Asia-Pacific Financial Markets
https://doi.org/10.1007/s10690-024-09448-9

ORIGINAL RESEARCH

The Indirect Diversification Benefits of Investing in Japanese Firms: An Alternative Perspective

Pearlean Chadha[1] · **Jenny Berrill**[2]

Accepted: 19 January 2024

Abstract

This paper examines the role of firm-level multinationality in equity portfolio diversification for Japanese firms from 1998 to 2015. We use a unique multinationality dataset for constituents of the Nikkei 225 based on two measures of sales and subsidiaries. We employ an extended version of the traditional Capital Asset Pricing Model (CAPM) to analyse the exposure of firm returns to various geographical regions. There is evidence that firms are not influenced by the geographic regions where they report operations. The results also indicate that there are benefits from investing in Japanese multinationals but these benefits do not increase with increasing multinationality. A new category of firms is identified that may be beneficial to investors—firms that are influenced by a geographical region where they do not report sales or subsidiaries. This finding has far reaching implications for portfolio management. Investors must do more than analyse the international location of firm operations. They must analyse the geographical influences on firm returns. Existing studies fail to distinguish between these two criteria, assuming them to be the same. We find evidence to the contrary.

Keywords Home-bias · International Financial Markets · Multinational corporations (MNCs) · Portfolio diversification

JEL Classification G11 · G15 · F23

✉ Pearlean Chadha
pearlean.chadha@tudublin.ie

[1] School of Accounting, Economics and Finance, Technological University Dublin, Dublin, Ireland

[2] Trinity Business School, Trinity College Dublin, Dublin, Ireland

Published online: 18 March 2024

1 Introduction

The benefits from international portfolio diversification are well documented throughout the literature (Bae et al., 2019; Mukherji & Jeong, 2021; Oloko, 2018; Raju, 2023; Thomas et al., 2022). However, investors continue to invest disproportionate amounts domestically, a phenomenon known as the home bias puzzle (Lee et al., 2023; Daly & Vo, 2013; French & Poterba, 1991). Behavioural biases such as familiarity, information asymmetry, patriotism and overconfidence are some of the explanations for home bias outlined in existing literature (Van Nieuwerburgh & Veldkamp, 2009; Sercu & Vanpée, 2012; Zahera & Bansal, 2018; Sahabuddin et al., 2022). In recent years, the barriers and restrictions on international investments have reduced substantially. However, investors continue to hold a disproportionate amount of their equity portfolios domestically (Levy & Levy, 2014). Domestic listed equities in Japan accounted for 7.2 percent of global equities but local investors held 55.2 percent in domestic equities, as reported by IMF's Coordinated Portfolio Investment Survey for 2014. Researchers measure home bias by comparing the actual foreign holdings to the optimal foreign holdings of an investor (Mishra, 2015). This implies that an investor's foreign exposure is measured through direct investments in international markets. However, investors can also gain foreign exposure by investing in domestically traded assets that represent claims on foreign markets.

Many studies consider investing in Multinational Corporations (MNCs) as a substitute to direct international portfolio diversification (Demirci et al., 2022). This may provide investors with indirect international exposure without being exposed to foreign market risks and uncertainties. However, evidence on the indirect benefits from investing in MNCs is mixed and inconclusive. Rowland and Tesar (2004), Fillat and Garetto (2015), and Farooqi et al. (2015) find that MNCs can provide substantial diversification benefits. Tongli et al. (2005) find that internationally diversified firms offer better returns to investors than their non-diversified counterparts. More recently, O'Hagan-Luff and Berrill (2015) find that MNCs with geographically dispersed sales provide indirect diversification benefits to US investors. Demirci et al. (2022) also find that there are diversification and cost-reduction benefits of investing in multinationals with internationally diversified percentage of foreign sales. On the other hand, Omer, Durr, Siegel, and Khursheed (1998) and Salehizadeh (2003) claim that investing in MNCs is a poor substitute to direct foreign investment. Phylaktis and Xia (2006) find that investment in portfolios of firms with lower levels of foreign sales is beneficial for country-based diversification. Mullen and Berrill (2017) also find that firms with only domestic sales offer global investors greater diversification benefits than MNCs with globally dispersed sales.

We argue that these inconsistencies may lie in the criteria used to measure the international diversification of MNCs. Most studies rely on a single measure of multinationality, compiled at one point in time (Antoniou et al., 2010; Collinson & Rugman, 2008; Oehler et al., 2017). Many studies use the percentage foreign sales as a measure of firm-level multinationality (Farooqi et al., 2015;

Krapl, 2015). Some studies use the ratio of foreign to total subsidiaries and/or the number of foreign subsidiaries (Lu & Beamish, 2001, 2004; Arregle et al., 2013). Others use the percentage of foreign employees (Chan Kim et al., 1989), foreign taxes paid (Burgman, 1996; Oehler et al., 2017), foreign direct investment (Erramillli, Srivastava & Kim, 1999), and foreign assets (Reeb et al., 1998). While the majority of studies use foreign sales to measure the multinationality of firms—some argue that a one-dimensional perspective is not sufficient to capture the richness of the international activities of multinationals (Clark & Knowles, 2003; Clark et al., 2004). Although existing studies differ significantly in the variables they use to measure firm level multinationality, they all take an *internal* perspective, that is, they analyse the international diversification of various firm characteristics. We take a more wholistic view and also provide an *external* perspective and include the foreign exposure of firm returns in our analysis. Existing studies implicitly assume that the internal diversification and international exposure of firms are the same phenomena but we argue that the internal diversification of operations may not be reflected in firm returns and therefore, we need to analyse these two criteria separately in order to provide a more complete and in-depth analysis on the benefits of investing in MNCs.

This paper analyses the benefits of investing in firms with varying levels of multinationality and exposure to foreign regions. We hypothesise that diversification benefits increase for firms based on increasing levels of multinationality and exposure to geographic regions where they operate. We use constituents of the Nikkei 225 index and categorise firms using the multinational classification system developed by Aggarwal et al. (2011), hereafter ABHK. We categorise firms each year from 1998 to 2015 using a unique hand collected dataset based on sales and subsidiary data. The sales data allows us to measure the trading of firms while the subsidiary data measures the investment made by firms and puts forth an alternative measure for a firm's upstream activity that captures investments beyond the firm's accounting books. Next, we use an extended version of the CAPM to investigate if firm returns are influenced by the geographical regions where they report operations. This provides a dataset of three categories of firms—firms that are influenced by a geographical region where they report operations, firms that are influenced by a geographical region where they do not report operations and firms that are not influenced by a geographical region where they report operations. Finally, we use mean–variance spanning (MVS) and Sharpe ratio analysis to investigate the benefits of investing in firms with varying levels of multinationality and exposure to various geographical regions.

This paper makes several contributions to the existing literature. The longitudinal classification of firms based on their level of multinationality and exposure to geographical regions allows us to provide a more in-depth analysis on the benefits of investing in multinationals than exists in literature to date. We also identify a new category of firm that may provide diversification benefits to Japanese investors—firms that are significantly influenced by a geographic region where they do not report operations. These novel tests highlight the importance of studying the exposure of firms' returns to various geographical regions in combination with

firm-level operations, to yield the greatest diversification benefits while investing in domestically listed firms.

Our main findings are as follows. We find that firm level multinationality of Japanese firms is increasing over time—this is confirmed using both sales and subsidiary data. Most firms are trans-regional whereby they operate across more than one geographical region. The firms demonstrate different levels of internationalisation based on the two measures. Firms in our dataset are more multinational based on subsidiaries than sales. An increasing number of firms have subsidiaries in multiple geographic regions. More firms tend to have subsidiaries in non-triad regions such as Africa, South America, and Oceania than sales. The extended CAPM model shows that firms tend to not be influenced by the geographic regions where they report sales and subsidiaries. Our results show that there are benefits from investing in Japanese MNCs, but these benefits do not necessarily increase with increasing levels of multinationality. The MVS tests show that firms influenced by a region with no operations in that region are beneficial for portfolio diversification. Thus, a new category of firms is identified that may be beneficial to investors—firms that are influenced by a geographical region where they do not report sales or subsidiaries. This finding has far reaching implications for portfolio allocations. Our findings provide support for the argument that analysing the geographic spread of firms' sales and subsidiaries does not give investors sufficient information on the influences on firm's returns. Investors must do more than analyse the international location of firm operations. Investors should be cognizant of the indirect exposure their domestic equity portfolios have to foreign regions. Existing studies fail to distinguish between these two criteria, assuming them to be the same. We find evidence to the contrary. We recommend that investors look beyond the location of operations when investing in Japanese firms and investigate the geographical regions that influence firms' returns. This strategy can help investors reap the benefits from international diversification while investing domestically and therefore support the home bias argument.

2 Data and Methodology

The dataset uses the constituents of the Nikkei 225 index in 2015 and the analysis is performed over an 18-year time period from 1998 to 2015. The multinationality dataset is compiled using both sales and subsidiaries data for each firm in each year. The geographic breakdown of sales data is accessed from Thompson Reuters Eikon and the subsidiary data is hand-collected for each year from Who Owns Whom published by Dun & Bradstreet (1998–2015). The weekly stock returns for each firm and market and the risk-free rate are obtained from Thompson Reuters Eikon.

2.1 Multinationality Classification

We categorise each firm using the multinational taxonomy developed by Aggarwal et al. (2011)—ABHK. The ABHK classification categorises firms based on the geographic spread of operations. This is measured across six geographic regions based

on inhabited continents namely, Africa, Asia, Europe, North America, Oceania and South America. Each firm is classified in each year based on the location of sales and subsidiaries. The ABHK classification system uses the following categories of multinationality. Domestic firms (D) have operations only in their domestic country. Regional firms (R) have operations only in their home-region, Trans-regional (T) firms have operations across more than one region—this category is further decomposed into T2 representing operations in two regions, T3 representing operations in three regions, T4 in four regions and T5 five regions, and Global (G) firms have operations in all six geographical regions. Each category is given a score such that Domestic firms score 0, Regional firms score 1, T2 firms score 2, T3 firms score 3, T4 firms score 4, T5 firms score 5 and Global firms score 6. These scores are used to categorise each firm is each year based on their measures of sales and subsidiaries. For example, in 2013, Yahama Corporation has foreign sales spread across all six geographic regions (score 6) and is classified as a Global firm based on the sales measure of multinationality.

