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ARIKAWA, Yasuhiro
Waseda University

MEHROTRA, Vikas
University of Alberta

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Distribution of Long-run Stock Returns: Evidence from Japan and the US*

Yasuhiro ARIKAWA[a] and Vikas MEHROTRA[b]

Abstract

We examine the distribution of long-run returns for all stocks listed in Japan and the US from 1977 to 2019. While our findings confirm the extreme skewness in realized long-run returns in the US documented in Bessembinder (2018), they offer two important points of departure. First, we find that over fixed horizons ranging from monthly to semi-decadal, return distributions in Japan are in broad concordance to those in the US – the mean, median, skewness, and fraction of returns greater than the risk-free rate are similar in the two markets. This symmetry is broken at lifetime horizons where the mean return in the US is almost four times as large as that in Japan, while the median return in Japan is seventy times larger than in the US. Second, we find that the probability of being delisted is higher for US-listed firms than for Japan-listed firms, with lifespans, defined as years active on the exchange, being measurably shorter in the US (6.5 years) than they are in Japan (19.3 years). Our results are consistent with a model of long-dated returns presented in Martin (2012) in which long-run stock returns for limited liability assets are characterized by occasional explosions that prevent expected returns from converging to zero.

Keywords: Stock returns; Japanese stock market; Return skewness
JEL classification: G11; G15

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[a] Waseda University, Tokyo, Japan. E-mail: arikawa@waseda.jp
[b] University of Alberta, Edmonton, Canada. E-mail: vmehrotr@ualberta.ca

"By periodically investing in an index fund … the know-nothing investor can actually outperform most investment professionals." [1]

Warren Buffet

1. Introduction

The wisdom that equity markets outperform treasuries in the long-run is by now well established and non-controversial.[2] Asset pricing models posit expected returns as an increasing function of risk, and multi-factor models based on the Fama-French (1993) variant have found empirical success in explaining the cross-section of portfolio returns. And yet, incongruities remain. For instance, Bessembinder (2018) finds evidence that at the individual firm level, a majority of stocks provide lifetime returns that are inferior to treasuries, and that the realized value of the equity risk premium can be traced to the episodic performance of a handful of stocks (around 4 out of hundred). Miss out on these, and stock returns look no different from those on risk free assets.

The natural question to Bessembinder's findings is what generates extreme skewness in long-dated returns.[3] One possibility is the return compounding process itself.[4] Arditti and Levy (1975) show that the third moment of returns increases in both the number of compounding periods as well as in the standard deviation of returns. Indeed, third moments for multi-period returns are positive even when the expected return is zero and single period returns come from a symmetric distribution. Extending this result for limited liability assets, Martin (2012) shows that realized long-period returns are driven by extreme events, and that absent these, long-period gross returns for limited liability assets converge to zero (net returns converge to minus 1) for commonplace Sharpe ratios. For exchange-listed stocks, this occurrence spells the end of the stock's life with a return of −1. In Martin's model as well as simulations, long-period modal returns are concentrated at or near −1, even as mean returns are positive, driven by occasional explosions in realized returns. Martin's argument

[1] Warren Buffet in letter to shareholders of Berkshire Hathaway, 1993.
See http://www.berkshirehathaway.com/letters/1993.html

[2] See recent work by Fama and French (2018) for evidence on long-horizon stock market returns.

[3] Albuquerque (2012) and Singleton and Wingender (1986), among others, confirm right skewness in the time series of individual stock returns.

[4] See de La Grandville (1998) on the mechanics of log-normal compounding for long periods.

is simple: without extreme events, it is hard to imagine why any investor would pay a positive price for assets whose gross return almost surely converges to zero.[5] An implied corollary is that the incidence of extreme returns is correlated with the mass of gross returns concentrated on zero. To wit, the more likely long-period gross returns are to converge to zero, the higher the incidence of the former.

In this paper we propose a modest test to validate the trade-off between the tendency for long-dated returns to converge to zero and the occasional explosions in returns that counter-balance such a tendency in large portfolios. We proxy the former by cataloguing the frequency of delistings in each of the two markets we survey, and the latter by estimating the cross-sectional skewness in realized returns at various horizons. We choose Japan as our principal focus, and include parallel data from the US in conducting all of our tests. Japanese equity markets are comparable in trading activity to the NYSE and NASDAQ, and have the advantage of providing some important points of departure that are helpful in interpreting the results. Specifically, we exploit the fact that the delisting experiences in the two markets are very different, despite notable similarities in market depth and liquidity. This asymmetry allows us to test the conjecture that markets with higher likelihood of delistings are associated with higher return skewness.

Our main results support the above conjecture. First, we document a remarkable similarity in the distribution of stock returns in Japan and the US at fixed short horizons; this concordance begins to diverge at longer horizons and breaks down at lifetime horizons. For instance, at the monthly horizon, we find that the first three moments, as well as the median, of stock returns in Japan are very similar to their US counterparts, confirming the generality of Bessembinder's (2018) findings. Specifically, 47.8% of monthly stock returns are higher than the risk-free return in Japan, vs. 47.9% in the US. Mean (median) monthly returns are 1.0% (0.0%) in Japan vs. 1.1% (0.0%) in the US. Skewness of monthly returns is 7.1 in Japan vs. 7.4 in the US. The similarity of monthly return distributions in the US and Japan suggests

[5] Several authors have recognized the importance of return skewness in investor preferences, especially for assets with low expected returns. For instance, McEnally (1974) notes that investors are "…*willing to trade off some expected returns from high risk common stocks in exchange for the enhanced opportunity they afford for extraordinarily large returns*." Similarly, Arditti (1971) notes that investor preference for the third moment might explain the observed underperformance of mutual funds vis-à-vis Blue Chip indexes.

similar forces are at play in the two markets – the influence of differences in delisting experience appears to be unimportant at the monthly interval. At the annual level, 51.4% of returns in Japan exceed the risk-free return, vs. 50.5% in the US. The mean annual return is 12.7% in Japan and 18.2% in the US. Annual return skewness is 41.9 in the US vs. 14.3 in Japan, underscoring the influence of extreme returns at the annual frequency relative to monthly returns in the two markets.

At longer variable horizons we expect the divergence between the return distributions in the two markets to widen as the influence of delisting experience gains prominence. For lifetime returns in Japan, we note both a lower propensity to generate extremely low returns relative to US listed firms, as well as a lower level of skewness. First quartile lifetime return in Japan is –37.5%, vs. –86.8% in the US, while mean lifetime returns are 370% in Japan vs. almost 1300% in the US. Only 44% of lifetime returns beat the risk-free return in the US (similar to Bessembinder's findings), while 57% of Japanese lifetime returns exceed the risk-free return. Skewness for lifetime returns is, as expected, higher in the US (40.2) than in Japan (27.5), but it doesn't tell the whole story about differences in the nature of realized returns in the two markets. In particular, we note that the maximum lifetime return in the US is 1.1 million percent, more than two orders of magnitudes higher than that in Japan.

