than overall REIT investments.

As such, the purpose of this paper is to assess the significance, risk-adjusted performance, and portfolio diversification benefits of sub-sector REITs in Japan and their strategic role in a mixed-asset portfolio in Japan. I track the performance of seven sub-sector REITs (diversified, office, retail, industrial, residential, hotel, and a benchmark REIT) and compare them with stocks, bonds, unlisted property funds, and listed property companies in Japan. Due to the lack of history and the accessibility of data, the sample period for this study is from 2010:Q1 to 2015:Q4. In the sections below, I address the research questions.

2. Significance of commercial real estate in Japan

Japan is the third largest economy in the world, after the U.S. (#1) and China (#2). Although the GDP growth rate in Japan has been low in recent years, (0% in 2014 and 0.5% in 2015), this is an improvement from negative GDP growth in 2011 (-1.2%) and expected to reach 1% in 2017 (OECD 2016). The Japan Exchange Group is the third largest stock exchange globally. There are 3,487 companies listed on the exchange, with a market capitalization of USD 4,405 billion as of September 2015 (WFE 2015). Japan is one of the most globally competitive business environments, being ranked #6 globally

and #2 in Asia-Pacific (WEF 2015), as well as being viewed as one of the least corrupt countries in Asia-Pacific (#4) and globally (#18) (TI 2015).

Japan is one of the most attractive real estate investment destinations for international investors and real estate fund managers in the world. Tokyo is the top preferred destination of real estate investment in the Asia-Pacific region, followed by Sydney and Melbourne. In particular, 88.9% global real estate fund of fund managers showed their intension to invest in Tokyo in 2016. They find that the size of the real estate market, the ability to easily assess quality commercial real estate, the government's policy for real estate investment, and hosting the 2020 Olympics as the main reasons for Tokyo to be the most preferred real estate investment destination. Also, Osaka (#5) and Nagoya (#10) are ranked in top 10 real estate investment destinations in Asia-Pacific (ANREV 2016a).

This indicates Japan is an attractive real estate investment market for both domestic and international real estate investors. In 2015, the total commercial real estate transaction volume globally, excluding development sites, was USD 898 billion and Asia-Pacific with USD 132 billion; Japan had a transaction volume of USD 42.4 billion, which was a 20% drop compared to 2014 but still accounting for 4.72% of global commercial real estate transactions, being fourth largest in the world, only exceeded by the U.S. (49.0%, USD 440.2 billion), the U.K. (10.9%, USD 97.7 billion), and Germany (7.7%, USD, 69.2 billion) and 32.1% of Asia-Pacific commercial real estate transactions, the largest in Asia-Pacific. The office sector in Japan was the hottest real estate market in Asia-Pacific, followed by China office (#2), Australia retail (#3), and Australia office (#4); three other sectors in Japan (Japan retail #5, Japan apartment #7, and Japan hotel #10) were listed in the top 10 hottest markets and sectors in Asia-Pacific. (Real Capital Analytics 2015).

While the population growth rate in Japan is negative (-0.19%), Japan has a population of 126 million, the 10th largest in the world (IMF 2015). This shows that 93.5% people reside in urban areas with the majority of people (70.9%) working in the services industry and only 2.9% working in the agriculture industry (CIA 2015). Japan is classified as a transparent real estate market, being ranked #19 globally and #5 in Asia-Pacific, exceeded by two highly transparent markets, Australia (#2) and New Zealand (#6), and two other transparent markets, Singapore (#11) and Hong Kong (#15) in Asia-Pacific

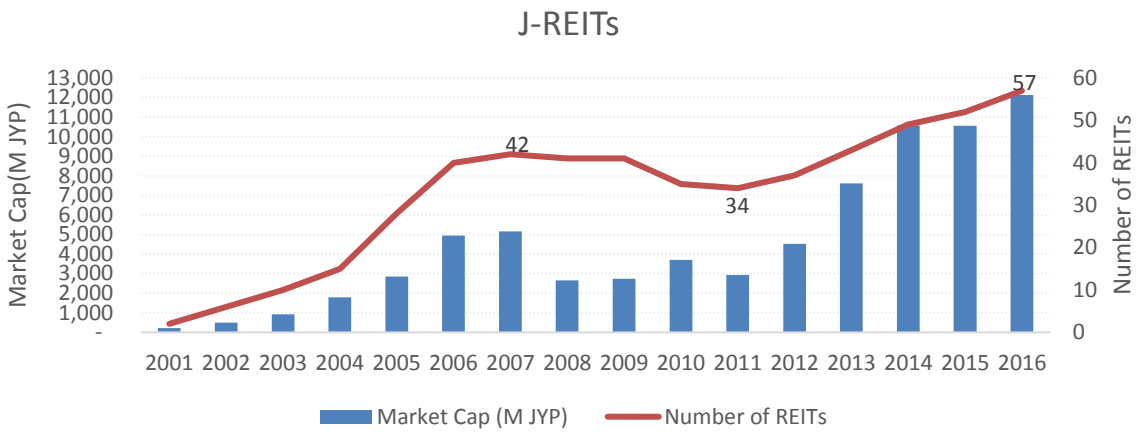
(JLL 2016). Tokyo is hosting the 2020 Olympics, which helps it to be in the top 14 fastest transforming and most dynamic urban economies in the world (JLL 2015) and being one of the preferred real estate investment destinations of international investors.

Japanese pension funds, such as the Government Pension Investment Fund (GPIF) and the Local Government Employees Fund are some of the largest pension funds in the world, with USD 2.75 trillion of assets under management and 2.0% year-to-year growth in 2015. Despite the huge size of the funds, more than 80% of the Japan pension funds have been allocated into deposits (52.3%) and insurance / pension reserves (29.8%) (AMP Capital 2017). Thus, they hold a very high portion of savings and riskless assets compared to other pension funds in developed countries. However, GPIF announced in 2016 that they would allocate 5% of their funds, approximately USD 75 billion, into alternative assets, including infrastructure, real estate, and private equity. With the expectation that the largest real estate investors in Japan will continue to increase their real estate allocation over next few years, Japan will be one of the most significant markets in the world and a significant focus for global real estate investors.