2.2 Extended CAPM Factor Model

Factors affecting stock returns forms a significant proportion of the asset pricing literature for stocks. Harvey et al. (2016) document close to 300 factors proposed in the existing literature, all of which have been claimed as significant determinants and drivers of the variability in stock returns. However, the literature surrounding factors relating to firm-level characteristics to explain the cross-sectional and time-series variation in stock returns has not received comprehensive examination (Hou et al., 2011). There is a growing need for such an analysis that focuses on whether these characteristics arise from domestic, regional or global factors. Some studies argue that only local, country-specific factors constructed from these firm-level characteristics influence global stock returns (Griffin, 2002), while others perceive a more globally integrated market, and advocate models that incorporate both local and foreign components of factors built from firm characteristics (Bekaert et al., 2009; Fama & French, 1998). We extend the traditional CAPM based on Berrill (2010) where the single foreign factor is divided into the six geographical regions listed in the ABHK model—Africa, Asia, Europe, North America, Oceania and South America. Hughes et al (1975), Agmon and Lessard (1977) and Cai and Warnock (2004) use factor models to study the relationship between share prices of MNCs and their level of international involvement. Busse et al. (2013) use emerging and developed markets as factors to study the performance of mutual funds. Bansal et al. (2018) fixed effects panel regression to evaluate factors of profitability in listed companies. In this paper, the extended CAPM model is estimated for each firm to determine the exposure of firms' returns to each geographic region. The regional factors provide a good representation of the multi-facetted nature of internationalisation.

This study uses rolling regressions to estimate the parameters of Eq. 1 across a moving sample period. This technique allows for a window of fixed width to pass through the sample. We estimate Eq. 1 for each firm in the sample to determine the exposure of individual firms' returns to each geographic region. This helps analyse

the changing statistical significance of regional coefficients on stock returns for each firm. Given that firms are classified based on their multinationality for each year, therefore, the regression parameters are determined for each rolling period of 1 year or 52 weeks. The nested least squares rolling window approach is commonly used in existing studies (Adrian et al., 2015; Fama & French, 1997; Lewellen & Nagel, 2006). This method directly estimates conditional coefficients using short-window regressions. Rather than estimating the extended CAPM equation once using the full-time series of returns, the estimates are modelled separately each year. The following equation is estimated for each firm using rolling regressions:

$$\overline{R}_{jt} - r_{ft} = \alpha_j + \beta_j^D(\overline{R}_{mt}^D - r_{ft}) + \sum_{k=1}^{6} \gamma_j^k(\overline{R}_{k,t} - r_{ft}) + \varepsilon_{jt} \quad (1)$$

where $\overline{R}_{j,t}$ is the return on each individual stock, r_{ft}. is the risk-free rate, $\overline{R}_{mt}^D$. is the return on the domestic market and $\overline{R}_{k,t}$ is the return on the regional index for each region 1–6. Equation 1 generates a series of coefficients for each rolling window (The software used for data analysis is STATA.) This analysis of each firms' exposure to the six regional factors enables an investigation into whether firm returns are influenced by individual geographic regions where they may or may not report operations.

The regional factors are based on the six geographical regions as outlined by ABHK namely, Africa, Asia, Europe, North America, South Amerind Oceania. Each regional factor is constructed using the primary stock market indices of the largest economies in the respective region. The World Bank Atlas method is used to measure the size of economies (following Berrill, 2010) based on Gross National Income (GNI). The World Bank measures GNI in US dollars and exchange rate fluctuations are smoothed by using a 3-year moving average, price-adjusted conversion factor. The market value weighted indices are constructed using the five largest countries in each region. The smaller economies are not included for regions of North America and Oceania due to limited availability of data. The index value of a region is calculated using $\sum_{i=1}^{n} w_{it}R_{it} = 1$, where *wit* is the market-value weight of country *i* at time *t*. *Rit* is the return of the country index at time t. Therefore, the regional indices are created using the following countries for each region—Africa (Nigeria, South Africa, Egypt, Morocco), Asia (China, India, Russia, Korea (Japan is excluded to avoid issues of multicollinearity), Europe (Germany, France, United Kingdom, Italy, Spain), North America (United States, Canada, Mexico), South America (Brazil, Argentina, Venezuela, Columbia, Chile) and Oceania (Australia, New Zealand).

2.3 Mean–Variance Spanning (MVS) and Sharpe Ratio Tests

Many different techniques may be used to investigate the benefits of portfolio diversification such as principal component analysis (Meric et al., 2008), dynamic asymmetric copula model (Christoffersen et al., 2012), generalised information theoretic measures (Batra & Taneja, 2022). We choose to use Mean Variance Spanning

(MVS) tests. First developed by Huberman and Kandel (1987), MVS tests are widely used in the existing literature to examine the diversification benefits from investing in various asset classes (Eiling et al., 2012; Chou et al., 2014; O'Hagan-Luff & Berrill, 2015; Bae et al., 2019). The set of K assets is defined as the benchmark portfolio and N assets is the test portfolio. These two portfolios are considered to investigate whether, conditional on the benchmark portfolio, addition of the test portfolio can shift the efficient frontier of the benchmark. In other words, consider the N + K assets; can the subset of K assets yield the same diversification benefits? MVS tests investigate whether the benchmark can span the extended portfolio consisting of N + K assets. To test whether the benchmark portfolio spans the extended portfolio, the joint hypothesis $\alpha = 0$ and $\beta = 1$ is tested, where α is the intercept and β is the slope coefficient. The null hypothesis in this case is that the benchmark portfolio spans the extended portfolio. If we reject the null hypothesis, it implies that the efficient frontiers of the benchmark and the extended portfolios are different.

In our analysis, domestic firms are set as the benchmark portfolio and firms with varying degrees of international operations and influences compile the test portfolios. The MVS tests are originally estimated using Ordinary Least Squares (OLS). The assumption under OLS estimation is that the error terms are normally distributed and homoscedastic. Any violation of the homoscedasticity and normality conditions may have implications on the outcome of spanning tests (Ferson et al., 1993). Kan and Zhou (2012) proposed the generalised method of moments (GMM) approach as more appropriate in this case. This is because the GMM approach does not require information on the exact distribution of the error terms. We repeat the MVS tests by estimating all Eqs. 2–5 using GMM to test the robustness of our results.[1] The first set of tests examine the benefits of investing in firms with varying degrees of sales operations. Firms with domestic sales are set as the benchmark portfolio in each equation. The following equation is estimated using MVS tests.

$$R_i = \alpha + \beta R_D + \varepsilon_t \tag{2}$$

Let R_D be the return on market-value weighted portfolio of firms with domestic sales and $R_i (i = 1, 2, 3 \ldots 6)$ be the return on market-value weighted portfolio of firms classified as regional, T2 firms, T3 firms, T4 firms, T5 firms and Global firms based on sales. For example, R_1. is the return on market-value weighted portfolio of firms classified as regional based on sales. Equation (2) tests whether the mean–variance frontier of the benchmark domestic firms spans the frontier of each category of firms based on varying degrees of sales. The joint-Wald tests and step-down Wald tests are used to determine the statistical significance of the benefits of investing in the extended portfolio of stocks. The joint Wald test tests whether $\alpha = 0$ and $\beta = 1$. This is useful in identifying if the additional assets can

[1] The instruments used in the GMM estimation are the regressors themselves, therefore the coefficient estimates are the same, but the standard errors are robust to heteroskedasticity and serial correlation. However, the power of tests using GMM estimation is lower, and can result in larger standard errors than those of OLS estimation. The GMM joint and step-down Wald tests confirm the main analysis, and the results are available upon request from authors or in the electronic supplementary material.

reduce the variance of the global minimum portfolio. It is not useful in the case of additional assets that improve the tangency portfolio. The tangency portfolio is where the Sharpe ratio is maximised. The use of the step-down Wald test overcomes this limitation by first testing whether $\alpha = 0$ and then testing if $\beta = 1$ conditional on $\alpha = 0$. If $\alpha = 0$ is rejected, the tangency portfolios of the benchmark and test assets are statistically different. If $\beta = 1$ is rejected, the two global minimum portfolios are statistically different. The step-down Wald test analyses the benefits associated with investing in additional securities that reduce the variance of the global minimum variance portfolio and those that improve the tangency portfolio. If both the hypotheses are rejected, there is strong statistical evidence that adding the additional securities reduces the risk of the global-minimum variance portfolio and improves the tangency portfolio.

The second set of tests investigate the benefits of investing in firms with different degrees of subsidiary operations. The above tests using Eq. (2) are repeated for firms with varying degrees of multinationality based on subsidiary data. For example, the set of firms with subsidiaries only in Japan form the benchmark portfolio, and we select firms classified as regional, T2, T3, T4, T5 and Global based on subsidiary data as the test portfolios.

The final set of MVS tests examine the benefits of investing in firms based on their exposure to the six regional factors from Eq. 1. The results from the extended factor model are used to create portfolios of firms that are influenced but do not report sales (subsidiaries) in that region, firms that are influenced and report sales (subsidiaries) in the region and firms that are not influenced but report sales (subsidiaries) in the region. These portfolios are included in the extended portfolios and are regressed on the benchmark portfolio of domestic firms. These tests are performed for each geographic region. For example, let R_{j_1} be the return on market-value weighted portfolio of firms influenced by a regional index with no sales in the region, R_{j_2} be the return on market value weighted portfolio of firms influenced with sales in the region and R_{j_3} be the return on market-value weighted portfolio of firms not influenced but with sales in the region;

$$R_{j_1} = \alpha + \beta R_D + \varepsilon_t \tag{3}$$

$$R_{j_2} = \alpha + \beta R_D + \varepsilon_t \tag{4}$$

$$R_{j_3} = \alpha + \beta R_D + \varepsilon_t \tag{5}$$

The economic benefits associated with investing in additional securities is measured using a Sharpe Ratio analysis. If there is an increase in the Sharpe Ratio of the optimal combination of test and benchmark assets, then the investor can achieve a better risk-return profile compared to investing only in the benchmark. The change in Sharpe Ratio is analysed both when short sales are and are not permitted.

3 Results

3.1 Investing Based on International Operations

Table 1 presents the results of firms categorised using the ABHK classification system. The results show that the majority of firms are categorised as trans-regional based on both sales and subsidiaries measures. There is little evidence that firms focus only on their home-region and an increasing number of firms are becoming global. The proportion of purely domestic firms based on both measures decreases significantly over the sample period. An increasing trend in multinationality is also observed based on the subsidiary data. The percentage of global firms based on subsidiaries is substantially higher than those based on sales. Fewer firms are categorised as domestic based on subsidiaries than sales. This highlights the distinction in patterns of internationalisation for firms based on accounting and non-accounting measures of multinationality. Firms are becoming more multinational over time based on both measures, the degree of multinationality is greater based on subsidiaries than sales. This finding suggests that Japanese firms contradict the traditional internationalisation theories that focus on expansion of sales first and subsidiaries last (Meyer & Thaijongrak, 2013). These findings also demonstrate the possible limitations of solely using accounting data while measuring firm-level multinationality (Fig. 1).