Per our conjecture, 22% of lifetime returns in the US are less than –90%, versus 8.2% of all lifetime returns in Japan. More tellingly, approximately 16.4% of all firms that were listed in 1977 remain active at the end of 2019 in Japan; by contrast, only 1.9% of firms listed in the US in 1977 are still active at the end of 2019. We investigate delistings further by looking into its causes. Most of the delistings in the US are due to mergers and acquisitions, accounting for 47% of delistings on the NYSE and NASDAQ, whereas in Japan mergers account for 28% of delistings. Setting merger-related delistings aside (mean returns for these delistings are positive), we find that liquidations and dropped firms represent 6.6% of firms in Japan vs. 35.3% of firms in the US over our sample period, with dropped firms accounting for the vast majority of them.

We find that a small minority of Japanese firms (15%) is responsible for all of the wealth created in stock markets in Japan over our sample period. The corresponding number for the US is 3%, meaning that only 3 out of 100 stocks listed in the US over our sample period are responsible for all of the net wealth created by listed firms. To put this in perspective, Bessembinder finds that four out of 100 stocks in the US are responsible for generating the entire realized value of the equity risk premium in the CRSP era. Overall these results support our main conjecture that realized long-term returns tend to converge to zero, and that the likelihood of this happening in different markets is correlated with explosions in realized returns. Absent these high realized returns, asset prices would need to decline substantially to accommodate positive expected returns.

A limitation of our findings is that they represent correlations, and not causal links. Put simply, our finding that higher mean returns in the US relative to Japan coincide with higher likelihoods of delistings does not establish a causal link between return explosions as in Martin (2012) and the tendency for long-dated returns to converge to zero. To forge a causal link between the two we need a plausible channel. We provide a speculative channel at the end of the paper, but do not formally test it. The rest of the paper is organized as follows. In section 2, we describe our data. In section 3 we present our results. Section 4 concludes the paper.

2. Data

We rely on data from all major stock exchanges in Japan – namely the Tokyo Stock Exchange (tier 1 and tier 2, and Mothers), the Osaka Stock Exchange(tier 1 and tier 2, and Hercules), and JASDAQ. We use NEEDS daily stock return database. Our sample period spans 43 years, January 1977 to December 2019, and includes the universe of all listed firms in Japan over this period. For the US we use CRSP common stocks (share codes 10, 11, and 12) from January 1977 to December 2019. We begin by documenting some simple firm characteristics in Table 1.

The total number of firms listed on the major stock exchanges in Japan has grown from 1616 in 1977 to 3704 in 2019, while the CRSP coverage of US stocks has marginally declined from 4772 in 1977 to 4196 at the end of 2019. Over this time period, the mean market cap per firm in Japan has increased from ¥33.1 billion to ¥181.5 billion, whereas in the US, the mean market cap increased from $0.2 billion to $8.4 billion. The total market cap in Japan has also grown from ¥53 trillion to ¥672 trillion, while in the US, the total market cap has grown from \$0.9 trillion to \$35.1trillion.

3. Results

All returns are calculated as buy-and-hold returns for individual stocks using NEEDS and CRSP daily stock returns that are based on the following equation.

$$R_{i,t} = \ln(P_{i,t}/P_{i,t-1}) \qquad (1)$$

where $R_{i,t}$ denotes the return from time t-1 to t based on the closing price P_{t-1} *and* P_t on days t-1 and t respectively. If there is a dividend paid during this interval, it is added to the numerator. P_t is adjusted for splits.

Long-dated returns, $LR_{i,T}$, are calculated using (1) for the appropriate number of returns in each month/year/5-year/lifetime terms. That is,

$$1 + LR_{i,T} = (1 + R_{i,1}) \cdot\ (1 + R_{i,2}) \cdots (1 + R_{i,T}) \qquad (2)$$

3.1 Monthly, Annual, Semi-decadal, and Lifetime Returns

We begin by pooling all monthly returns for firms listed on major Japanese exchanges and present univariate statistics in Panel A of Table 2. There are a total of 1,435,670 monthly firm returns over the sample period of 1977-2019. Forty-nine percent of all monthly returns are positive, with 51% being negative. Likewise, 48% of monthly returns exceed the risk-free return proxy, the Japanese inter-bank call rate. The median monthly return is 0.0%, while the mean is 1.0%. As in Japan, 48% (50%) of US monthly returns exceed the risk-free return proxy, the one-month Treasury bill return (zero). The mean monthly return in the US is 1.1%, only slightly higher than that in Japan. The skewness coefficients in Japan and the US are 7.1 and 7.4 respectively. What is remarkable about these statistics is the near identical nature of monthly return distributions in Japan and the US. As we show later in our paper, the similarities in monthly returns in the two countries gives little inkling into how different long-dated returns are.

In Panel B, we present results for annual buy-and-hold returns over the same period using equation (1), with *t* measured in years and all prices based on year-end close. In Japan, fifty-one percent (54%) of annual returns exceed the risk-free return (zero). The median annual return is 2.6%, while the mean return is 12.7%, indicating a high level of skewness. Indeed, the skewness coefficient for annual returns is 14.3. Once again, these results are comparable to those from the US, where the mean (median) return is 18.2% (4.5%), although the skewness is higher at 41.9. Roughly the same fraction (51%) of annual returns in the US exceed the realized risk-free return as in Japan, and roughly the same fraction (54.7%) are positive.

In Panel C, we measure returns over 5-year intervals beginning in 1977 and ending in 2016, and find that 49.7% of semi-decadal returns in Japan exceed the risk-free return, with the mean and median returns being 57.6% and 10.5%. These figures are comparable to US stock returns, with 49.7% exceeding the US risk-free return and the mean and median returns being 63.6% and 13.0% respectively. The skewness coefficient for Japanese semi-decadal return distribution is 10.0, lower than that in the US, where it is 18.1. The first hint that the symmetry in short-period returns between Japan and the US is diverging at longer horizons is evident in semi-decadal returns.