3. Significance of REITs in Japan

Japan's institutional commercial real estate market was estimated at USD 2.7 trillion in 2011 (Pramerica 2012), being the second largest, only exceeded by the U.S. with USD 6.7 trillion and accounting for 10.1% of the global real estate market. The listed real estate sector in Japan accounts for 8.04% of the real estate market in Japan and listed real estate companies account for 56% of the listed real estate sector on the Tokyo stock market while Japan REITs account for 44% of the listed real estate sector on the Tokyo stock market (EPRA 2015b). Thus, the listed real estate sector is larger than the size of REITs in Japan. However, REITs in Japan have taken on increased significance in recent years (Newell & Peng 2012).

Exhibit 3: Japan REITs market



Source: Author's compilation from ARES (2017)

Exhibit 3 shows the growth of the J-REIT market in 2001–2016. Japan established the first REIT market in Asia in September 2001, with two REITs listed at that time. The number of J-REITs increased to 42 (JYP 5,151 million; USD 46 billion) in 2007, but the Global Financial Crisis (GFC) hit the J-REIT market and the number decreased to 34 (JYP 2,941 million; USD 38 billion) in 2011. Since then, J-REITs have recovered and as of December 2016, there are 57 J-REITs with JYP 12,123 million (USD 104 billion) (ARES 2017).

Exhibit 4 shows the size of REIT markets in Asia-Pacific as of September 2015. At this time, the J-REIT market was the second largest in Asia-Pacific, accounting for 27.6% of the Asia-Pacific REIT market and 5.5% (#3) of the global REIT market (EPRA 2015a).

Exhibit 5 shows the ten largest J-REITs. The two largest, Nippon Building and Japan Real Estate, are office sector focused REITs, while Japan Retail (#3), Nippon Prologis (#6), and Advance Residence (#9) are focused on the retail, logistics, and residential sectors. Some other REITs, such as Nomura Master (#4), United Urban (#5), Orix JREIT (#7), and Japan Prime Realty (#8), have diversified portfolios.

Exhibit 6 illustrates the asset value of sub-sector J-REITs as of December 2015. The office sector accounts for 46.4% of J-REITs with 22 REITs, followed by retail (18.1%), residential (16.7%), industrial (10.2%), hotel (4.2%), and others (4.3%). Thus, J-REITs

provide broad REIT sub-sector investment opportunities while having one of the largest commercial real estate markets with transparent and market favorable policies.

Exhibit 4: Size of Asia-Pacific REITs: 2015

Country	No of REITs	Market Cap (USD M)	% of AP Market	AP Rank
Australia	43	112,660	37.01%	1
Japan	**53**	**84,100**	**27.63%**	**2**
Singapore	37	52,049	17.10%	3
Hong Kong	12	29,231	9.60%	4
Thailand	50	9,061	2.98%	5
Malaysia	16	8,640	2.84%	6
New Zealand	4	4,161	1.37%	7
Taiwan	6	2,933	0.96%	8
South Korea	5	1,530	0.50%	9
Asia-Pacific Total	**226**	**$ 304,364**	**100%**	

Source: Author's compilation from EPRA (Sep. 2015)

Exhibit 5: Top 10 Japan REITs

No	REIT	Market Cap		Asset Size		Sector
		(USD B)	(JPY B)	(USD B)	(JPY B)	
1	Nippon Building	6.76	814.7	9.0	1,080.3	Office
2	Japan Real Estate	6.38	768.5	7.7	927.7	Office
3	Japan Retail	4.92	592.6	6.9	834.6	Retail
4	Nomura Master	4.61	556.0	6.6	792.6	Diversified
5	United Urban	3.74	451.2	4.6	551.6	Diversified
6	Nippon Prologis	3.14	378.1	3.4	405.0	Logistics
7	ORIX JREIT	3.01	362.9	4.6	552.3	Diversified
8	Japan Prime Realty	2.99	360.5	3.4	410.3	Diversified
9	Advance Residence	2.87	345.4	3.5	424.9	Residential
10	Daiwa Office	2.63	316.5	3.7	445.7	Office

Source: Author's compilation from ARES (2017) / As of December 2015

Exhibit 6: Asset value of Japan REITs by sub-sector

Asset	Value of Asset USD (JPY B)	Market share	Number of REITs
Office REITs	53.98 B (6,503)	46.4%	22
Retail REITs	21.09 B (2,541)	18.1%	7
Residential REITs	19.43 B (2,341)	16.7%	11
Industrial (Logistics) REITs	11.90 B (1,434)	10.2%	5
Hotel REITs	4.87 B (587)	4.2%	4
Others (health care etc.)	4.96 B (598)	4.3%	3
Total	116.23 B (14,004)	100.0%	52

Source: Author's compilation from ARES (2017) / As of December 2015

Overall, J-REITs are an important investment asset for domestic and international real estate investors, providing diversified investment options and strategies as four real estate sectors, office (#1), retail (#5), apartment (#7), and hotel (#10) are among the hottest real estate sectors in Asia-Pacific. Therefore, it is important to understand the characteristics and the role of each sub-sector in the property investment universe in Japan.

4. Data and methodology

Despite the significant size of the real estate and the REIT market in Japan, sub-sector REIT markets are relatively new in Asia-Pacific; hence, there are not many reliable data sources. One of few indices available for Asia-Pacific sub-sector REITs are the S&P sub-sector indices; however, these indices only began in August 2009. In addition, the quarterly total return data for unlisted property funds in Japan are accessible from 2010:Q1 and are only available quarterly. Due to a lack of historical data and accessibility, the data used in this study are quarterly total returns from 2010: Q1 to 2015:Q4.

The indices for sub-sector REITs and other assets used in this study are summarised in Exhibit 7. In this study, six sub-sector REITs, including Japan diversified REITs, office REITs, retail REITs, industrial REITs, residential REITs, and hotel (including resorts, restaurants, and leisure facilities) REITs are analyzed and compared with other domestic assets, including Japan unlisted property funds, Japan listed property companies, and Japan stocks and bonds. S&P indices are used for the analysis of REITs and listed property companies while Japan unlisted property funds are examined and analyzed using the ANREV Japan total return index, which tracks 11 funds in Japan with a gross asset value of USD 28.2 billion as of 2015:Q4 (ANREV, 2016b). The Association for Real Estate Securitization (ARES) J-REIT index and data are also used to analyze the J-REIT market.