We next use MVS tests to test the benefits of investing in firms with varying levels of multinationality. Firms with domestic sales (subsidiaries) are set as the benchmark portfolio and market-value weighted portfolios of firms in each multinationality category based on sales (subsidiaries) are set as the extended sets. The Wald test results are presented in Table 2. The results show that the benchmark portfolio does not span the extended portfolios with additional stocks for every multinational classification. This suggests stocks of all multinational classifications offer statistically significant diversification benefits to domestic investors. This is also true for the tests based on subsidiary measures. The Wald test results also shows that the extended portfolios provide a lower variance than the benchmark portfolio. But there is no improvement in the tangency portfolio when test assets are added to domestic firms. Thus, the diversification benefits of the extended portfolios are due to the overall risk reduction they provide to the domestic benchmark portfolio.

The economic benefits of investing in the extended portfolios are measured using Sharpe ratios. When there is a positive increase in the Sharpe ratio, it implies that investors can improve the risk-return metrics of their investments by extending their portfolio of domestic firms to include portfolio of firms with different multinationality classifications. For categories based on sales, economic benefits exist from investing in Regional, T3 and Global firms because there is a change in Sharpe ratios. The greatest increase in Sharpe ratio is 8.74 percent provided by Regional firms, followed by T3 firms (3.75 percent increase). Global firms also provide economic benefits but the increase in Sharpe ratio is only 0.69 percent. For categories based on subsidiaries, economic benefits exist

Table 1 Classification of Japanese firms based on sales and subsidiaries

	Domestic	Regional	T2	T3	T4	T5	Global
	Classification of firms based on sales						
1998	35 (21.34%)	0 (0.00%)	34 (20.73%)	42 (25.61%)	35 (21.34%)	16 (9.76%)	2 (1.22%)
1999	34 (21.12%)	0 (0.00%)	27 (16.77%)	40 (24.84%)	42 (26.09%)	16 (9.94%)	2 (1.24%)
2000	30 (18.52%)	0 (0.00%)	28 (17.28%)	43 (26.54%)	43 (26.54%)	17 (10.49%)	1 (0.62%)
2001	23 (14.84%)	1 (0.65%)	25 (16.13%)	35 (22.58%)	49 (31.61%)	21 (13.55%)	1 (0.65%)
2002	19 (12.26%)	1 (0.65%)	27 (17.42%)	36 (23.23%)	51 (32.90%)	20 (12.90%)	1 (0.65%)
2003	17 (10.90%)	1 (0.64%)	29 (18.59%)	36 (23.08%)	51 (32.69%)	22 (14.10%)	0 (0.00%)
2004	16 (10.26%)	1 (0.64%)	30 (19.23%)	37 (23.72%)	51 (32.69%)	20 (12.82%)	1 (0.64%)
2005	16 (9.94%)	1 (0.62%)	29 (18.01%)	43 (26.71%)	47 (29.19%)	24 (14.91%)	1 (0.62%)
2006	17 (10.37%)	2 (1.22%)	30 (18.29%)	43 (26.22%)	45 (27.44%)	25 (15.24%)	2 (1.22%)
2007	16 (9.47%)	3 (1.78%)	31 (18.34%)	47 (27.81%)	44 (26.04%)	27 (15.98%)	1 (0.59%)
2008	17 (9.94%)	2 (1.17%)	34 (19.88%)	41 (23.98%)	47 (27.49%)	28 (16.37%)	2 (1.17%)
2009	18 (10.40%)	2 (1.16%)	33 (19.08%)	39 (22.54%)	52 (30.06%)	27 (15.61%)	2 (1.16%)
2010	19 (10.67%)	2 (1.12%)	35 (19.66%)	40 (22.47%)	52 (29.21%)	28 (15.73%)	2 (1.12%)
2011	21 (11.86%)	3 (1.69%)	38 (21.47%)	26 (14.69%)	57 (32.20%)	29 (16.38%)	3 (1.69%)
2012	19 (10.73%)	3 (1.69%)	38 (21.47%)	28 (15.82%)	56 (31.64%)	28 (15.82%)	5 (2.82%)
2013	56 (27.05%)	7 (3.38%)	43 (20.77%)	41 (19.81%)	36 (17.39%)	22 (10.63%)	2 (0.97%)
2014	61 (28.37%)	7 (3.26%)	50 (23.26%)	42 (19.53%)	30 (13.95%)	23 (10.70%)	2 (0.93%)
2015	66 (30.00%)	8 (3.64%)	50 (22.73%)	41 (18.64%)	31 (14.09%)	22 (10.00%)	2 (0.91%)
Average	27.78	2.44	33.94	38.89	45.5	23.06	1.78
	Classification based on subsidiaries						
1998	5 (2.82%)	9 (5.08%)	28 (15.82%)	64 (36.16%)	46 (25.99%)	23 (12.99%)	2 (1.13%)
1999	5 (2.82%)	9 (5.08%)	28 (15.82%)	64 (36.16%)	46 (25.99%)	23 (12.99%)	2 (1.13%)
2000	12 (6.38%)	5 (2.66%)	25 (13.30%)	72 (38.30%)	49 (26.06%)	23 (12.23%)	2 (1.06%)
2001	13 (6.88%)	4 (2.12%)	26 (13.76%)	57 (30.16%)	55 (29.10%)	29 (15.34%)	5 (2.65%)

Table 1 (continued)

	Domestic	Regional	T2	T3	T4	T5	Global
2002	13 (6.81%)	8 (4.49%)	28 (15.73%)	57 (32.02%)	46 (25.84%)	32 (17.98%)	7 (3.93%)
2003	18 (9.18%)	4 (2.04%)	27 (13.78%)	59 (30.10%)	51 (26.02%)	30 (15.31%)	7 (3.57%)
2004	19 (9.55%)	6 (3.02%)	28 (14.07%)	61 (30.65%)	46 (23.12%)	26 (13.07%)	13 (6.53%)
2005	18 (9.09%)	9 (4.55%)	22 (11.11%)	65 (32.83%)	46 (23.23%)	23 (11.62%)	15 (7.58%)
2006	18 (8.70%)	6 (2.90%)	24 (11.59%)	65 (31.40%)	45 (21.74%)	29 (14.01%)	20 (9.66%)
2007	19 (9.18%)	5 (2.42%)	26 (12.56%)	54 (26.09%)	51 (24.64%)	30 (14.49%)	22 (10.63%)
2008	20 (9.43%)	5 (2.36%)	25 (11.79%)	54 (25.47%)	56 (26.42%)	31 (14.62%)	21 (9.91%)
2009	23 (11.11%)	7 (3.38%)	17 (8.21%)	54 (26.09%)	49 (23.67%)	36 (17.39%)	21 (10.14%)
2011	15 (7.01%)	10 (4.67%)	27 (12.62%)	70 (32.71%)	41 (19.16%)	27 (12.62%)	24 (11.21%)
2012	21 (10.10%)	4 (1.92%)	23 (11.06%)	54 (25.96%)	36 (17.31%)	43 (20.67%)	27 (12.98%)
2013	14 (6.48%)	5 (2.31%)	31 (14.35%)	55 (25.46%)	51 (23.61%)	42 (19.44%)	18 (8.33%)
2014	19 (8.96%)	5 (2.36%)	18 (8.49%)	50 (23.58%)	54 (25.47%)	38 (17.92%)	28 (13.21%)
2015	15 (7.08%)	7 (3.30%)	22 (10.38%)	42 (19.81%)	53 (25.00%)	44 (20.75%)	29 (13.68%)
Average	14.83	6	23.61	55.39	45.61	29.39	14.61

Note: This table contains the number of firms in Japan categorised as Domestic, Regional, Trans-regional and Global based on their location of sales and subsidiaries data. The average number of firms in each category over the entire sample period are also calculated. The percentage of firms in each category is shown in the brackets. For example, the average number of Domestic firms based on subsidiaries is 14.83. The subsidiary data for 2010 is not available and is left out of the analysis

for Regional, T2, T4 and Global firms. The maximum benefits exist for T4 firms with a 4.53 percent increase in Sharpe ratio followed by Regional firms with a 1.01 percent increase. The extended portfolios containing T2 and Global firms increase the Sharpe ratio by 0.44 and 0.84 percent respectively. Investing in firms with both Trans-regional sales and subsidiaries provides investors with the greatest increase in Sharpe ratio, followed by Regional and Global firms. This finding is supported in the literature by Michel and Shaked (1986), Rowland and Tesar (2004), Sukpanich and Rugman (2007), Qian et al. (2010), Oh and Contractor (2014) and Mullen and Berrill (2017). There is also evidence that firms with increasing levels of multinationality do not provide investors with increasing diversification benefits. These results show that there are benefits from