Finally, in Panel D, we compute lifetime returns, defined as the cumulative return for individual stocks beginning in 1977 or the IPO date (if later) and ending in 2019 or the delisting date (if earlier). Lifetime returns are important in understanding total wealth created by individual firms over our sample period. While monthly, annual and semi-decadal returns in Japan are comparable to those in the US, the distribution of lifetime returns in the two countries is very different in the two countries. We begin by noting the mean lifetime returns in the two countries: 370% in Japan vs. 1,298% in the US.[6] In contrast, the median lifetime return is 66.1% in Japan vs. 0.9% in the US. While 56.6% of lifetime returns in Japan exceed the risk-free return, only 44.4% do so in the US. The significantly lower mean but higher median lifetime returns in Japan indicate higher skewness in the US – we confirm this

[6] By comparison, Bessembinder (2018) finds a lifetime return of 797% for stocks listed in the 1977-1986 cohort, measured through 2016. His skewness parameter is 40.5, with 40% of lifetime returns being positive. These are comparable to our findings over the 1977-2019 period.

by noting a skewness coefficient estimate of 27.5 in Japan vs. 40.2 in the US. A quarter of Japanese lifetime returns are less than –37.5%; the corresponding return in the US is –86.8%.

In the next section we plot kernel density of returns at the monthly, annual, semi-decadal and lifetime horizons to supplement the univariate analyses above.

3.2 Distributions for monthly, annual, semi-decadal and lifetime returns.

In Figure 1 Panel A, we provide two plots with the kernel density estimates of all monthly returns for Japanese and US stocks from Jan-1977 to Dec-2019. In Plot I, we see that for both the Japanese and US markets, there is a single peak at 0%, with a minimum value set at –1, and higher values truncated at 5. Very few monthly returns are extreme (greater in absolute value than 0.5). In Plot II, we zoom in on the tails, and see that the kernel density graph for the US (green line) dominates that for Japan (red line), indicating a higher likelihood of extreme events in both tails for the US.

In Panel B, we repeat the plots for Annual Returns – first for the kernel density over the full range of returns, and then separately for the left tail (less than –0.5) and the right tail (between +1 and +10). Plot I shows that the distribution of annual returns is similar to monthly returns with a peak at 0%, and more mass in the two tails for the US graph compared to Japan. In Plot II, we confirm the higher kernel density for low return in the US vs. Japan, and in Plot III we confirm the higher kernel density for high returns in the US in comparison to Japan.

The pattern changes in Panel C in which we look at semi-decadal returns. In Plot I, we see that the kernel density for Japanese semi-decadal returns is highest at 0, as it was for annual and monthly returns. By contrast, the kernel density of semi-decadal returns in the US is highest very close to –1. In Plot II, we zoom in on returns below –0.5, and note that below a return of –0.8, the graph for US returns dominates that for Japan. In other words, the mass in the extreme left tail is greater for US stocks than for Japanese stocks. This is offset by the dominance of US returns over Japanese returns in the right tail, as shown in Plot III, where for returns in excess of +5, the US graph (stochastically) dominates that for Japan.

In Panel D, we repeat the process for lifetime returns. In Plot I, we see that the peak kernel density for lifetime returns is close to –1 for US listed firms, whereas it is closer to 0 in Japan. In Plot II, we again zoom in on the left tail, specifically in regions where the return is less than –0.5, and find that for extreme low returns (less than –0.8), the graph for the US dominates that for Japan. This tendency to generate very low lifetime returns in the US is offset by a reverse tendency to generate very high returns in the right tail as shown in Plot III. We find that in the extreme high return region (>+30), the US graph tends to dominate that for Japan.

Overall, the findings in this section support Martin's (2012) main thesis that long-dated returns on limited liability assets tend to converge to –1, and positive expected returns are kept afloat only by occasional explosions in realized returns. In the next section, we explore whether the divergent long-dated returns, especially lifetime returns, in the two countries are related to differences in their delisting experiences.

3.3 Delisting and Survivorship influence on Returns

In the above section, we document two main findings. First, at fixed intervals (monthly, annual and semi-decadal) the distribution of returns in Japan is similar to that in the US. Second, at the lifetime horizon, we find the symmetry in Japanese and US return distributions broken, with mean returns being significantly higher in the US, and median returns being significantly higher in Japan. Why do lifetime returns differ when shorter fixed horizon returns don't? We submit that delistings are the critical variable that separate lifetime returns for firms in Japan from those in the US. To explore this idea further, we classify returns based on whether the firm was continuously listed throughout our sample period, or whether it was delisted from the exchange during the sample period. If the firm was delisted, we explore further and note the reason for its delisting along the lines of the CRSP delisting codes. Results are presented in Table 3.

We follow CRSP delisting codes and classify firms into four categories: Active, Merged, Liquidated and Dropped. Active firms are those that are listed at the end of 2019. Merged firms are those that were acquired in mergers. In CRSP, there is another category named Exchange that represents firms acquired by the exchange of stock. This category is not available for firms listed in Japan, and Merged includes both Merged and Exchange categories for US firms.

Liquidated are firms that stopped trading as a result of liquidation and Dropped are firms that stopped trading on the exchange for reasons other than liquidation. While the CRSP database provides these codes for all firms in the US, we had to hand collect the information for delisted firms in Japan. For Japanese listed firms, the delisting data are obtained from NEEDS daily stock return database. We use the MARR M&A Database to obtain data on acquired firms in Japan. We collect data on Liquidated firms in Japan using the TSR monthly report on bankruptcy and the data on Dropped firms from the disclosure documents of each securities market.

In Table 3 we present lifetime returns by listing/delisting status. The mean lifetime return for Japanese Active firms is 521%, vs. 5,301% for US Active firms. It seems eliminating delisted stocks has a much larger survivorship influence on US lifetime returns than it does in Japan. We suspect this is due to the higher delisting frequency in the US compared to Japan, and note that Dropped firms comprise 5.6% of lifetime returns in Japan, vs. 34.2% in the US.[7] Also, if we compare the percentage of firms that are listed throughout the period from January 1977 to December 2019 (we call this category Survivor), it is 16.4% of the total for Japanese firms, while it is only 1.9% for American firms. In Table 1 we note that the median lifespan (years active on the exchange) for Japanese and US listed firms is 6.5 and 19.3 years.

In Figure 2 we plot the time series of dropped firms scaled by the total number of listed firms in a given year. In Japan the Dropped ratio varies from 0% in the late 1980s just prior to the peaking of the Nikkei index, to 1% in the aftermath of the dot.com bubble bursting in 2001 and the financial crisis in 2009. By contrast, the corresponding Dropped ratio in the US is much higher, ranging from 1% of listed firms in the late 1970s and early 1980s, to more than 4% and 5% of listed firms in the aftermath of the dot.com bubble bursting in 2001 and the financial crisis in 2009. Median returns for dropped firms are less than –99% in Japan, versus –91.3% in the US, with fewer than 2% of dropped firms earning a positive lifetime return in Japan vs. fewer than 10% in the US. The lower likelihood of Japanese firms being dropped from the exchange likely has its origins in the main bank influence over Japanese corporate

[7] For Japan, there are cases where it is difficult to distinguish between Dropped and Liquidated, such as delisting and liquidation occur at the same time. In this case, the results are almost the same as for Dropped and Liquidated, respectively.

governance in which banks typically bail out firms in financial distress in return for greater lender control (see Morck and Nakamura, 1999).