Exhibit 7: Indices for sub-sector REITs in Japan: Q1 2010 – Q4 2015

Asset	Index
Benchmark (BMK) REITs	S&P Japan REIT – Total Return Index
Diversified REITs	S&P Japan REIT Diversified – Total Return Index
Office REITs	S&P Japan REIT Office – Total Return Index
Retail REITs	S&P Japan REIT Retail – Total Return Index
Industrial REITs	S&P Japan REIT Industrial – Total Return Index
Residential REITs	S&P Japan REIT Residential – Total Return Index
Hotel REITs	S&P Japan REIT Hotel – Total Return Index
Unlisted Property Funds (UPFs)	ANREV_ Japan Total Return Index
Property Companies (PCs)	S&P Japan Property – Total Return Index
Shares	DJGL Japan – Total Return Index
Bonds	Japan Government 10-year Bond Yield
Cash	3 Month Interbank Rate

Average quarterly returns were calculated from the quarterly total return indices and annualised for the performance analysis and comparison with standard deviations. A Sharpe ratio analysis was then conducted to assess the risk-adjusted return performance.

The risk-return ratio and reward to risk ratio are also presented. Diversification benefits were assessed using correlation coefficient analysis. Mean- variance analysis was used to find expected portfolio return and risk and then used to assess the optimal asset allocations and efficient frontiers of the portfolios to find expected portfolio return and risk and then also used for optimal asset allocations and efficient frontiers of the portfolios to find the role of sub-sector REITs. All the indices and rates used for this study are based on the Japanese yen.

5. Results

5.1 Risk-adjusted returns

Exhibit 8 presents the risk-adjusted performance of Japanese assets, including the six sub-sector J-REITs. The benchmark (BMK) J-REITs achieved 16.66% return and 26.25% risk annually. The hotel REITs recorded the best return (44.61%) among the sub-sector REITs, followed by industrial REITs (19.83%), residential REITs (19.44%), diversified REITs (19.35%), retail REITs (17.34%), and office REITs (13.76%). Only office REITs underperformed BMK returns. The risk of BMK J-REITs is 26.25% annually, while retail REITs (24.38%), industrial REITs (24.42%), and residential REITs (26.24%) have lower volatilities than the BMK REITs. Diversified REITs (28.15%), office REITs (27.80%), and hotel REITs (35.51%) show higher standard deviations than the BMK. Hotel REITs delivered the highest return and risk over and office REITs achieved the lowest return but have the second highest risk level.

For all risk-adjusted returns, based on the Sharpe ratio, hotel REITs are #1 in the sub-sector REITs, followed by industrial REITs (#2), residential REITs (#3), retail REITs (#4), diversified REITs (#5), BMK REITs (#6), and office REITs (#7). Including all other assets, Japanese bonds (Sharpe ratio = 4.00) are the best risk-adjusted performer and J-UPFs (Sharpe ratio = 0.37) position at #11 lags behind all the sub-sector REITs (Sharpe ratios between 1.25 and 0.49). All sub-sector REITs outperformed Japanese stocks (Sharpe ratio = 0.57), except office REITs (0.49).

Exhibit 8: Risk-adjusted performance of Japan sub-sector REITs: Q1 2010 – Q4 2015

	J-UPFs	Japan BMK REITs	Diversified REITs	Office REITs	Retail REITs	Industrial REITs	Residential REITs	Hotel REITs	J-PCs	J-shares	J-bonds	J-cash
Average annual return	3.47%	16.66%	19.35%	13.76%	17.34%	19.83%	19.44%	44.61%	15.43%	11.18%	0.79%	0.17%
Annual risk	9.06%	26.25%	28.15%	27.80%	24.38%	24.42%	26.24%	35.51%	24.29%	19.42%	0.16%	0.02%
Risk-return ratio	2.61	1.58	1.45	2.02	1.41	1.23	1.35	0.80	1.57	1.74	0.20	0.15
Reward to risk ratio	0.38	0.63	0.69	0.49	0.71	0.81	0.74	1.26	0.64	0.58	5.07	6.81
Sharpe ratio	0.37	0.63	0.68	0.49	0.70	0.81	0.73	1.25	0.63	0.57	4.00	0.00
Rank	11	8	6	10	5	3	4	2	7	9	1	12

5.2 Diversification benefits

To assess the portfolio diversification benefits, the inter-asset correlation matrix for sub-sector REITs and other asset classes from 2010:Q1 to 2015:Q4 is shown in Exhibit 9. All of the sub-sector J-REITs have a significant correlation with BMK REITs and show significant correlations with other assets listed on the Japan stock exchange, including property companies and Japanese stocks. However, none of the sub-sector REITs are significantly correlated with J-UPFs, Japanese bonds, or Japanese three-month interbank rates. It is reasonable to say that J-REITs are closely related to the Japan stock market.

Office REITs have the highest correlation with the BMK REITs (r = 0.98). All other sub-sector REITs, except hotel REITs, have higher than r > 0.9 correlations with the BMK REITs. Hotel REITs have a correlation of r = 0.77 with BMK REITs, but it is still significant and the lowest correlation with property companies and Japanese stocks, compared to other sub-sector REITs.

Hotel REITs have relatively low correlations with other sub-sector REITs and listed assets and also provide the lowest correlations with J-UPFs (r = -0.06), J-PCs (r = -0.65) and Japanese stocks (r = 0.49) among the sub-sector REITs, so it is expected to deliver good diversification benefits if included in domestic mixed-asset portfolios. Industrial REITs have the lowest correlation with Japanese bonds (r = -0.01) and office REITs show the lowest correlation with Japanese cash (r = -0.03) within the sub-sector groups. On the other hand, BMK REITs have highest correlations with J- UPFs (r = 0.15) and Japanese stock (r = 0.67), while office REITs have the highest correlation with J-PCs (r = 0.88) within the sub-sector REITs.

Overall, the diversification benefits of sub-sector J-REITs are very limited with listed assets such as property companies and shares, but they could provide good diversification benefits if combined with J-UPFs, Japanese bonds, and cash.