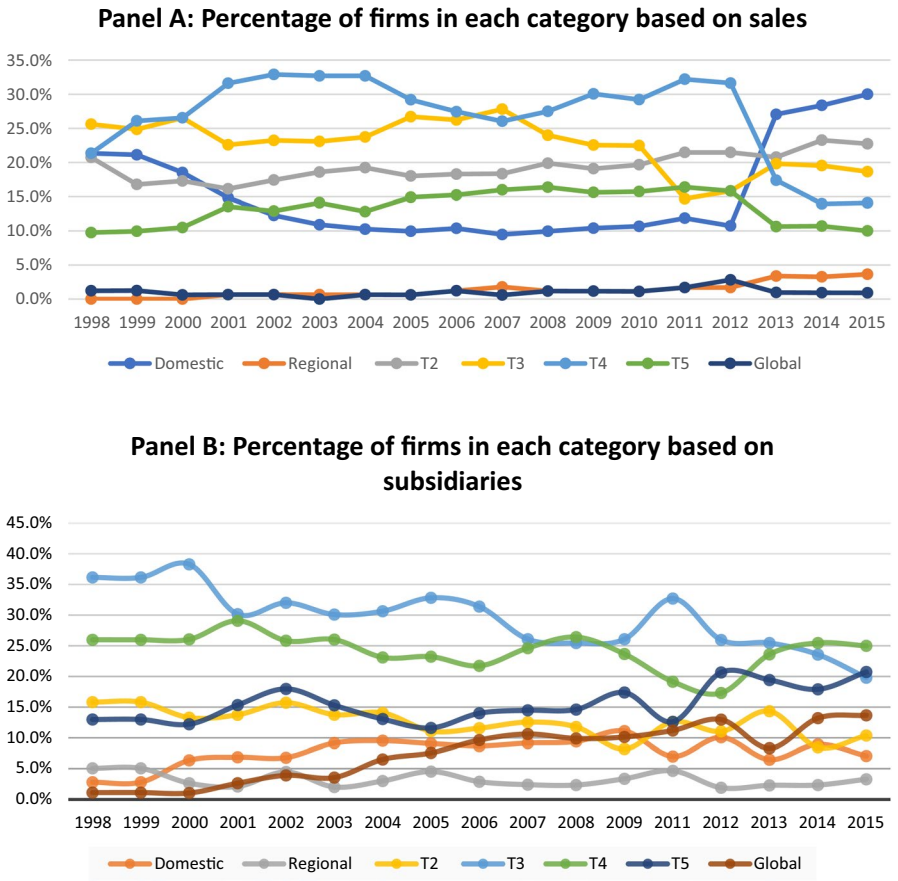

Fig. 1 Percentage of firms in each category in each year. Note: This figure shows the proportion of firms in each of the categories namely, Domestic, Regional, T2, T3, T4, T5 and Global firms. Panel A and Panel B show the distribution of firms in each year based on sales and subsidiaries data respectively. For example, in 1998 35 percent of firms in the sample are categorised as T3 based on subsidiaries. This proportion falls to 25 percent in 2007

investing in Japanese MNCs but the benefits do not increase as multinationality increases. These findings contradict Berrill and Kearney (2010), who find that more internationalised firms offer greater diversification benefits. Contrary results are also reported by Kyaw et al. (2011), Creal et al. (2014), Krapl (2015), who use the percentage of foreign sales as a measure of geographic diversification and provide evidence of significant premium associated with more geographically dispersed foreign operations. Our results highlight the importance of using robust measures of multinationality, thus, allowing for an in-depth investigation of the diversification benefits associated with these firms.

Table 2 Benefits of investing in firms with different levels of multinationality 1998–2015

	Correlation with benchmark	Joint Wald test $\alpha=0$; $\beta=1$	Step Down Wald $\alpha=0$	Step Down Wald $\beta=1$	Sharpe ratio	Optimal weight—no short selling	Change in sharpe ratio	Optimal weight—with short selling	Change in sharpe ratio
Portfolios based on sales									
Domestic (benchmark)					29.68%				
Regional	0.37	7.97 (0.00)	0.91 (0.33)	7.97 (0.00)	33.64%	43.60%	8.74%	43.60%	8.74%
T2	0.64	28.06 (0.00)	0.08 (0.77)	28.06 (0.00)	13.27%	0.00%	0.00%	− 33.33%	0.92%
T3	0.71	23.27 (0.00)	0.41 (0.52)	23.27 (0.00)	31.90%	60.99%	3.75%	60.99%	3.75%
T4	0.65	30.19 (0.00)	0.00 (0.97)	30.19 (0.00)	19.46%	0.88%	0.00%	0.88%	0.00%
T5	0.63	16.99 (0.00)	0.16 (0.69)	16.99 (0.00)	10.78%	0.00%	0.00%	− 38.49%	1.70%
Global	0.41	26.31 (0.00)	0.08 (0.77)	26.31 (0.00)	18.05%	14.93%	0.69%	14.93%	0.69%
Portfolios based on subsidiaries									
Domestic (benchmark)					20.96%				
Regional	0.75	0.4 (0.67)	0.07 (0.78)	0.40 (0.67)	20.07%	36.61%	1.01%	36.61%	1.01%
T2	0.73	16.29 (0.00)	0.04 (0.84)	16.29 (0.00)	18.27%	26.47%	0.44%	26.47%	0.44%
T3	0.66	20.32 (0.00)	0.00 (0.97)	20.32 (0.00)	14.09%	1.93%	0.00%	1.93%	0.00%
T4	0.64	19.06 (0.00)	0.36 (0.54)	19.06 (0.00)	24.56%	64.30%	4.53%	64.30%	4.53%
T5	0.58	25.49 (0.00)	0.00 (0.95)	25.49 (0.00)	10.66%	0.00%	0.00%	− 9.08%	0.08%
Global	0.51	12.29 (0.00)	0.06 (0.79)	12.29 (0.00)	15.84%	21.27%	0.84%	21.27%	0.84%
Portfolios based on sales and subsidiaries									
Domestic (benchmark)					20.15%				
Regional	0.64	58.59 (0.00)	0.28 (0.59)	58.59 (0.00)	22.33%	61.73%	3.45%	61.73%	3.45%
Trans-regional	0.50	35.67 (0.00)	0.83 (0.36)	35.67 (0.00)	29.23%	74.78%	9.77%	74.78%	9.77%
Global	0.46	36.82 (0.00)	0.11 (0.74)	36.82 (0.00)	16.02%	29.00%	1.39%	29.00%	1.39%

Table 2 (continued)

Note: This table shows the MVS test results for Japanese firms with different levels of multinationality based on sales and subsidiary data, in the local currency. In each case the benchmark portfolio is the portfolio with domestic firms. The extended portfolios contain all other stocks in the dataset based on the multinational classification developed by Aggarwal et al. (2011). The first column shows the correlation of each extended portfolio with the benchmark portfolio. The second column shows the Joint Wald test results, displaying the *F*-statistic for each with the figure in brackets is the *p*-value. The third and fourth column show the Step-down Wald test results with the *F*-statistic and *p*-value in brackets. The fifth column shows the Sharpe Ratio for each portfolio. The sixth and seventh column show the weights of an optimal portfolio containing the benchmark and test-assets which maximises the Sharpe Ratio and the change in Sharpe Ratio from the benchmark portfolio. The eighth and ninth column show the weights of an optimal portfolio containing the benchmark and test assets, where short-positions are allowed, which maximises the Sharpe Ratio and the change in Sharpe Ratio from the benchmark portfolio. For example, investing the extended portfolio containing Regional stocks based on sales the *F*-statistic of the Wald test and a *p*-value are statistically significant. The extended portfolio increases the Sharpe Ratio by 8.74 percent with 43.60 percent weight in the Regional stocks

3.2 Investing Based on International Influences

Tables 3 and 4 present the results from Eq. 1 combined with data on regional level sales and subsidiaries. The results in Table 3 show the number of firms influenced by a region (with sales in that region), firms influenced by a region (with no sales in that region) and firms not influenced by a region (with sales in that region). These categories are also reported in Table 4 using subsidiary data. Results show that many firms are not influenced by the geographical regions where they report sales and subsidiaries. This is an important finding as it suggests that firm-level diversification of operations does not give a complete picture of the influences on the firms' returns. The results also show that firms' returns tend to be influenced by geographical regions where they do not report operations. The number of firms influenced by geographical regions where they report operations is small in the sample. These results suggest that firms tend not to be influenced by the geographical regions where they report sales and subsidiaries. We also find that more firms tend to be influenced by regions where they report subsidiaries compared to the sales data.

The MVS test results from Eqs. 3, 4 and 5 based on regional influences and sales data are presented in Table 5. Firms with domestic sales form the benchmark portfolio. The test portfolios are firms that are influenced by a regional index with no sales in that region, firms that are influenced by a regional factor with sales in that region, and firms that are not influenced by the regional factor but report sales in that region. The Wald test results for Eqs. 3–5 show that the benchmark portfolio of firms with domestic sales does not span the three extended portfolios. This suggests that investing in these three categories of firms based on each of the six geographic regions yield statistically significant benefits for the investor. The minimum variance portfolio of the benchmark and extended portfolio are statistically different implying that investing in the extended portfolios provides a lower variance to investors.

The economic benefits are measured using changes in the Sharpe ratios and results are also presented in Table 5. When we estimate the benefits from investing in firms influenced by a region with no sales in that region (Eq. 3), the results show that there is an increase in Sharpe ratio for Asia (2.84 percent), North America (3.31 percent) and South America (3.38 percent). When we measure the benefits from investing in firms influenced by a region with sales in that region (Eq. 4), results show that there is an increase in Sharpe ratio for Asia (0.56 percent). There is no increase in the Sharpe ratio for other regions. The estimates for the benefits from investing in firms not influenced by a region with sales in that region (Eq. 5), show that there is an increase in the Sharpe ratio only for the African region (6.16 percent). There is no change in the Sharpe ratios for other regions.

Table 6 presents results for Eqs. 3–5 using subsidiary data. The Wald test results in all cases show that the benchmark portfolio of firms with domestic subsidiaries does not span the extended portfolios with only one exception—North America. This suggests that the extended portfolios have statistically different efficient frontiers from the benchmark portfolio of domestic subsidiaries. The results

Table 3 Regional influences on Japanese firms and their regional sales from 1998–2015