3.4 Wealth creation in Japanese stock markets

Thus far we have seen that in Japan, as in the US, the distribution of realized returns for individual stocks displays a marked right skewness. Median returns at the monthly or even annual intervals are barely above zero, so the aggregate wealth created in Japanese stock markets over our sample period must come from a small fraction of stellar performance firms. We follow Bessembinder (2018) in measuring excess returns at the firm level and compounding this over our sample period.

$$XR_{i,t} = (R_{i,t} - R_{f,t}) \tag{2}$$

$$W_{i,t} = MV_{i,t-1} * XR_{i,t} \tag{3}$$

where *i* and *t* are firm and year subscripts, $R_{i,t}$ is the realized return for firm i in year t, $R_{f,t}$ is the risk-free return, *XR* is the excess realized return, *MV* is market value, and $W_{i,t}$ is the wealth created in period *t* by firm *i*. Total lifetime wealth created by a firm is then given by the following expression, assuming calculation of future value at the compounded risk-free return.

$$LW_i = \sum_{t=1}^{T} FV_{i1,T} W_{i,t} \tag{4}$$

$$CLW_T = \sum_{i}^{N} LW_i \tag{5}$$

where *LW* is the lifetime wealth created by stock of firm i beginning in 1977 (or its IPO year, if later) and ending in year *T*, where *T* is the earlier of delisting year and 2019, *FV* is the future value factor based on the realized risk-free return, and *CLW* is the cumulative wealth created by all *N* listed firms.

The initial value of the listed stocks grows over time based on the specific realized return for each firm. We estimate its future value at the end of our sampling period in 2019 using the realized risk-free return. Net wealth created is then the compounded excess return on the firm's initial market value. We then rank all firms from highest to lowest based on excess wealth created, and define cumulative wealth as the sum of the wealth created by all firms and plot it in Figure 3. The graph dips down towards the end because a handful of firms create negative net wealth.

We find that cumulative wealth reaches ¥ 246 trillion by the end of 2019 in Japan. In terms of contributions by individual stocks, Figure 3 shows that 100% of cumulative wealth is created by approximately 15% of listed firms (842 out of 5464 firms). By comparison, in Figure 3 we show that the corresponding fraction for the US is 3% (633 out of 24,320 firms), meaning that over our sample period of 1977-2019, aggregate wealth created in the equity markets is accounted for by only 3% of listed firms.[8] The higher fraction of listed firms accounting for aggregate wealth creation in Japan vs. the US is consistent with our earlier results showing lower levels of skewness in Japan. We note that delistings in Japan remain significantly less popular in comparison to those in the US.

4. Conclusion

In this study we examine the performance of individual firms listed on all major Japanese exchanges over four decades between 1977 and 2019. Our main findings mirror those in Bessembinder's – specifically, we show that roughly half of all stock returns exceed the risk-free rate, rendering the median return close to zero. Mean returns are positive over monthly, annual and semi-decadal intervals, and they appear to be driven by positive skewness. These fixed period returns are very similar in terms of mean, median, standard deviation and skewness to those in the US over the same time period, with the concordance strongest at the shortest horizon. On the other hand, lifetime returns in Japan break this symmetry with the US, with higher median and a substantially lower mean return for Japanese stocks vis-à-vis US stocks. Finally, we find that the likelihood of delisting is significantly higher in the US relative to Japan, rendering the longevity of US firms at about a third that of Japanese firms.

[8] Bessembinder (2018) shows that in CRSP data (1926-2016), roughly 4% of stocks are responsible for creating all of the excess wealth. His fraction is comparable to ours for the US.

We believe the twin results are consistent with a model of long-dated returns for limited liability assets proposed by Martin (2012).

We would like to end by speculating on the link between the likelihood of delistings and extremely high returns in the two markets. If one views the delistings as a measure of how unfettered creative destruction is in each market, their lower incidence in Japan is an indication of a less free economy, at least in regards to the likelihood of firms disappearing for performance reasons. Put simply, the lower likelihood of delistings points to a less Schumpeterian industrial organization; in fact, extant evidence suggests keeping firms on life-support saps growth opportunities for the more productive firms in the industry, as is the case for Zombie firms in Japan documented by Caballero, Hoshi and Kashyap (2008).

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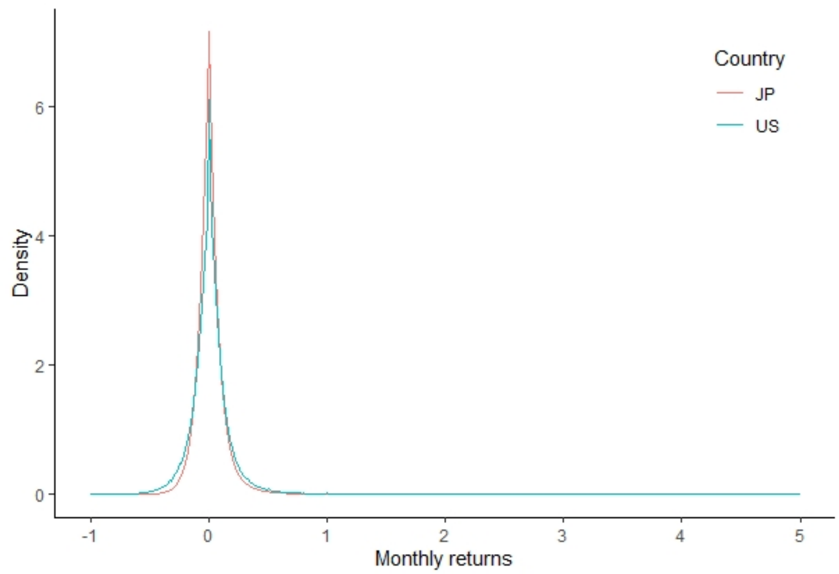
Figure 1
Distribution of Stock Returns for Japanese and US Firms