Exhibit 9: Correlation coefficient matrix: Q1 2010 – Q4 2015

	J-UPFs	J. BMK REITs	D. REITs	O. REITs	Rt. REITs	I. REITs	Rd. REITs	H. REITs	J-PCs	J-shares	J-bonds	J-cash
J-UPFs	1.00											
J. BMK REITs	0.15	1.00										
D. REITs	0.08	0.97*	1.00									
O. REITs	0.18	0.98*	0.93*	1.00								
Rt. REITs	0.09	0.96*	0.92*	0.93*	1.00							
I.REITs	0.05	0.92*	0.89*	0.90*	0.89*	1.00						
Rd. REITs	0.11	0.92*	0.93*	0.86*	0.92*	0.83*	1.00					
H. REITs	–0.06	0.77*	0.82*	0.71*	0.75*	0.74*	0.74*	1.00				
J-PCs	0.17	0.87*	0.81*	0.88*	0.84*	0.74*	0.76*	0.65*	1.00			
J-shares	0.35	0.67*	0.64*	0.66*	0.64*	0.55*	0.57*	0.49*	0.84*	1.00		
J-bonds	–0.75*	–0.08	–0.07	–0.08	–0.05	–0.01	–0.06	–0.13	–0.08	–0.24	1.00	
J-cash	–0.79*	0.05	0.07	0.03	0.12	0.11	0.06	0.08	0.05	–0.18	0.93	1.00

* Significant correlation (p< 5%)

- J: Japan
- D: Diversified
- O: Office
- Rt: Retail
- I: Industrial
- Rd: Residential
- H: Hotel
- PCs: Property companies
- UPFs: Unlisted property funds
- BMK: Benchmark

5.3 Portfolio analysis

Exhibit 10: Japan mixed-asset portfolios for analysis

Portfolio	Assets in Portfolio	No of Assets
1	**Japan BMK REITs**, J-UPFs, J-PCs, Japan Shares, Japan Bonds	5
2	**Diversified REITs**, J-UPFs, J-PCs, Japan Shares, Japan Bonds	5
3	**Office REITs**, J-UPFs, J-PCs, Japan Shares, Japan Bonds	5
4	**Retail REITs**, J-UPFs, J-PCs, Japan Shares, Japan Bonds	5
5	**Industrial REITs**, J-UPFs, J-PCs, Japan Shares, Japan Bonds	5
6	**Residential REITs**, J-UPFs, J-PCs, Japan Shares, Japan Bonds	5
7	**Hotel REITs**, J-UPFs, J-PCs, Japan Shares, Japan Bonds	5
8	J-UPFs, Japan Shares, Japan Bonds	3
9	J-PCs, Japan Shares, Japan Bonds	3
10	**Japan BMK REITs**, Japan Shares, Japan Bonds	3
11	**Diversified REITs**, Japan Shares, Japan Bonds	3
12	**Office REITs**, Japan Shares, Japan Bonds	3
13	**Retail REITs**, Japan Shares, Japan Bonds	3
14	**Industrial REITs**, Japan Shares, Japan Bonds	3
15	**Residential REITs**, Japan Shares, Japan Bonds	3
16	**Hotel REITs**, Japan Shares, Japan Bonds	3
17	Japan Shares, Japan Bonds	2

Note: For practical investment reasons, 10% maximum allocation imposed on all real estate assets

To assess the role of sub-sector J-REITs, I constructed 17 domestic mixed-asset portfolios, which are presented in Exhibit 10. These include seven five-asset portfolios, nine three-asset portfolios, and one two-asset portfolio. Five-asset portfolios include Japanese stocks and bonds, J-UPFs, J-PCs, and one of the sub-sector REITs with a maximum 10% allocation to all real estate assets. Three-asset portfolios include Japanese stocks and bonds plus one of the real estate assets, including a sub-sector REIT with a maximum 10%

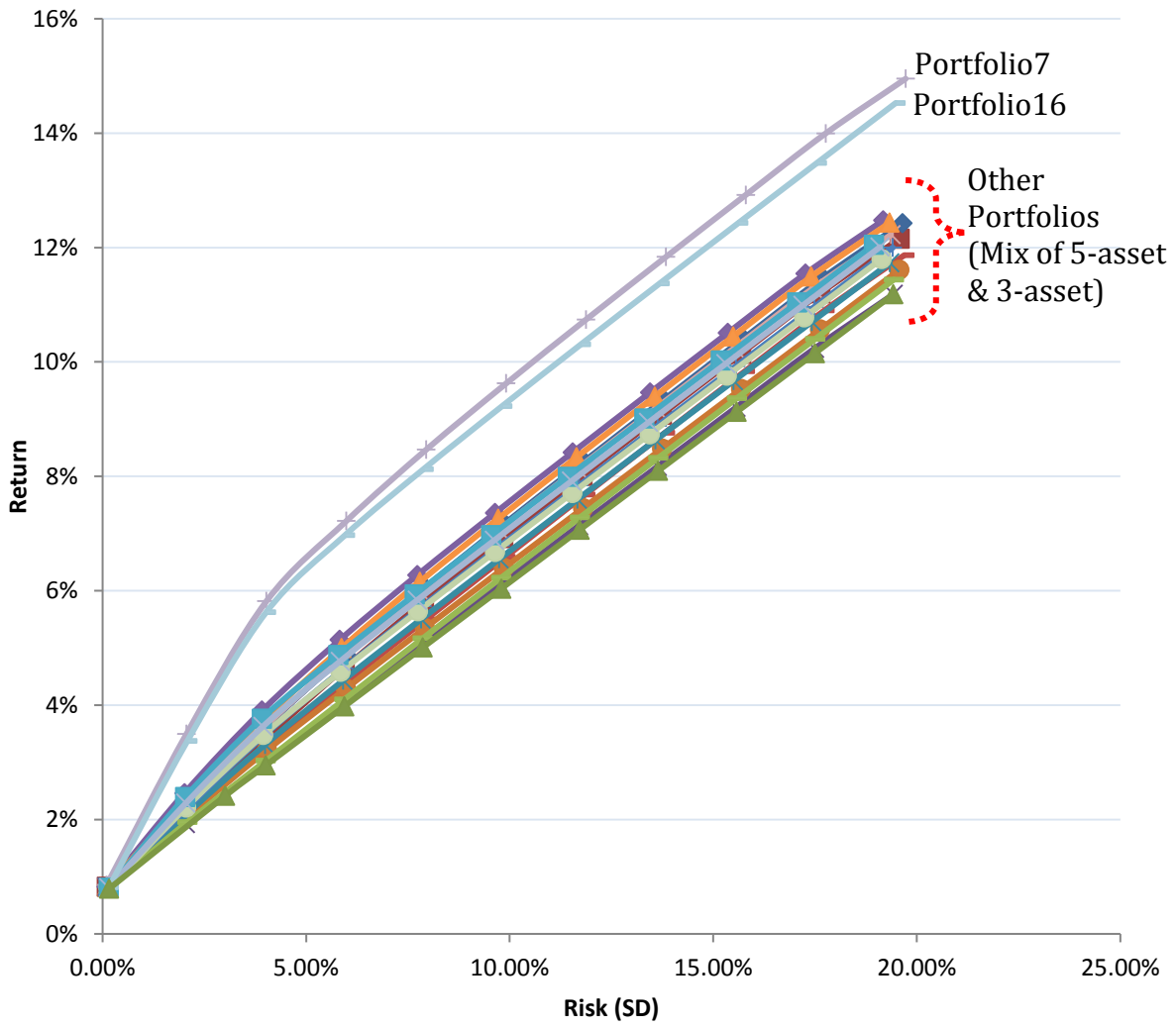
allocation to all real estate assets. The two-asset portfolio is the traditional portfolio having Japanese stocks and bonds only.