		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Influenced, no sales	Europe	17 (7.56)	5 (2.22)	16 (7.11)	4 (1.78)	3 (1.33)	18 (8.00)	7 (3.11)	4 (1.78)	5 (2.22)	8 (3.56)
	Asia	15 (6.67)	10 (4.44)	20 (8.89)	15 (6.67)	43 (19.11)	47 (20.89)	24 (10.67)	7 (3.11)	4 (1.78)	6 (2.67)
	North America	18 (8.00)	5 (2.22)	1 (0.44)	3 (1.33)	3 (1.33)	1 (0.44)	5 (2.22)	5 (2.22)	2 (0.89)	4 (1.78)
	South America	10 (4.44)	12 (5.33)	13 (5.78)	15 (6.67)	5 (2.22)	16 (7.11)	11 (4.89)	19 (8.44)	1 (0.44)	10 (4.44)
	Africa	7 (3.11)	18 (8.00)	5 (2.22)	4 (1.78)	26 (11.56)	10 (4.44)	7 (3.11)	11 (4.89)	24 (10.67)	13 (5.78)
	Oceania	40 (17.78)	6 (2.67)	28 (12.44)	15 (6.67)	3 (1.33)	7 (3.11)	8 (3.56)	8 (3.56)	5 (2.22)	7 (3.11)
Influenced, sales	Europe	10 (4.44)	3 (1.33)	5 (2.22)	4 (1.78)	3 (1.33)	16 (7.11)	6 (2.67)	2 (0.89)	10 (4.44)	1 (0.44)
	Asia	6 (2.67)	3 (1.33)	9 (4.00)	19 (8.44)	40 (17.78)	52 (23.11)	27 (12.00)	8 (3.56)	3 (1.33)	4 (1.78)
	North America	13 (5.78)	6 (2.67)	3 (1.33)	1 (0.44)	2 (0.89)	3 (1.33)	2 (0.89)	11 (4.89)	3 (1.33)	5 (2.22)
	South America	0 (0.00)	1 (0.44)	0 (0.00)	1 (0.44)	0 (0.00)	4 (1.78)	3 (1.33)	6 (2.67)	0 (0.00)	1 (0.44)
	Africa	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.44)	0 (0.00)
	Oceania	2 (0.89)	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)	0 (0.00)	2 (0.89)	0 (0.00)
Not influenced, sales	Europe	63 (28.00)	76 (33.78)	74 (32.89)	74 (32.89)	77 (34.22)	67 (29.78)	79 (35.11)	87 (38.67)	78 (34.67)	94 (41.78)
	Asia	65 (28.89)	36 (16.00)	71 (31.56)	58 (25.78)	39 (17.33)	32 (14.22)	68 (30.22)	91 (40.44)	106 (47.11)	114 (50.67)
	North America	80 (35.56)	93 (41.33)	96 (42.67)	101 (44.89)	101 (44.89)	103 (45.78)	102 (45.33)	96 (42.67)	103 (45.78)	106 (47.11)
	South America	16 (7.11)	16 (7.1)	17 (7.56)	24 (10.67)	27 (12.00)	27 (12.00)	30 (13.33)	29 (12.89)	37 (16.44)	36 (16.00)
	Africa	2 (0.89)	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)	0 (0.00)	2 (0.89)
	Oceania	14 (6.22)	15 (6.67)	15 (6.67)	17 (7.56)	17 (7.56)	14 (6.22)	14 (6.22)	18 (8.00)	19 (8.44)	28 (12.44)
		2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
Influenced, no sales	Europe	8 (3.56)	59 (26.22)	1 (0.44)	12 (5.33)	4 (1.78)	7 (3.11)	1 (0.44)	20 (8.89)	17 (7.56)	11.56
	Asia	6 (2.67)	24 (10.67)	2 (0.89)	20 (8.89)	37 (16.44)	22 (9.78)	37 (16.44)	13 (5.78)	17 (7.56)	20.17
	North America	4 (1.78)	2 (0.89)	3 (1.33)	1 (0.44)	1 (0.44)	0 (0.00)	3 (1.33)	14 (6.22)	1 (0.44)	4

Table 3 (continued)

		2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
	South America	10 (4.44)	25 (11.11)	7 (3.11)	8 (3.56)	46 (20.44)	45 (20.00)	18 (8.00)	4 (1.78)	1 (0.44)	14.78
	Africa	13 (5.78)	10 (4.44)	64 (28.44)	15 (6.67)	15 (6.67)	6 (2.67)	4 (1.78)	15 (6.67)	4 (1.78)	14.33
	Oceania	7 (3.11)	114 (50.67)	62 (27.56)	24 (10.67)	22 (9.78)	21 (9.33)	3 (1.33)	9 (4.00)	36 (16.00)	23.22
Influenced, sales	Europe	1 (0.44)	47 (20.89)	0 (0.00)	12 (5.33)	1 (0.44)	1 (0.44)	2 (0.89)	29 (12.89)	8 (3.56)	8.89
	Asia	4 (1.78)	53 (23.56)	0 (0.00)	48 (21.33)	101 (44.89)	38 (16.89)	35 (15.56)	11 (4.89)	29 (12.89)	27
	North America	5 (2.22)	3 (1.33)	3 (1.33)	2 (0.89)	1 (0.44)	0 (0.00)	3 (1.33)	4 (1.78)	1 (0.44)	3.67
	South America	1 (0.44)	9 (4.00)	0 (0.00)	2 (0.89)	8 (3.56)	5 (2.22)	8 (3.56)	0 (0.00)	0 (0.00)	2.67
	Africa	0 (0.00)	0 (0.00)	1 (0.44)	1 (0.44)	0 (0.00)	0 (0.00)	1 (0.44)	0 (0.00)	0 (0.00)	0.22
	Oceania	0 (0.00)	19 (8.44)	21 (9.33)	3 (1.33)	0 (0.00)	5 (2.22)	0 (0.00)	0 (0.00)	6 (2.67)	3.56
Not influenced, sales	Europe	94 (41.78)	48 (21.33)	96 (42.67)	86 (38.22)	92 (40.89)	90 (40.00)	90 (40.00)	62 (27.56)	82 (36.44)	78.61
	Asia	114 (50.67)	65 (28.89)	121 (53.78)	76 (33.78)	29 (12.89)	91 (40.44)	84 (37.33)	106 (47.11)	92 (40.89)	74.67
	North America	106 (47.11)	108 (48.00)	109 (48.44)	112 (49.78)	103 (45.78)	106 (47.11)	64 (28.44)	55 (24.44)	59 (26.22)	94.28
	South America	36 (16.00)	28 (12.44)	37 (16.44)	36 (16.00)	27 (12.00)	30 (13.33)	27 (12.00)	38 (16.89)	38 (16.89)	28.89
	Africa	2 (0.89)	2 (0.89)	2 (0.89)	2 (0.89)	5 (2.22)	6 (2.67)	4 (1.78)	5 (2.22)	4 (1.78)	2.28
	Oceania	28 (12.44)	9 (4.00)	7 (3.11)	27 (12.00)	29 (12.89)	24 (10.67)	23 (10.22)	27 (12.00)	21 (9.33)	18.78

Note: This tables summarises the rolling regression results from Eq. 1 for Japanese firms and sales in each region. Each panel shows the number of firms influenced with sales in the region, number of firms influenced with no sales in the region, and number of firms not influenced with sales in the region. The percentage of firms in each category is shown in brackets. The last column shows the average number of firms in each category over the 18 year period from 1998 to 2015

Table 4 Regional influences on Japanese firms and their regional subsidiaries from 1998 to 2015

		1998	1999	2000	2001	2002	2003	2004	2005	2006	Average
Influenced, no subsidiaries	Europe	7 (3.11)	2 (0.89)	5 (2.22)	1 (0.44)	0 (0.00)	9 (4.00)	1 (0.44)	0 (0.00)	3 (1.33)	5.4
	Asia	5 (2.22)	4 (1.78)	10 (4.44)	4 (1.78)	16 (7.11)	14 (6.22)	8 (3.56)	4 (1.78)	3 (1.33)	7.6
	North America	8 (3.56)	5 (2.22)	1 (0.44)	2 (0.89)	2 (0.89)	2 (0.89)	5 (2.22)	8 (3.56)	1 (0.44)	2.7
	South America	8 (3.56)	11 (4.89)	10 (4.44)	11 (4.89)	4 (1.78)	12 (5.33)	10 (4.44)	17 (7.56)	1 (0.44)	11.6
	Africa	6 (2.67)	18 (8.00)	4 (1.78)	4 (1.78)	24 (10.67)	10 (4.44)	6 (2.67)	9 (4.00)	24 (10.67)	13.1
	Oceania	29 (12.89)	4 (1.78)	21 (9.33)	11 (4.89)	2 (0.89)	6 (2.67)	6 (2.67)	7 (3.11)	3 (1.33)	16.1
Influenced, subsidiaries	Europe	20 (8.89)	6 (2.67)	16 (7.11)	7 (3.11)	6 (2.67)	25 (11.11)	12 (5.33)	6 (2.67)	12 (5.33)	14.9
	Asia	16 (7.11)	9 (4.00)	19 (8.44)	30 (13.33)	67 (29.78)	85 (37.78)	43 (19.11)	11 (4.89)	4 (1.78)	38.3
	North America	23 (10.22)	6 (2.67)	3 (1.33)	2 (0.89)	3 (1.33)	2 (0.89)	2 (0.89)	8 (3.56)	4 (1.78)	5.2
	South America	2 (0.89)	2 (0.89)	3 (1.33)	5 (2.22)	1 (0.44)	8 (3.56)	4 (1.78)	8 (3.56)	0 (0.00)	6.3
	Africa	1 (0.44)	0 (0.00)	1 (0.44)	0 (0.00)	2 (0.89)	0 (0.00)	1 (0.44)	2 (0.89)	1 (0.44)	1.4
	Oceania	13 (5.78)	3 (1.33)	8 (3.56)	5 (2.22)	2 (0.89)	2 (0.89)	3 (1.33)	1 (0.44)	4 (1.78)	10.7
Not influenced, subsidiaries	Europe	112 (49.78)	126 (56.00)	127 (56.44)	138 (61.33)	140 (62.22)	119 (52.89)	135 (60.00)	140 (62.22)	167 (74.22)	139.1
	Asia	139 (61.78)	91 (40.44)	141 (62.67)	131 (58.22)	99 (44.00)	82 (36.44)	125 (55.56)	161 (71.56)	150 (66.67)	132
	North America	114 (50.67)	131 (58.22)	140 (62.22)	142 (63.11)	142 (63.11)	149 (66.22)	149 (66.22)	146 (64.89)	154 (68.44)	153.1
	South America	34 (15.11)	34 (15.11)	26 (11.56)	38 (16.89)	44 (19.56)	42 (18.67)	44 (19.56)	51 (22.67)	63 (28.00)	54.9
	Africa	1 (0.44)	2 (0.89)	3 (1.33)	8 (3.56)	10 (4.44)	11 (4.89)	19 (8.44)	19 (8.44)	21 (9.33)	19
	Oceania	37 (16.44)	47 (20.89)	56 (24.89)	65 (28.89)	65 (28.89)	68 (30.22)	57 (25.33)	55 (24.44)	74 (32.89)	64.9

Table 4 (continued)