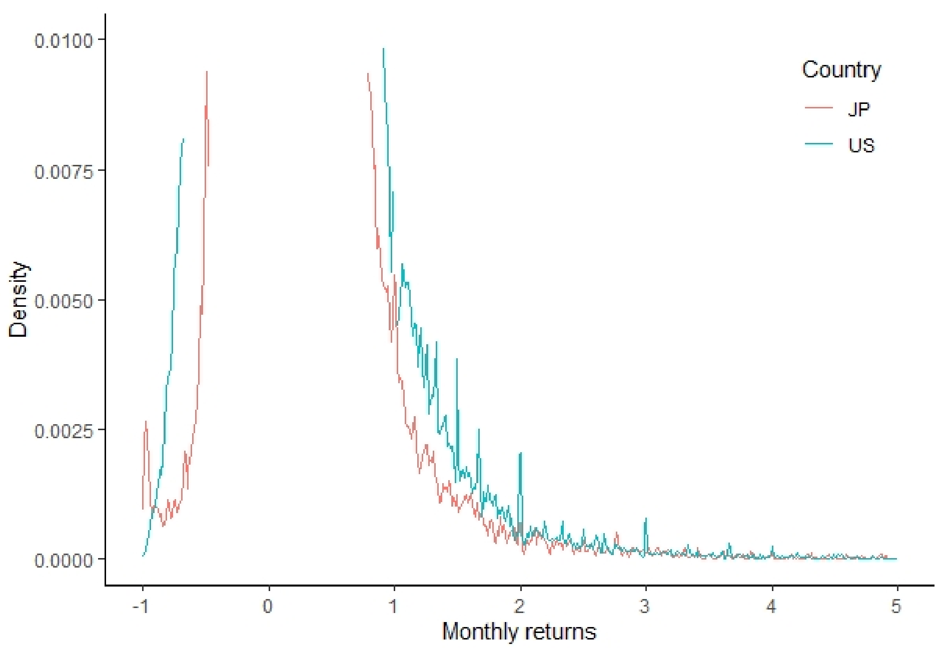
The sample period is 1977-2019. Returns are calculated based on end-of-period prices and include dividends. The graphs are the kernel density estimates of net returns adjusted for contemporary Japanese interbank monthly call rates and contemporary T-bill returns.

Panel A: Kernel Density for Monthly Returns

Plot I: Returns from –1 to +5

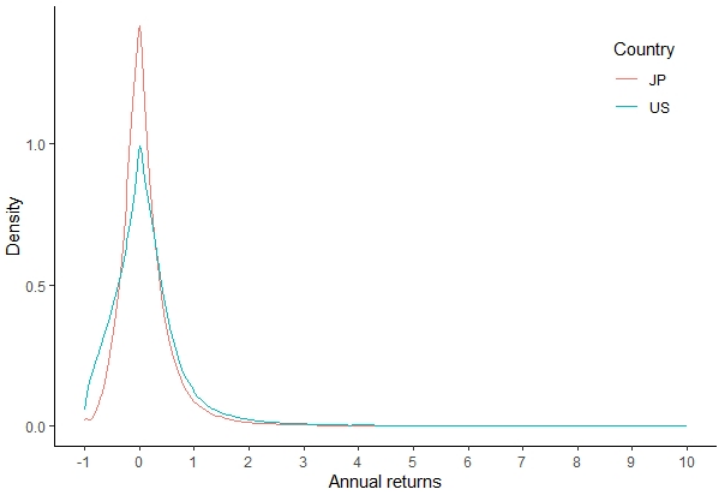


Plot II: Returns from –1 to +5

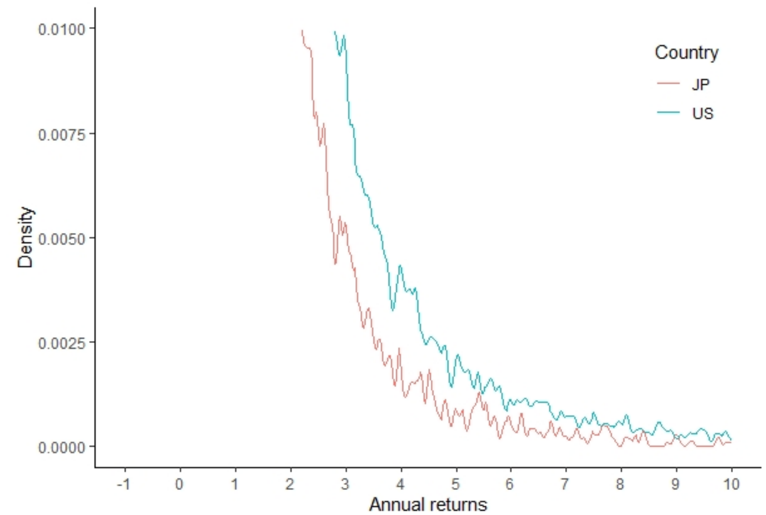


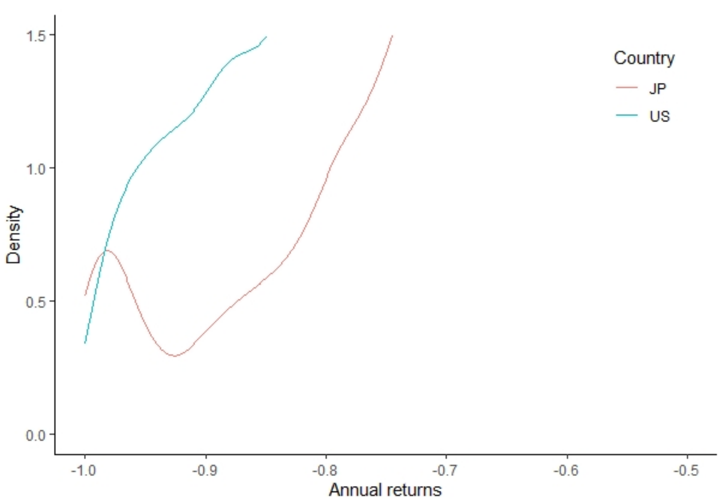
Panel B: Kernel Density for Annual Returns