Portfolios 1–7 are five-asset portfolios and portfolios 8–16 are three-asset portfolios. Portfolios 8 and 9 are the three-asset portfolios without REITs, but having other real estate assets, such as J-UPFs and J-PCs. Portfolio 17 is the only portfolio without any real estate asset, consisting of Japanese stocks and bonds.

Exhibit 11 illustrates the efficient frontiers of all the portfolios. Portfolios having hotel REITs (7 and 16) show the best efficient frontiers, providing the highest returns in the entire risk range. It is also notable that all five-asset portfolios and three-asset portfolios outperformed the two-asset portfolio.

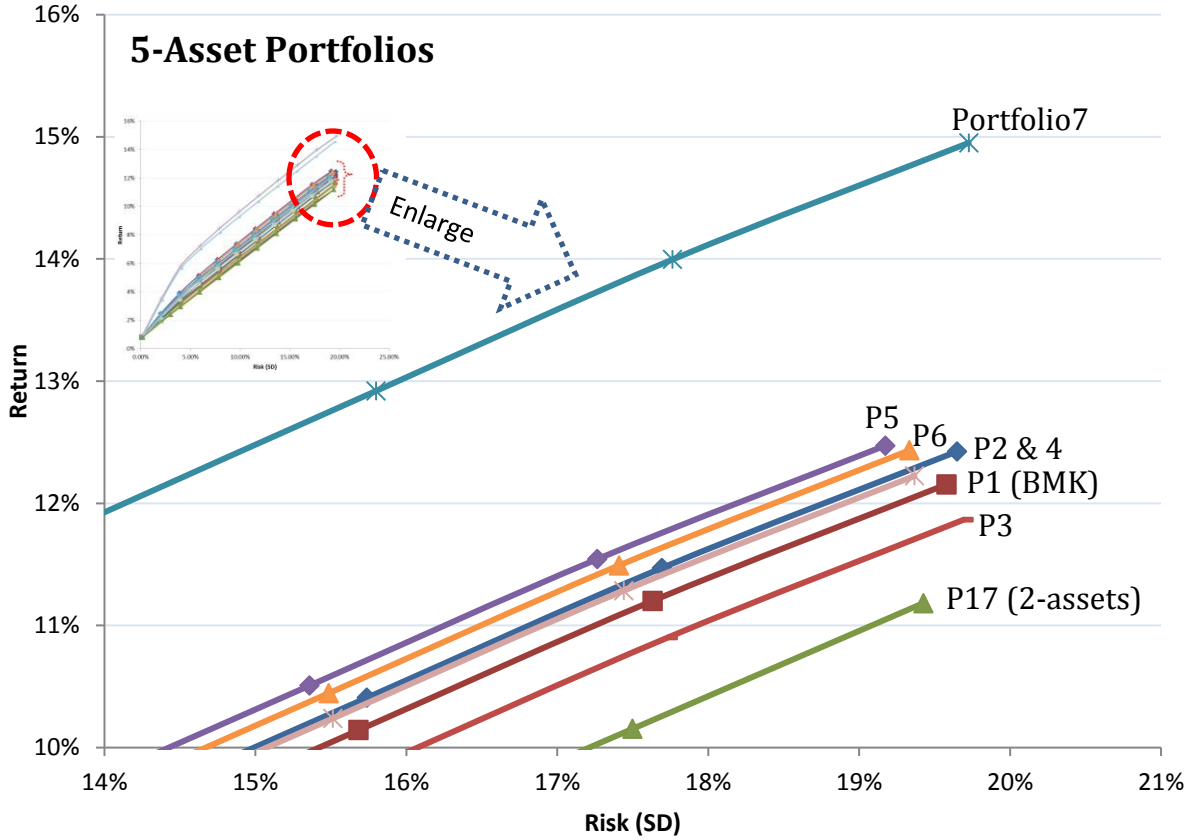
Exhibit 12 shows the enlarged efficient frontiers of five-asset portfolios and three-asset portfolios for a better understanding of the role of each real estate asset in mixed- asset portfolios. In the five-asset portfolios, the risk spectrums of the portfolios span between 0.10% (all portfolios) and 19.73% (portfolio 7) and return ranges are between 0.82% (all portfolios except portfolio 7; 0.85%) and 14.95% (portfolio 7). Portfolio 7 has wider risk spectrums than the other portfolios and achieved higher returns than all other five-asset portfolios.