		2007	2008	2009	2011	2012	2013	2014	2015	Average
Influenced, no subsidiaries	Europe	4 (1.78)	29 (12.89)	0 (0.00)	3 (1.33)	4 (1.78)	0 (0.00)	11 (4.89)	12 (5.33)	5.4
	Asia	2 (0.89)	13 (5.78)	0 (0.00)	15 (6.67)	10 (4.44)	12 (5.33)	4 (1.78)	6 (2.67)	7.6
	North America	0 (0.00)	1 (0.44)	3 (1.33)	2 (0.89)	0 (0.00)	3 (1.33)	3 (1.33)	0 (0.00)	2.7
	South America	4 (1.78)	21 (9.33)	5 (2.22)	30 (13.33)	33 (14.67)	17 (7.56)	2 (0.89)	1 (0.44)	11.6
	Africa	12 (5.33)	10 (4.44)	59 (26.22)	11 (4.89)	5 (2.22)	4 (1.78)	14 (6.22)	3 (1.33)	13.1
	Oceania	4 (1.78)	79 (35.11)	43 (19.11)	16 (7.11)	18 (8.00)	2 (0.89)	4 (1.78)	18 (8.00)	16.1
Influenced, subsidiaries	Europe	5 (2.22)	77 (34.22)	1 (0.44)	2 (0.89)	4 (1.78)	3 (1.33)	38 (16.89)	13 (5.78)	14.9
	Asia	8 (3.56)	64 (28.44)	2 (0.89)	123 (54.67)	50 (22.22)	60 (26.67)	20 (8.89)	40 (17.78)	38.3
	North America	9 (4.00)	4 (1.78)	3 (1.33)	0 (0.00)	0 (0.00)	3 (1.33)	15 (6.67)	2 (0.89)	5.2
	South America	7 (3.11)	13 (5.78)	2 (0.89)	24 (10.67)	17 (7.56)	9 (4.00)	2 (0.89)	0 (0.00)	6.3
	Africa	1 (0.44)	0 (0.00)	6 (2.67)	4 (1.78)	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)	1.4
	Oceania	3 (1.33)	54 (24.00)	40 (17.78)	6 (2.67)	8 (3.56)	1 (0.44)	5 (2.22)	24 (10.67)	10.7
Not influenced, subsidiaries	Europe	147 (65.33)	81 (36.00)	154 (68.44)	160 (71.11)	162 (72.00)	166 (73.78)	132 (58.67)	159 (70.67)	139.1
	Asia	172 (76.44)	119 (52.89)	177 (78.67)	71 (31.56)	130 (57.78)	136 (60.44)	171 (76.00)	149 (66.22)	132
	North America	150 (66.67)	161 (71.56)	161 (71.56)	178 (79.11)	168 (74.67)	177 (78.67)	165 (73.33)	176 (78.22)	153.1
	South America	59 (26.22)	56 (24.89)	66 (29.33)	53 (23.56)	66 (29.33)	70 (31.11)	90 (40.00)	98 (43.56)	54.9
	Africa	23 (10.22)	23 (10.22)	20 (8.89)	28 (12.44)	33 (14.67)	30 (13.33)	33 (14.67)	39 (17.33)	19
	Oceania	93 (41.33)	36 (16.00)	52 (23.11)	58 (25.78)	84 (37.33)	81 (36.00)	96 (42.67)	79 (35.11)	64.9

Note: This table summarises the rolling regression results from Eq. 1 for Japanese firms and subsidiaries in each region. Each panel shows the number of firms influenced with subsidiaries in the region, number of firms influenced with no subsidiaries in the region, and number of firms not influenced with subsidiaries in the region. The percentage of firms in each category is shown in brackets. The final column shows the average number of firms in each category over the 18-year period from 1998 to 2015

Table 5 Investing in firms based on international influences and sales

	Equation 3 Portfolio of firms influenced with no sales in						Equation 4 Portfolio of firms influenced with sales in			
Domestic firms SR = 29.68%	Asia	Europe	North America	South America	Africa	Oceania	Asia	Europe	North America	South America
Correlation with bmark	0.58	0.53	0.44	0.48	0.59	0.58	0.57	0.42	0.46	0.34
Joint Wald Test $\alpha=0; \beta=1$	14.84 (0.00)	18.53 (0.00)	9.59 (0.00)	18.29 (0.00)	21.4 (0.00)	36.25 (0.00)	12.64 (0.00)	26.2 (0.00)	9.78 (0.00)	47.01 (0.00)
Step down Wald $\alpha=0$	0.29 (0.58)	0.26 (0.60)	0.34 (0.55)	0.36 (0.55)	0.04 (0.84)	0.13 (0.71)	0.06 (0.80)	0.20 (0.65)	0.93 (0.33)	0.00 (0.96)
Step Down Wald $\beta=1$	14.84 (0.00)	18.53 (0.00)	9.59 (0.00)	18.29 (0.00)	21.40 (0.00)	36.25 (0.00)	12.64 (0.00)	26.20 (0.00)	9.78 (0.00)	47.01 (0.00)
Sharpe ratio (SR)	28.05%	4.74%	26.06%	26.91%	13.22%	9.37%	21.62%	2.03%	− 7.04%	10.46%
Optimal weight—No SS	39.73%	0.00%	30.27%	37.24%	0.00%	0.00%	17.09%	0.00%	0.00%	0.84%
Change in SR	2.84%	0.00%	3.31%	3.38%	0.00%	0.00%	0.56%	0.00%	0.00%	0.00%
Optimal weight—with SS	39.73%	− 46.98%	30.27%	37.24%	− 19.87%	− 39.74%	17.09%	− 37.25%	− 62.10%	0.84%
Change in SR	2.84%	2.69%	3.31%	3.38%	0.49%	1.47%	0.56%	2.14%	8.16%	0.00%

	Equation 4 Portfolio of firms influenced with sales in		Equation 5 Portfolio of firms not influenced with sales in					
Domestic firms SR = 29.68%	Africa	Oceania	Asia	Europe	North America	South America	Africa	Oceania
Correlation with bmark	0.22	0.37	0.69	0.68	0.68	0.65	0.33	0.61
Joint Wald Test $\alpha=0; \beta=1$	332.39 (0.00)	48.85 (0.00)	38.54 (0.00)	29.07 (0.00)	30.82 (0.00)	21.69 (0.00)	21.02 (0.00)	5.95 (0.00)
Step down Wald $\alpha=0$	0.03 (0.87)	0.28 (0.59)	0.00 (0.95)	0.00 (0.94)	0.00 (0.99)	0.05 (0.83)	0.66 (0.41)	0.18 (0.66)

Table 5 (continued)

	Equation 4 Portfolio of firms influenced with sales in		Equation 5 Portfolio of firms not influenced with sales in					
Domestic firms SR = 29.68%	Africa	Oceania	Asia	Europe	North America	South America	Africa	Oceania
Step Down Wald β = 1	332.39 (0.00)	48.85 (0.00)	38.54 (0.00)	29.07 (0.00)	30.82 (0.00)	21.69 (0.00)	21.02 (0.00)	5.95 (0.00)
Sharpe ratio (SR)	1.51%	− 1.51%	20.99%	18.72%	19.69%	14.96%	28.66%	9.58%
Optimal weight—No SS	0.00%	0.00%	2.80%	0.00%	0.00%	0.00%	36.49%	0.00%
Change in SR	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	6.16%	0.00%
Optimal weight—with SS	− 27.98%	− 45.69%	2.80%	− 9.68%	− 2.20%	− 22.36%	36.49%	− 35.19%
Change in SR	0.43%	2.84%	0.01%	0.08%	0.00%	0.54%	6.16%	1.89%

Note: This table shows MVS benefits of diversification using firms based on their regional exposure to the six geographic regions and the regions in which they have sales, in local currency. These tests are based on Eqs. 3, 4 and 5. In each case the benchmark (bmark) portfolio for the local investor is the set of firms with sales only in the home-country. The extended portfolio of firms are firms influenced by a geographic region with no sales in the region, firms influenced by a geographic region with sales in the region and firms not influenced by a geographic region with sales in the region. For example, the portfolio of firms based on exposure to the South America region with no sales in the region, the *F*-statistic of the Wald test and a *p*-value of 0 shows diversification benefits are statistically significant. The inclusion of the market-value weighted portfolio of this portfolio of stocks increases the Sharpe Ratio by 3.38 percent with 37.24 percent weight in the additional portfolio of stocks

Table 6 Investing in firms based on international influences and subsidiaries

	Equation 3 Portfolio of firms influenced with no subsidiaries in						Equation 4 Portfolio of firms influenced with subsidiaries in			
Domestic firms SR = 20.96%	Asia	Europe	North America	South America	Africa	Oceania	Asia	Europe	North America	South America
Correlation with bmark	0.43	0.46	0.4	0.58	0.59	0.56	0.44	0.55	0.35	0.39
Joint Wald test $\alpha=0; \beta=1$	14.14 (0.00)	30.25 (0.00)	2.7 (0.06)	6.8 (0.00)	7.76 (0.00)	17.69 (0.00)	15.84 (0.00)	14.27 (0.00)	18.99 (0.00)	8.97 (0.00)
Step down Wald $\alpha=0$	1.13 (0.28)	0.22 (0.63)	0.24 (0.62)	2.02 (0.15)	0.01 (0.91)	0.08 (0.77)	0.33 (0.56)	0.17 (0.68)	0.10 (0.75)	0.42 (0.51)
Step down Wald $\beta=1$	14.14 (0.00)	30.25 (0.00)	2.70 (0.06)	6.80 (0.00)	7.76 (0.00)	17.69 (0.00)	15.84 (0.00)	14.27 (0.00)	18.99 (0.00)	8.97 (0.00)
Sharpe Ratio (SR)	32.86%	19.49%	19.43%	41.39%	10.34%	17.28%	21.62%	3.01%	14.18%	− 6.26%
Optimal Weight—No SS	68.19%	37.66%	30.17%	100.00%	0.00%	26.52%	41.89%	0.00%	20.93%	0.00%
Change in SR	12.79%	2.79%	3.24%	20.43%	0.00%	1.05%	4.17%	0.00%	1.22%	0.00%
Optimal weight—with SS	68.19%	37.66%	30.17%	100.00%	− 11.25%	26.52%	41.89%	− 45.90%	20.93%	− 58.98%
Change in SR	12.79%	2.79%	3.24%	20.43%	0.16%	1.05%	4.17%	2.31%	1.22%	5.22%

	Equation 4 Portfolio of firms influenced with subsidiaries in		Equation 5 Portfolio of firms not influenced with subsidiaries in					
Domestic firms SR = 20.96%	Africa	Oceania	Asia	Europe	North America	South America	Africa	Oceania
Correlation with bmark	0.41	0.54	0.68	0.65	0.64	0.61	0.61	0.62
Joint Wald test $\alpha=0; \beta=1$	19.22 (0.00)	17.6 (0.00)	28.57 (0.00)	24.72 (0.00)	23.45 (0.00)	27.9 (0.00)	20.9 (0.00)	24.36 (0.00)
Step down Wald $\alpha=0$	5.53 (0.01)	0.01 (0.91)	0.04 (0.83)	0.01 (0.92)	0.00 (0.94)	0.01 (0.91)	0.05 (0.82)	0.15 (0.69)
Step down Wald $\beta=1$	19.22 (0.00)	17.60 (0.00)	28.57 (0.00)	24.72 (0.00)	23.45 (0.00)	27.90 (0.00)	20.90 (0.00)	24.36 (0.00)
Sharpe Ratio (SR)	63.63%	8.86%	17.61%	15.15%	14.34%	10.20%	16.70%	5.22%