Plot I: Returns from –1 to +10



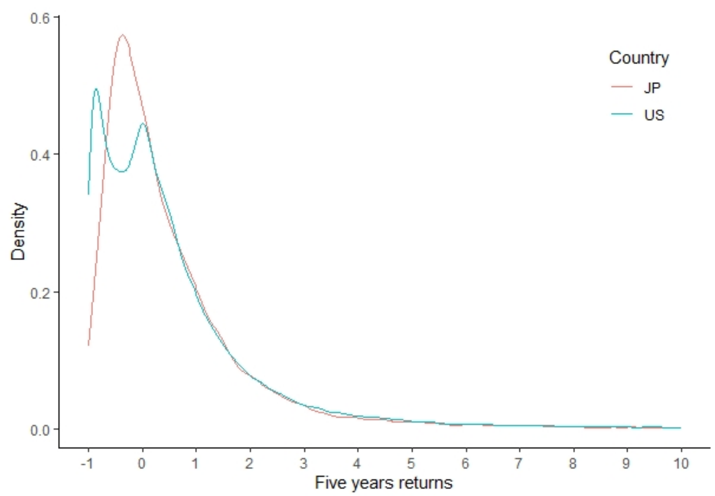
Plot III: Right-tail from –1 to +10



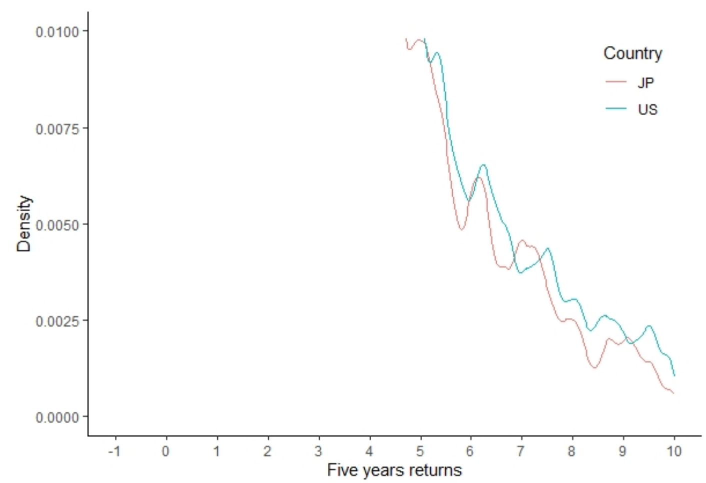


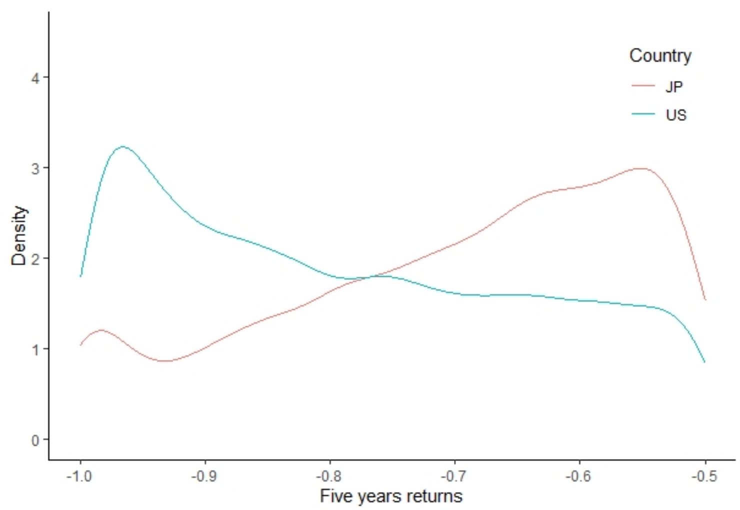
Panel C: Kernel Density for Semi-decadal Returns

Plot I: Returns from –1 to +10



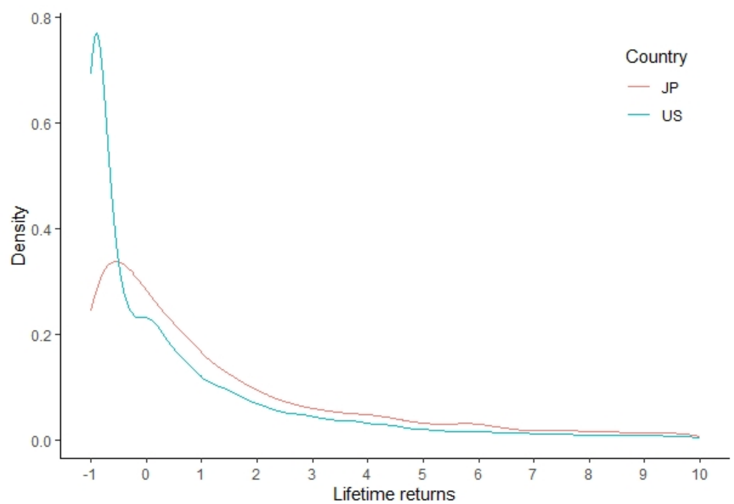
Plot III: Right-tail from –1 to +10



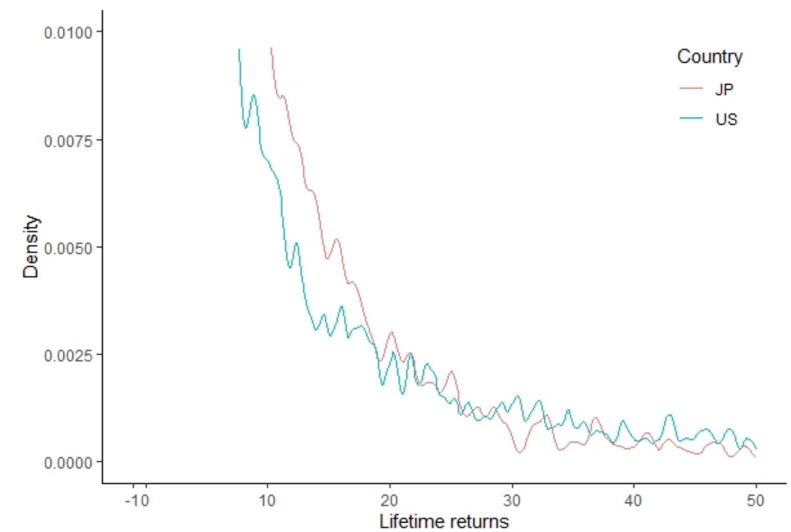


Panel D: Kernel Density for Lifetime Returns

Plot I: Right-tail from –1 to +10



Plot III: Right-tail from –1 to +50



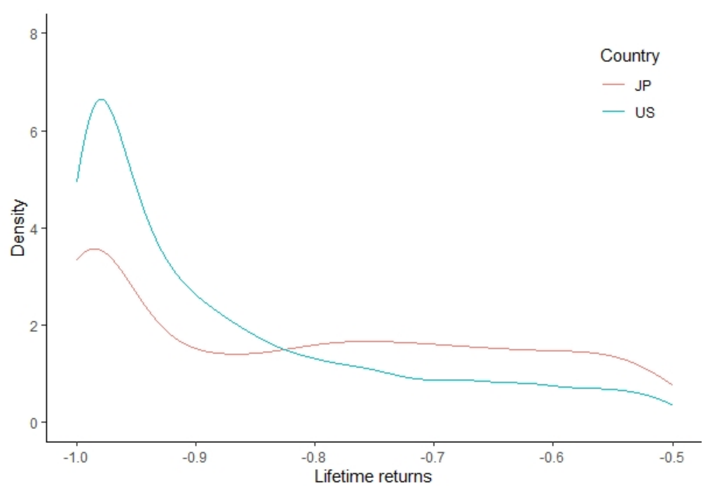


Figure 2

Dropped Ratios in Japan and the US

The graph shows the fraction of firms that were delisted because they were dropped by the exchange for reasons other than liquidation on Japanese and US stocks exchanges from 1977 to 2019.