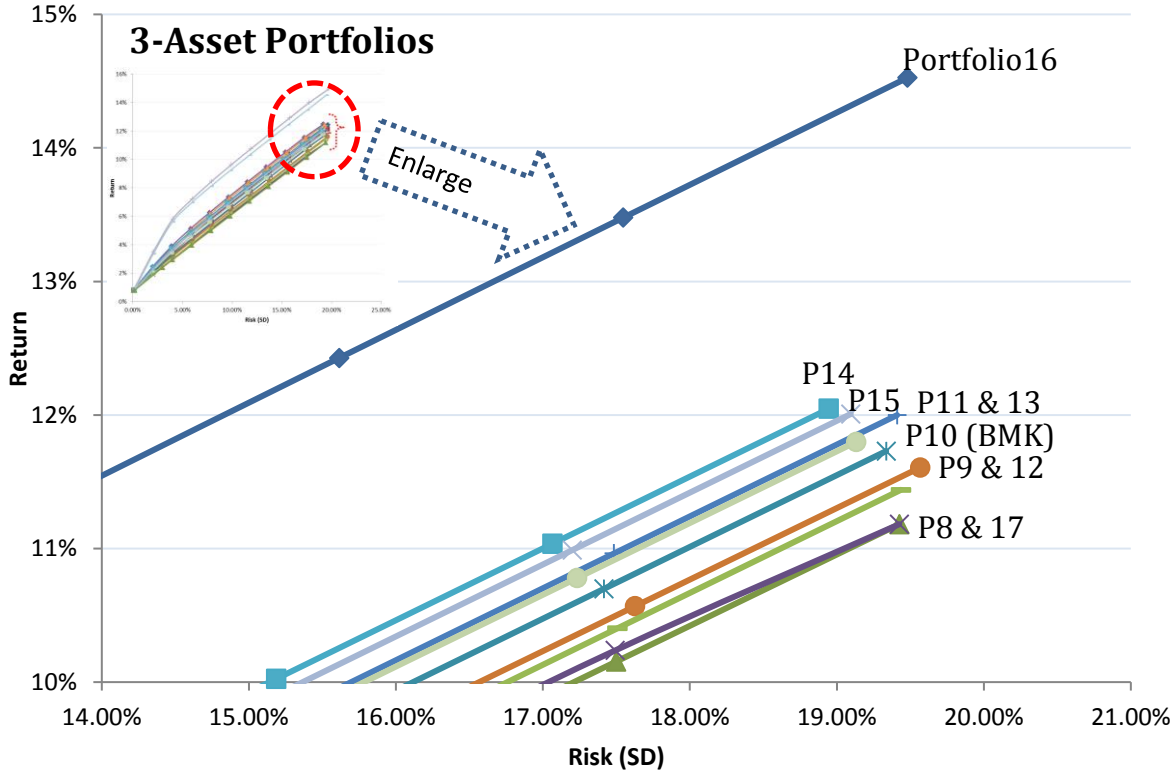
Exhibit 11: Efficient frontiers for the entire portfolios: Q1 2010 – Q4 2015



(P1) Stocks, Bonds, Unlisted (10% Max), REITs (10% Max) & Property Companies (10% Max)
(P2) Stocks, Bonds, Unlisted (10% Max), Diversified REITs (10% Max) & Property Companies (10% Max)
(P3) Stocks, Bonds, Unlisted (10% Max), Office REITs (10% Max) & Property Companies (10% Max)
(P4) Stocks, Bonds, Unlisted (10% Max), Retail REITs (10% Max) & Property Companies (10% Max)
(P5) Stocks, Bonds, Unlisted (10% Max), Industrial REITs (10% Max) & Property Companies (10% Max)
(P6) Stocks, Bonds, Unlisted (10% Max), Residential REITs (10% Max) & Property Companies (10% Max)
(P7) Stocks, Bonds, Unlisted (10% Max), Hotel REITs (10% Max) & Property Companies (10% Max)
(P8) Stocks, Bonds & Unlisted (10% Max)
(P9) Stocks, Bonds & Property companies (10% Max)
(P10) Stocks, Bonds & REITs (10% Max)
(P11) Stocks, Bonds & Diversified REITs (10% Max)
(P12) Stocks, Bonds & Office REITs (10% Max)
(P13) Stocks, Bonds & Retail REITs (10% Max)
(P14) Stocks, Bonds & Industrial REITs (10% Max)
(P15) Stocks, Bonds & Specialty REITs (10% Max)
(P16) Stocks, Bonds & Hotel REITs (10% Max)
(P17) Stocks & Bonds

Exhibit 12: Enlarged efficient frontiers for 5-asset & 3-asset portfolios





Very similar results are found for three-asset portfolio. The risk spectrums span between 0.10% (portfolio 8) and 19.57% (portfolio 9) and return ranges are between 0.81% (all portfolios except portfolio 8; 0.82%) and 14.53% (portfolio 16). Hotel REITs are the best contributor for the mixed-asset portfolio that includes Japanese stocks and bonds. All sub-sector REITs, except office REITs, could provide better performance enhancement to the portfolio than including J-UPFs (portfolio 8). All sub-sector REITs outperformed J-PCs (portfolio 9) and the Japanese stocks and bonds only portfolio (17).

Adding hotel REITs to domestic mixed-asset portfolios instead of BMK REITs, the portfolio returns are enhanced by another 2.8% at medium- to high-risk levels; however, the extra returns decrease as the risk level moves lower (0%). So for the investors and fund managers who take medium to high risks (more than 10%), hotel REITs would be the best assets to include with stocks and bonds in traditional portfolios to maximize returns.

The roles of most sub-sector REITs, except the office REITs, are greater than BMK REITs in domestic mixed-asset portfolios. This result suggests that some sub-sector J-REITs could provide better performance than BMK REITs when they are included with stocks and bonds in portfolios.

Exhibit 13: Portfolio #7 risk, return and asset allocations: Q1 2010 – Q4 2015

Return	Risk	J-UPFs	Hotel REITs	J-PCs	J-shares	J-bonds	Sharpe ratio
0.85%	0.10%	1.30%	0.08%	0.00%	0.00%	98.63%	7.05
3.49%	2.06%	7.48%	5.72%	0.00%	0.00%	86.80%	1.62
5.81%	4.02%	10.00%	10.00%	0.47%	2.97%	76.56%	1.40
7.22%	5.99%	10.00%	10.00%	8.70%	4.87%	66.44%	1.18
8.47%	7.95%	10.00%	10.00%	10.00%	15.04%	54.96%	1.04
9.62%	9.91%	10.00%	10.00%	10.00%	26.17%	43.83%	0.95
10.74%	11.87%	10.00%	10.00%	10.00%	36.91%	33.09%	0.89
11.84%	13.84%	10.00%	10.00%	10.00%	47.46%	22.54%	0.84
12.92%	15.80%	10.00%	10.00%	10.00%	57.88%	12.12%	0.81
14.00%	17.76%	10.00%	10.00%	10.00%	68.23%	1.77%	0.78
14.95%	19.73%	0.00%	10.00%	10.00%	80.00%	0.00%	0.75

Exhibits 13 and 14 give optimal asset allocations for portfolio 7, which is a five-asset portfolio including hotel REITs. As it has a very high-risk level, the role of hotel REITs is insignificant at low-end risk levels, but the maximum 10% allocation takes place from the 4.02% risk level, which is still very low.

Among the three real estate assets in the five-asset mixed portfolios, hotel REITs play a more significant than J-UPFs and J-PCs. This is due to the higher return profile of hotel REITs, even though the risk is also higher than any other assets in Japan and there are low correlations with other asset classes. The contribution of hotel REITs to the portfolios is very significant in three-asset mixed portfolios as well.