Table 6 (continued)

	Equation 4 Portfolio of firms influenced with subsidiaries in		Equation 5 Portfolio of firms not influenced with subsidiaries in					
Domestic firms SR = 20.96%	Africa	Oceania	Asia	Europe	North America	South America	Africa	Oceania
Optimal Weight—No SS	100.00%	0.00%	26.03%	10.39%	6.16%	0.00%	23.40%	0.00%
Change in SR	42.67%	0.00%	0.51%	0.08%	0.03%	0.00%	0.59%	0.00%
Optimal weight—with SS	100.00%	− 13.18%	26.03%	10.39%	6.16%	− 16.78%	23.40%	− 59.55%
Change in SR	42.67%	0.22%	0.51%	0.08%	0.03%	0.23%	0.59%	2.22%

Note: This table shows MVS benefits of diversification using firms based on their regional exposure to the six geographic regions and the regions in which they have subsidiaries, in local currency. These tests are based on Eqs. 3, 4 and 5. In each case the benchmark (bmark) portfolio for the local investor is the set of firms with subsidiaries only in the home-country. The extended portfolio of firms are firms influenced by a geographic region with no subsidiaries in the region, firms influenced by a geographic region with subsidiaries in the region and firms not influenced by a geographic region with subsidiaries in the region. For example, the portfolio of firms based on exposure to the South America region with no subsidiaries in the region, the *F*-statistic of the Wald test and a *p*-value of 0 shows diversification benefits are statistically significant. The inclusion of the market-value weighted portfolio of this portfolio of stocks increases the Sharpe Ratio by 20.43 percent with 100 percent weight in the additional portfolio of stocks

also highlight the benefit of risk reduction provided by extended portfolios although they do not show an improvement in the tangency portfolio. The Sharpe ratio analysis is also presented in Table 6. The results for the firms influenced by a region with no subsidiaries in the region (Eq. 3), show an increase in the Sharpe ratio for all regions with the exception of Africa. This suggests that there are benefits from investing in firms influenced by geographical regions where firms do not report subsidiaries. The greatest increase in Sharpe ratio is for the extended portfolio consisting of firms influenced by South America with no subsidiaries in the region (20.43 percent). For estimates of the benefits from investing in firms influenced by a region with subsidiaries in the region (Eq. 4), results show that there is an increase in the Sharpe ratio for Asia, North America and Africa. The extended portfolio of firms influenced by Africa with subsidiaries in the region offer the greatest increase in Sharpe ratio (42.67 percent), followed by Asia (4.17 percent) and North America (1.22 percent). The estimates of the benefits associated with investing in firms not influenced by a region where they report sales, results in small increases in the Sharpe ratio for Asia (0.51 percent), Europe (0.08 percent), North America (0.03 percent) and Africa (0.59 percent). These findings put forth an alternative investment strategy for Japanese investors to gain foreign exposure within their domestic equity portfolios. We provide evidence that investors can gain diversification benefits by analysing the foreign exposure of firm returns in addition to the location of operations. The results show that there are benefits to investing in firms that are significantly influenced by a geographic region where they may or may not report operations. These findings echo but also extend the conclusions of Cai and Warnock (2012), Farooqi et al. (2015) and Oehler et al. (2017), who find that investing in domestic equities provides considerable foreign exposure to local investors. They recommend that domestic investors can 'free-ride' the foreign exposure of local firms.

3.3 Sub-Period Analysis

We divide the 18-year period into three sub periods using the structural breaks tests of Quandt-Andrews and graphical inspection of the risk-free rates, MSCI World Index and Nikkei 225. Antoniou et al. (2010) and O'Hagan-Luff & Berrill (2019) use a similar technique to identify sub-periods. These sub-periods allow us to investigate the robustness of the main results in periods of high and low volatility. The tables with detailed results from the sub-period analysis are not shown here but are available upon request. Sub-period 1 and sub-period 3 are the most volatile as they encompass the dot-com bubble and the global financial crisis respectively. The effects of the crises in sub-period 1 and 3 is evident from the low returns and high standard deviations. Sub-period 2 is less volatile with moderate coefficients of variation for the portfolio of stocks. The sub-period analysis suggests that firms with increasing levels of multinationality fail to provide investors with significant returns during crisis periods, but these may be safe investment vehicles during periods of low volatility and high growth. There are very limited diversification benefits in sub-periods 1 and 3 while sub-period 2 shows significant economic benefits of

diversification using portfolios based on regional influences on firms' returns. The sub-period analysis confirms the primary findings that an increasing level of multinationality does not provide increasing diversification benefits during economic down turns. Firms with geographically dispersed operations and firms with exposure to foreign markets, may provide diversification benefits during less volatile years.

4 Discussion

Results show that most Japanese firms are classified as trans-regional based on both sales and subsidiaries measures. An increasing trend in multinationality is also observed based on the subsidiary data, with global firms increasing over the time-period. The proportion of global firms based on subsidiaries is higher than those based on sales. Fewer firms are categorised as domestic based on subsidiaries than sales. The distinction in the patterns of internationalisation for firms based on accounting and non-accounting measures of multinationality is evident. Firms are becoming more multinational over time based on both measures, the degree of multinationality is greater based on subsidiaries than sales. There is evidence that Japanese firms tend to not follow the traditional path of internationalisation where expansion of sales takes place first and subsidiaries last. An increasing number of firms have subsidiaries in multiple geographic regions. More firms tend to have subsidiaries in non-triad regions such as Africa, South America, and Oceania than sales. The extended CAPM shows that firms tend not to be influenced by the geographical regions where they report operations. This has major implications for all empirical research focusing on financial risks faced by MNCs and for investors, as analysing the regions where firms operate is not sufficient to determine the risks they are exposed to. The results show that there are benefits from investing in MNCs with varying degrees of multinationality. However, these benefits do not necessarily increase with increasing multinationality. A new category of firm is identified based on exposure to geographical regions where they do not report operations. This result has far reaching implications for portfolio investment strategies. When choosing domestic firms for investment, it is important to investigate the exposure of firms' returns to foreign markets rather than solely analysing a firm's location of operations. An investment strategy based on analysing firms' return exposure to regional factors may provide better returns when compared to investments based solely on the geographic diversification of firm operations. Thus, investors should be aware of the indirect exposure their domestic equity portfolios have to foreign regions while making investment decisions.

5 Conclusion

In this paper, we analyse the diversification benefits of investing in domestically listed firms in Japan with varying degrees of multinationality and international influences. First, firms are classified using the ABHK taxonomy based on both sales and

subsidiaries measures. Second, an extended version of the CAPM is used to analyse each firm returns' exposure to regional factors where they may or may not report sales and subsidiaries. Finally, MVS tests and Sharpe Ratio analysis is used to compare the benefits of investing in various portfolios of firms based on their international operations and exposure to geographical factors.

The findings in this paper highlight the importance of using a classification system based on two measures of multinationality. This allows for an in-depth investigation of diversification benefits associated with these firms. The next set of findings put forth an alternative investment strategy for investors to gain indirect foreign exposure within their 'home-made' equity portfolios. This paper provides evidence that the benefits from investing in firms that are significantly influenced by a geographic region are greater than firms with operations in that region. This investment approach also provides support for the hypothesis that locally listed firms face foreign exposure indirectly through their operations. However, we find evidence that the indirect foreign exposure stems from international markets rather than the location of firm operations. We conclude that the home-bias displayed by Japanese investors may not be a sub-optimal investment choice. The home bias phenomenon may be overstated as it overlooks this avenue of indirect foreign exposure. Investments in domestically listed firms can be viewed as an alternative explanation to the home-bias puzzle since these firms provide a considerable degree of international exposure.

This study has significant practical implications for portfolio managers and individual investors alike. We put forth a new facet of portfolio optimisation is put forward where investors can gain international diversification benefits by investing withing home boundaries. Investors may have foreign investment constraints and focus their investments to domestic markets while making portfolio selection decisions. Our results show that it is not sufficient for investors to look at the geographic dispersion of firm operations, and they must analyse the geographical influences on firms' returns while investing in local firms. Future research may investigate the influences on firms' returns in other countries, such as the US and G7 countries. This will have significant implications in the international finance literature that study the foreign exposure of domestic equities. Another possible extension of this analysis is to explore the benefits of home-based diversification using other domestically traded assets such as cross-listed firms, country funds and Exchange Traded Funds (ETFs). Researchers may also explore a more entrepreneurial perspective where SMEs, family-owned companies, government-owned companies are used to investigate alternative investment opportunities for investors using different measures such as Tobin's Q, economic value added (EVA) and cash flow return on investment (CFROI).

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10690-024-09448-9.

Funding Open Access funding provided by the IReL Consortium.

Data Availability Statement The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

Adrian, T., Crump, R. K., & Moench, E. (2015). Regression-based estimation of dynamic asset pricing models. *Journal of Financial Economics, 118*(2), 211–244.

Aggarwal, R., Berrill, J., Hutson, E., & Kearney, C. (2011). What is a multinational corporation? Classifying the degree of firm-level multinationality. *International Business Review, 20*(5), 557–577.

Agmon, T., & Lessard, D. R. (1977). Investor recognition of corporate international diversification. *The Journal of Finance, 32*(4), 1049–1055.

Antoniou, A., Olusi, O., & Paudyal, K. (2010). Equity home-bias: A suboptimal choice for UK investors? *European Financial Management, 16*(3), 449–479.

Arregle, J., Miller, T. L., Hitt, M. A., & Beamish, P. W. (2013). Do regions matter? An integrated institutional and semiglobalization perspective on the internationalization of MNEs. *Strategic Management Journal, 34*(8), 910–934.

Bae, J. W., Elkamhi, R., & Simutin, M. (2019). The best of both worlds: Accessing emerging economies via developed markets. *The Journal of Finance, 74*(5), 2579–2617.

Bansal, R., Singh, A., Kumar, S., & Gupta, R. (2018). Evaluating factors of profitability for Indian banking sector: A panel regression. *Asian Journal of Accounting Research, 3*(2), 236–254.