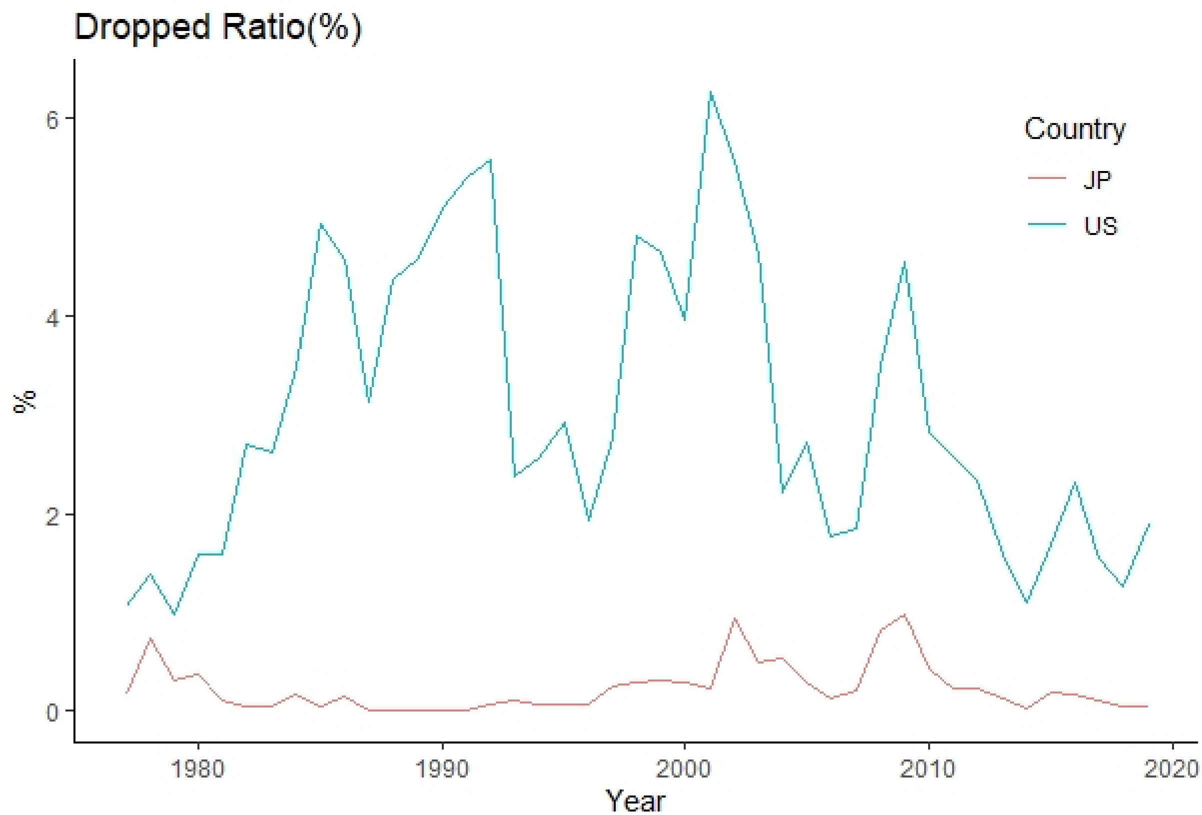


Figure 3
Wealth created by all listed firms in Japan and the US from 1977-2019

The vertical axis is a cumulative percent of net wealth creation in the stock market by all listed firms from 1977 to 2019. We rank all firms from highest to lowest based on excess wealth created. The horizontal intercept for 100% of wealth created is at 15% of total firms (842 firms/5464 firms) for Japan, and 3% of total firms (633 firms/24320 firms) for the US.