Exhibit 14: Optimal asset allocation diagram for portfolio #7: Q1 2010 – Q4 2015

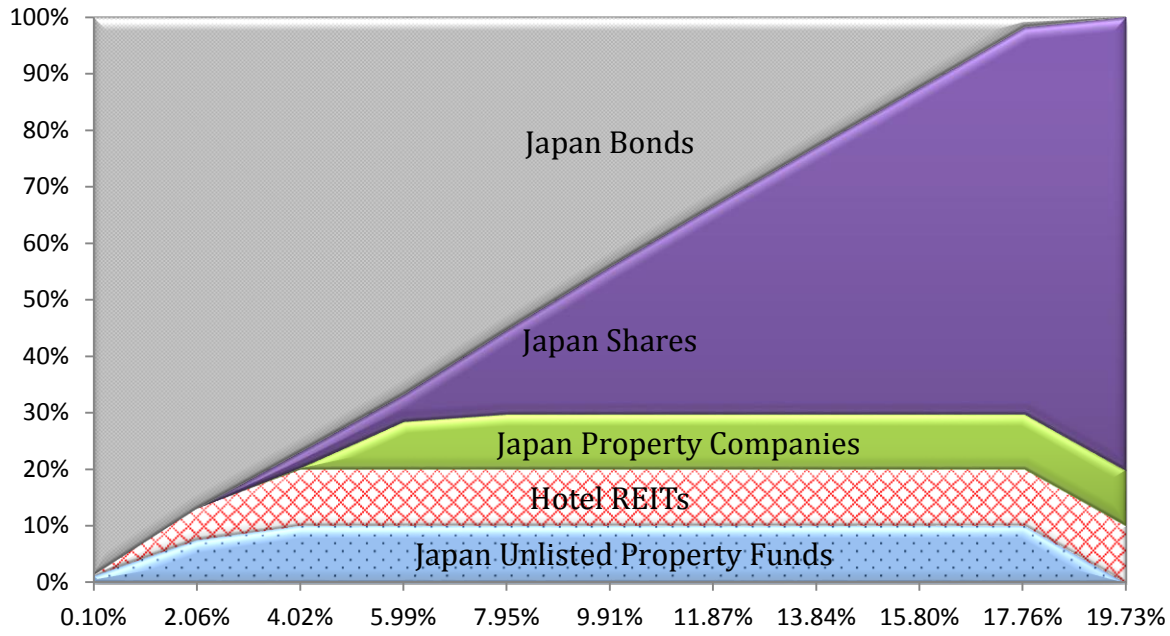
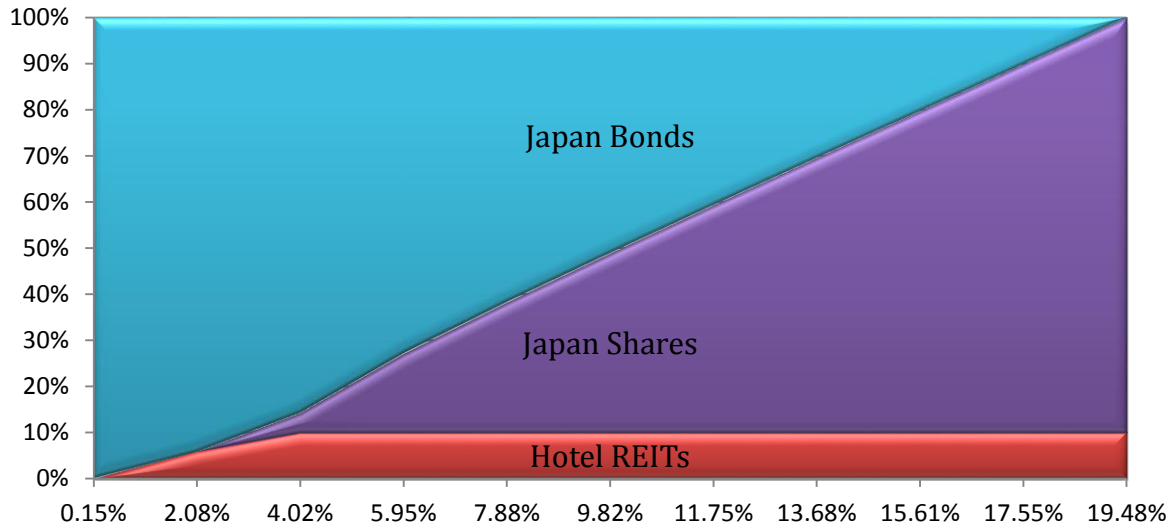


Exhibit 15 illustrates the optimal asset allocation for portfolio 16. As for portfolio 16, a three-asset portfolio, hotel REITs take their 10% maximum asset allocation from the 4.02% risk level to the 19.48% risk level.

Exhibit 15: Optimal asset allocation diagram for portfolio #16: Q1 2010 – Q4 2015



6. Sub-sector REIT investment implications for Japan REITs

In this study, I track the performance of seven sub-sector REITs, including diversified, office, retail, industrial, residential, hotel, and local benchmark REITs, and compare them with local stocks, bonds, unlisted property funds, and listed property companies in Japan. The results show that some sub-sector REITs could provide better risk- return performance than the benchmark REITs in Japan.

Exhibit 16: Sub-sector REITs risk-returns compared to local benchmark REITs (%)

	Japan	
	Return	**Risk**
Diversified REITs	**19.35*** (+2.69)	**28.15*** (+1.90)
Office REITs	**13.76** (–2.90)	**27.80** (+1.55)
Retail REITs	**17.34*** (+0.69)	**24.38*** (–1.87)
Industrial REITs	**19.83*** (+3.17)	**24.42*** (–1.83)
Residential REITs	**19.44*** (+2.78)	**26.24*** (–0.01)
Hotel REITs	**44.61*** (+27.96)	**35.51*** (+9.26)
Local Benchmark (BMK) REITs	***16.66%***	***26.25%***

– "(+/-)" indicating return/risk surplus (or deficit) of the sub-sector REITs over local Benchmark (BMK) REITs

– * indicating better risk-adjusted performance of the sub-sector REITs compared to local Benchmark (BMK) REITs

In Exhibit 16, I compare the performance of sub-sector J-REITs. The results show that five out of six sub-sector REIT types (except office REITs) outperform the local benchmark REITs return. In particular, hotel REITs have 27.96% higher return than the benchmark REITs from 2010:Q1 to 2015:Q4. In risk-adjusted performance, based on the Sharpe ratio, all sub-sector REITs, except office REITs, also outperformed the local benchmark REITs.