Batra, L., & Taneja, H. C. (2022). Portfolio optimization based on generalized information theoretic measures. *Communications in Statistics-Theory and Methods, 51*(18), 6367–6384.

Bekaert, G., Hodrick, R. J., & Zhang, X. (2009). International stock return comovements. *The Journal of Finance, 64*(6), 2591–2626.

Berrill, J. (2010). Firm-level analysis of the international diversification of small integrated stock markets: Ireland 1999–2007. *Research in International Business and Finance, 24*(2), 172–189.

Berrill, J., & Kearney, C. (2010). Firm-level internationalisation and the home bias puzzle. *Journal of Economics and Business, 62*(4), 235–256.

Burgman, T. A. (1996). An empirical examination of multinational corporate capital structure. *Journal of International Business Studies, 27*(3), 553–570.

Busse, J. A., Goyal, A., & Wahal, S. (2013). Investing in a global world. *Review of Finance, 18*(2), 561–590.

Cai, F., & Warnock, F. E. (2004). *International diversification at home and abroad*. National Bureau of Economic Research.

Cai, F., & Warnock, F. E. (2012). Foreign exposure through domestic equities. *Finance Research Letters, 9*(1), 8–20.

Chan Kim, W., Hwang, P., & Burgers, W. P. (1989). Global diversification strategy and corporate profit performance. *Strategic Management Journal, 10*(1), 45–57.

Chou, H.-I., Zhao, J., & Suardi, S. (2014). Factor reversal in the euro zone stock returns: Evidence from the crisis period. *Journal of International Financial Markets, Institutions and Money, 33*, 28–55.

Christoffersen, P., Errunza, V., Jacobs, K., & Langlois, H. (2012). Is the potential for international diversification disappearing? A dynamic copula approach. *The Review of Financial Studies, 25*(12), 3711–3751.

Clark, T., & Knowles, L. L. (2003). Global myopia: Globalization theory in international business. *Journal of International Management, 9*(4), 361–372.

Clark, T., Knowles, L., & Hodis, M. (2004). Global dialogue: A response to the responders in the special globalization issue of JIM. *Journal of International Management, 10*(4), 511–514.

Collinson, S., & Rugman, A. M. (2008). The regional nature of Japanese multinational business. *Journal of International Business Studies, 39*(2), 215–230.

Creal, D., Schwaab, B., Koopman, S. J., & Lucas, A. (2014). Observation-driven mixed-measurement dynamic factor models with an application to credit risk. *Review of Economics and Statistics, 96*(5), 898–915.

Daly, K., & Vo, X. V. (2013). The determinants of home bias puzzle in equity portfolio investment in Australia. *International Review of Financial Analysis, 27*, 34–42.

Demirci, I., Ferreira, M. A., Matos, P., & Sialm, C. (2022). How global is your mutual fund? International diversification from multinationals. *The Review of Financial Studies, 35*(7), 3337–3372.

Dun and Bradstreet (1998–2015), *Who Owns Whom?,* Dun & Bradstreet International.

Eiling, E., Gerard, B., Hillion, P., & de Roon, F. A. (2012). International portfolio diversification: Currency, industry and country effects revisited. *Journal of International Money and Finance, 31*(5), 1249–1278.

Erramilli, M. K., Srivastava, R., & Kim, S.-S. (1999). Internationalization theory and Korean multinationals. *Asia Pacific Journal of Management, 16*(1), 29–45.

Fama, E. F., & French, K. R. (1997). Industry costs of equity. *Journal of Financial Economics, 43*(2), 153–193.

Fama, E. F., & French, K. R. (1998). Value versus growth: The international evidence. *The Journal of Finance, 53*(6), 1975–1999.

Farooqi, J., Huerta, D., & Ngo, T. (2015). Should you globally diversify or let the globally diversified firm do it for you? *The Quarterly Review of Economics and Finance, 57*, 75–85.

Ferson, W. E., Foerster, S. R., & Keim, D. B. (1993). General tests of latent variable models and mean-variance spanning. *The Journal of Finance*, *48*(1), 131–156.

Fillat, J. L., & Garetto, S. (2015). Risk, returns, and multinational production. *The Quarterly Journal of Economics, 130*(4), 2027–2073.

French, K., & Poterba, J. (1991). Investor diversification and international equity market. *American Economic Review*, *81*, 222–226.

Griffin, J. M. (2002). Are the Fama and French factors global or country specific? *The Review of Financial Studies, 15*(3), 783–803.

Harvey, C. R., Liu, Y., & Zhu, H. (2016). … and the cross-section of expected returns. *The Review of Financial Studies, 29*(1), 5–68.

Hou, K., Karolyi, G. A., & Kho, B. C. (2011). What factors drive global stock returns? *The Review of Financial Studies, 24*(8), 2527–2574.

Huberman, G., & Kandel, S. (1987). Mean-variance spanning. *The Journal of Finance, 42*(4), 873–888.

Hughes, J. S., Logue, D. E., & Sweeney, R. J. (1975). Corporate international diversification and market assigned measures of risk and diversification. *Journal of Financial and Quantitative Analysis, 10*(4), 627–637.

Kan, R., & Zhou, G. (2012). Tests of mean-variance spanning. *Annals of Economics & Finance*, *13*(1).

Krapl, A. A. (2015). Corporate international diversification and risk. *International Review of Financial Analysis, 37*, 1–13.

Kyaw, N. A., Manley, J., & Shetty, A. (2011). Factors in multinational valuations: Transparency, political risk and diversification. *Journal of Multinational Financial Management, 21*(1), 55–67.

Lee, J., Lee, K., & Oh, F. D. (2023). International portfolio diversification and the home bias puzzle. *Research in International Business and Finance*, *64*, 101807.

Levy, H., & Levy, M. (2014). The home bias is here to stay. *Journal of Banking & Finance, 47*, 29–40.

Lewellen, J., & Nagel, S. (2006). The conditional CAPM does not explain asset-pricing anomalies. *Journal of Financial Economics, 82*(2), 289–314.

Lu, J. W., & Beamish, P. W. (2001). The internationalization and performance of SMEs. *Strategic Management Journal, 22*(6–7), 565–586.

Lu, J. W., & Beamish, P. W. (2004). International diversification and firm performance: The S-curve hypothesis. *Academy of Management Journal*, *47*(4), 598–609.

Meric, I., Ratner, M., & Meric, G. (2008). Co-movements of sector index returns in the world's major stock markets in bull and bear markets: Portfolio diversification implications. *International Review of Financial Analysis, 17*(1), 156–177.

Meyer, K. E., & Thaijongrak, O. (2013). The dynamics of emerging economy MNEs: How the internationalization process model can guide future research. *Asia Pacific Journal of Management, 30*(4), 1125–1153.

Mishra, A. V. (2015). Australia's home bias and cross border taxation. *Journal of Empirical Finance, 34*, 293–312.

Mukherji, S., & Jeong, J. G. (2021). Long-term international diversification of equities. *Global Finance Journal, 50*, 100584.

Mullen, C., & Berrill, J. (2017). Mononationals: The diversification benefits of investing in companies with no foreign sales. *Financial Analysts Journal, 73*(2), 116–132.

O'Hagan-Luff, M., & Berrill, J. (2015). Why stay-at-home investing makes sense. *International Review of Financial Analysis, 38*, 1–14.

Oehler, A., Wendt, S., & Horn, M. (2017). Are investors really home-biased when investing at home? *Research in International Business and Finance, 40*, 52–60.

Oh, C. H., & Contractor, F. (2014). A regional perspective on multinational expansion strategies: Reconsidering the three-stage paradigm. *British Journal of Management, 25*, S42–S59.

O'Hagan-Luff, M., & Berrill, J. (2019). The international diversification benefits of US-traded equity products. *International Journal of Finance & Economics, 24*(3), 1238–1253.

Oloko, T. F. (2018). Portfolio diversification between developed and developing stock markets: The case of US and UK investors in Nigeria. *Research in International Business and Finance, 45*, 219–232.

Omer, K., Durr, D., & Siegel, P. H. (1998). Degree of multinationality and financial performance: A study of U.S.-based multinational corporations. *Review of Quantitative Finance and Accounting, 11*, 53–68.

Phylaktis, K., & Xia, L. (2006). Sources of firms' industry and country effects in emerging markets. *Journal of International Money and Finance, 25*(3), 459–475.

Qian, G., Khoury, T. A., Peng, M. W., & Qian, Z. (2010). The performance implications of intra-and inter-regional geographic diversification. *Strategic Management Journal, 31*(9), 1018–1030.

Raju, R. (2023). International Diversification in Equity Portfolios: An Indian Perspective. *Available at SSRN 4323893*.

Reeb, D. M., Kwok, C. C. Y., & Baek, H. Y. (1998). Systematic risk of the multinational corporation. *Journal of International Business Studies, 29*(2), 263–279.

Rowland, P. F., & Tesar, L. L. (2004). Multinationals and the gains from international diversification. *Review of Economic Dynamics, 7*(4), 789–826.

Sahabuddin, M., Islam, M. A., Tabash, M. I., Anagreh, S., Akter, R., & Rahman, M. M. (2022). Comovement, portfolio diversification, investors' behavior and psychology: Evidence from developed and emerging countries' stock markets. *Journal of Risk and Financial Management, 15*(8), 319.

Salehizadeh, M. (2003). US multinationals and the home bias puzzle: An empirical analysis. *Global Finance Journal, 14*(3), 303–318.

Sercu, P., & Vanpée, R. (2012). The home bias puzzle in equity portfolios. *International Finance: A Survey*, pp 310–331.

Sukpanich, N., & Rugman, A. (2007). Intra-regional sales, product diversity, and the performance of merchandising multinationals. *Journal of International Management, 13*(2), 131–146.

Thomas, N. M., Kashiramka, S., Yadav, S. S., & Paul, J. (2022). Role of emerging markets vis-à-vis frontier markets in improving portfolio diversification benefits. *International Review of Economics & Finance, 78*, 95–121.

Tongli, L., Ping, E. J., & Chiu, W. K. C. (2005). International diversification and performance: Evidence from Singapore. *Asia Pacific Journal of Management, 22*(1), 65–88.

Van Nieuwerburgh, S., & Veldkamp, L. (2009). Information immobility and the home bias puzzle. *The Journal of Finance, 64*(3), 1187–1215.

Zahera, S. A., & Bansal, R. (2018). Do investors exhibit behavioral biases in investment decision making? A systematic review. *Qualitative Research in Financial Markets, 10*(2), 210–251.