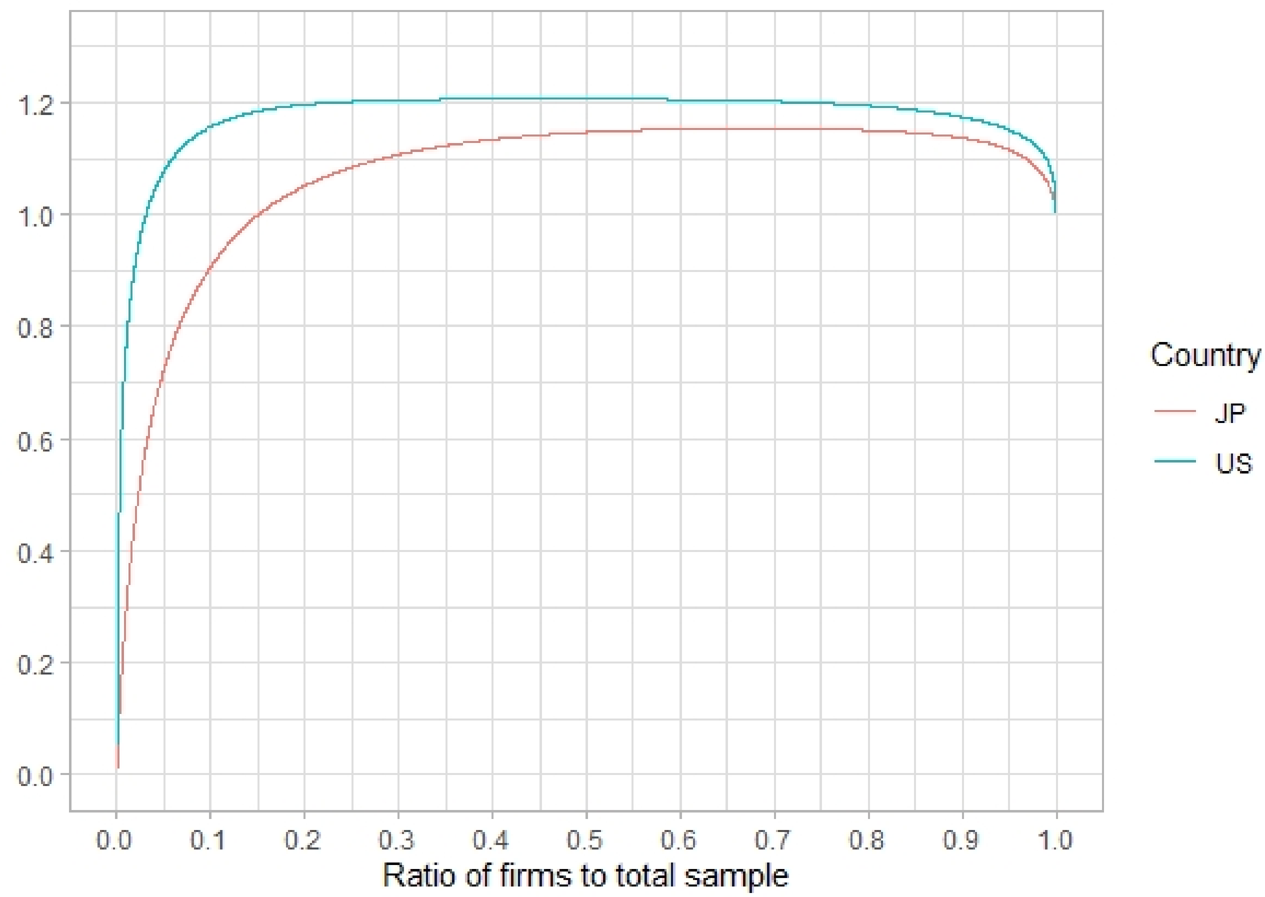


Table 1

Descriptive Statistics for Sample Firms

For Japan, we use stocks listed on the Tokyo Stock Exchange (tier 1 and tier 2, and Mothers), the Osaka Stock Exchange (tier 1 and tier 2, and Hercules), and JASDAQ from January 1977 to December 2019. For the US, we use CRSP common stocks (share codes 10, 11, and 12) from January 1977 to December 2019. Japanese market value expressed in billion Yen. CRSP US values in billion USD. All values in nominal Yens and Dollars.

	Japan	US
Number of Firms, January in 1977	1,616	4,772
Number of Firms, December in 2019	3,704	4,196
Market Value per firm, January in 1977	33.1	0.2
Market Value per firm, December in 2019	181.5	8.4
Total Market Cap, January in 1977	53,470	882
Total Market Cap, December in 2019	672,227	35,189
Number of Years Active on Stock Exchange, Median	19.3	6.5

Table 2

Japanese and US Common Stock Returns: 1977-2019

All returns are based on daily closing prices and include dividends. If a firm is delisted, returns are based on the delisting price. Risk-free rate (Rf) in Japan (US) is the overnight inter-bank call (T-bill) rate. NOB is the number of returns equal the sum of all firm-time observations.

	Min	1st Quartile	Median	Mean	3rd Quartile	Max	SD	Skewness	%>Rf	%>0	NOB
Panel A: Monthly Returns											
Japan	-0.999	-0.054	0.000	0.010	0.055	13.061	0.14	7.07	0.48	0.49	1,435,670
US	-0.998	-0.068	0.000	0.011	0.072	24.000	0.19	7.36	0.48	0.50	3,107,589
Panel B: Annual Returns											
Japan	-1.000	-0.173	0.026	0.127	0.278	48.4	0.69	14.30	0.51	0.54	122,784
US	-1.000	-0.263	0.045	0.182	0.384	208.3	1.15	41.88	0.50	0.55	258,328
Panel C: Five Years Returns (1977-2016)											
Japan	-1.000	-0.380	0.105	0.576	0.937	92.3	1.88	10.02	0.50	0.55	24,824
US	-1.000	-0.487	0.130	0.636	0.984	213.0	2.44	18.12	0.50	0.56	64,699
Panel D: Lifetime Returns											
Japan	-1.000	-0.375	0.661	3.703	3.254	759.7	16.9	27.50	0.57	0.64	5,646
US	-1.000	-0.868	0.009	12.985	2.150	11035.7	151.0	40.24	0.44	0.50	24,320

Table 3

Japanese and US Lifetime Stock Returns by Listing Status

All returns are based on daily closing prices and include dividends. Lifetime returns are based on year-end price in 2019. NOB is the number of firms in each category. Total is the number of all sample firms. Panel A shows results for Japanese firms. Panel B shows results for US listed firms for the same sample period. Active are those that were listed on the exchange as of year-end 2019. Merged firms are delisted due to acquisitions (CRSP delisting code 200 or 300). Liquidated firms refer to delistings caused by liquidations(CRSP delisting code 400), while dropped firms (CRSP delisting code 500) refer to performance-related exchange initiated delistings. Survivor are the firms that are listed through out the period from January 1977 to December 2019.

	Min	1st Quartile	Median	Mean	3rd Quartile	Max	SD	Skewness	%>Rf	%>0	NOB (A)	Total(B)	(A)/ (B)
Panel A: Japan													
Active Firms	-1.000	0.002	1.31	5.21	4.68	759.7	20.5	23.2	0.695	0.751	3,675	5,646	65.1%
Merged Firms	-1.000	-0.543	0.13	1.36	1.60	108.0	4.5	10.7	0.405	0.534	1,576	5,646	27.9%
Liquidated Firms	-1.000	-0.999	-1.00	-0.73	-0.99	2.6	0.7	2.9	0.055	0.109	55	5,646	0.97%
Dropped Firms	-1.000	-0.998	-0.99	-0.88	-0.97	10.4	0.7	14.7	0.006	0.019	316	5,646	5.60%
Liquidated+Dropped	-1.000	-0.998	-0.99	-0.86	-0.97	10.4	0.7	12.5	0.013	0.032	371	5,646	6.57%
Survivor Firms	-0.993	1.591	4.98	11.1	11.5	759.7	31.5	15.9	0.724	0.902	927	5,646	16.4%
Panel B: US													
Active Firms	-1.000	-0.514	0.58	53.01	7.72	11,036	343.7	18.8	0.587	0.627	4,161	24,320	17.1%
Merged Firms	-1.000	-0.020	1.09	8.57	3.90	4,223	68.8	37.8	0.658	0.744	11,482	24,320	47.2%
Liquidated Firms	-0.995	-0.025	0.20	1.63	2.11	26.8	3.4	3.1	0.667	0.735	279	24,320	1.15%
Dropped Firms	-1.000	-0.974	-0.91	-0.49	-0.70	147.9	2.9	27.4	0.067	0.096	8,306	24,320	34.2%
Survivor Firms	-1.000	29.9	115.9	323.5	282.4	11,036	827.1	7.4	0.879	0.945	472	24,320	1.94%