Exhibit 17: Portfolio risk-return profile (5-asset & 3-asset portfolios) (%)

Number of Asset in the portfolio	**Portfolio Performance**						**The best sub-sector REITs included**
	(including the best sub-sector REITs)		(including the local BMK REITs)		(including local shares & bonds only)		
	Min	**Max**	Min	Max	Min	Max	
5-asset	**0.85**	**14.95**	0.82	12.15	0.79	11.18	**Hotel**
	(0.10)	**(19.73)**	(0.10)	(19.58)	(0.16)	(19.42)	
3-asset	**0.81**	**14.53**	0.81	11.73	0.79	11.18	**Hotel**
	(0.15)	**(19.48)**	(0.15)	(19.34)	(0.16)	(19.42)	

– ( ) indicating volatility (standard deviation) of the portfolio

The roles of sub-sector REITs are even clearer in portfolios. Exhibit 17 presents the performance enhancements as a result of adding hotel REITs to domestic mixed-asset portfolios. With 10% maximum allocations for real estate assets, hotel REITs enhance the portfolio returns significantly. For example, by including hotel REITs instead of BMK REITs in portfolios (both in five-asset and three-asset portfolios), the portfolio could experience up to 2.8% additional return at the same levels of risk across a wide risk spectrum and up to 3.77% higher return than that of a portfolio containing only stocks and bonds only.

REITs have different investment characteristics depending on their underlying properties and sector focus. More and more sector-specific REITs are being created in the Asia-Pacific region and investors are keen to expand their investment strategy more efficiently and specifically. Thus, it is important for fund managers and investors to understand the characteristics of each sub-sector REIT in each market and how these

characteristics could be used for the overall fund and portfolio strategies for domestic mixed-asset portfolios.

The last few years have seen some outstanding movements in sub-sector investments and distributions in global real estate markets. The traditional REIT sectors have been gradually losing their market share while non-traditional sub-sector REITs have grown significantly and increased their market position. The findings in this study provide insights to REIT investors for the development of their investment strategies in Japan and Asia-Pacific.

As this study is one of the first attempts to find new theoretical and practical ideas on sub-sector REITs in Japan, several limitations are apparent. The first limitation is that the sample period is relatively short due to data availability, so it may be hard to generalize the results.

The second limitation of the study is the relatively small market size of the sub-sector REITs. Although this study has found very significant characteristics and roles for sub-sector J-REITs, this market is still relatively small compared to the overall real estate market size in Japan. For example, hotel REITs have USD 4.87 billion in assets, accounting for 4.2% of the J-REIT market and 0.18% of commercial real estate market in Japan. This may present issues for J-REIT sub-sector portfolios at any scale.

However, there are very limited empirical analyses of sub-sector REITs in a global and Asia-Pacific context and this study has provided investors with increased understanding about the different investment characteristics and the performance of sub-sector J-REITs. This study will be meaningful and helpful to future sub-sector REITs studies in a global and Asia-Pacific context.

References

AMP. Generational Shift Sees Japanese Investors Flock to Real Assets. AMP Capital, 2017.

ANREV. Asia Pacific Investment Intentions Survey 2016. Asian association for investors in non-listed real estate vehicles, 2016a.

-----. Quarterly Index Report Q4 2015. 2016b.

ARES. J-REITs Market Cap and Number of REITs. The association for real estate securitization, viewed 30 March 2017, <http://jreit-view.ares.or.jp/jreit_e/>, 2017.

CBRE. Globla Capital Markets: Will New Sources of Capital Extend The Cycle? CBRE Research, 2015.

CIA. World Fact Book 2015. Central Intelligence Agency, 2015.

EPRA. Global REIT Survey 2014. European Public Real Estate Association, 2014.

-----. Global REIT Survey 2015. European Public Real Estate Association, 2015a.

-----. Monthly Statistical Bulletin. European Public Real Estate Association, December 2015b.

Guojie, M. and D. Michayluk. Takeovers and The Market For Corporate Control in Japanese REITs. *Journal of Real Estate Literature,* 2015, 23, 115-37.

IMF. World Economic Outlook October 2015. International Monetary Fund, 2015.

JLL. City Momentum Index 2015. Jones Lang Lasalle, 2015.

-----. Global Real Estate Transparency Index 2016. Jones Lang LaSalle, 2016.

Kutsuna, K., W. Dimovski and R. Brooks. The Pricing and Underwriting Costs of Japanese REIT IPOs. *Journal of Property Research,* 2008, 25, 221-39.

Maroney, N. and A. Naka. Diversification Benefits of Japanese Real Estate over The Last Four Decades. *The Journal of Real Estate Finance and Economics,* 2006, 33, 259-74.

Newell, G. and H. W. Peng. The Significance and Performance of Japan REITs in a Mixed-Asset Portfolios. *Pacfific Rim Property Research Journal,* 2012, 18, 21-34.

OECD. Japan Economic Forecast Summary. The Organisation for Economic Co-operation and Development, November 2016.

Ong, S. E., J. L. Ooi and Y. Kawaguichi. Seasoned Equity Issuance by Japan and Singapore REITs. *The Journal of Real Estate Finance and Economics,* 2011, 43, 205-20.

Ooi, J. T. L., S.-E. Ong and P.-H. Neo. The Wealth Effects of Property Acquisitions: Evidence from Japanese and Singaporean REITs. *Real Estate Economics,* 2011, 39, 487-505.

Pramerica. A Bird's Eye View of Global Real Estate Markets: 2012 Update. Pramerica, 2012.

RCA. Global Capital Trends: 2015 Year in Review. Real Capital Analytics, 2016.

Shimizu, C., W. E. Diewert, K. G. Nishimura and T. Watanabe. Estimating Quality Adjusted Commercial Property Price Indexes Using Japanese REIT Data. *Journal of Property Research,* 2015, 32, 217-39.

Su, H. M., C. M. Huang and T. Y. Pai. The Hybrid Characteristic of Reit Returns: Evidence from Japanese and U.S. States Markets. *Journal of Real Estate Literature,* 2010, 18, 77-98.

TI. Corruption Perception Index 2015. Transparency International, 2015.

WEF. The Global Competitiveness Report 2015-2016. The World Economic Forum, 2015.

WFE. Focus November 2015. World Federation of Exchanges, 2015.