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Abstract

This paper examines the recent decline of the value premium in the Japanese market since the late 2000s, and discuss similarities and differences between the Japanese and US markets. We adopt the analytical framework of Fama and French (2021) using predictive regression with the book-to-market (BM) ratio and the framework by Arnott et al. (2021) based on the return decomposition of HML returns. The level and volatility of the Japanese BM ratio significantly changed toward the end of 1990s; thus, careful consideration in splitting the sample periods is needed in examining the predicting ability of BM ratio about the portfolio returns sorted by the firm size and BM ratio. We find the predictable component of Japanese HML returns is relatively stable over time, and the recent decline in HML returns is mostly explained by the unpredictable decline in the valuation of value stocks relative to growth stocks after the Global Financial Crisis in the late 2000s. This is consistent with the results reported in existing studies on the US market. The evidence provided by the decomposition of HML returns also supports the findings of this study’s analysis.

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Value Premium in Japanese Market: Statistical (Re)appraisal *

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Abstract

This paper examines the recent decline of the value premium in the Japanese market since the late 2000s, and discuss similarities and differences between the Japanese and US markets. We adopt the analytical framework of Fama and French (2021) using predictive regression with the book-to-market (BM) ratio and the framework by Arnott et al. (2021) based on the return decomposition of HML returns. The level and volatility of the Japanese BM ratio significantly changed toward the end of 1990s; thus, careful consideration in splitting the sample periods is needed in examining the predicting ability of BM ratio about the portfolio returns sorted by the firm size and BM ratio. We find the predictable component of Japanese HML returns is relatively stable over time, and the recent decline in HML returns is mostly explained by the unpredictable decline in the valuation of value stocks relative to growth stocks after the Global Financial Crisis in the late 2000s. This is consistent with the results reported in existing studies on the US market. The evidence provided by the decomposition of HML returns also supports the findings of this study's analysis.

Keywords: Japanese stock market, value premium, HML factor, Fama-French three-factor model

JEL Codes: G11, G12, G15

*The analysis in Section 2 is partially based on Iwaisako (2001), but we reworked our empirical analyses with an expanded data set, so that the main arguments and conclusions are changed to some extent. We thank Kohei Aono, Yasushi Ishikawa, Ryuta Sakemoto, Hitoshi Takehara, and the participants of Nippon Finance Association meetings in 2021 and 2022 for their comments. This work has been supported by 2022 Joint Research Program of Joint Usage and Research Center Programs at the Institute of Economic Research, Hitotsubashi University and JSPS KAKENHI Grant Number 18H00871.

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1 Introduction

"Is value investing dead?" — This is a question that has troubled finance researchers and practitioners in recent years (see Lee, 2020, for example, for the discussion about US market). Similarly, the significant decline in HML return in recent years has become a major issue for the Japanese market as well (Ishikawa, 2021, Iwaisako, 2021, Takehara, 2021).

The importance of the HML factor in both academic literature and financial practice was first highlighted in the series of works by Fama and French in the early 1990s . They initiated the surge of the systematic quant-type approach to value investment which utilizes the book-to-market (BM) ratio and HML factor in their three-factor model. [1] Fama and French (1992, 1993), using 28 years' worth of US market data from July 1963 to June 1991, present clear evidence that value stocks with a high BM ratio had higher average returns compared to growth stocks with a low BM ratio. In the subsequent paper, Fama and French (2017) further confirm the existence of significant value premium in stock markets in European and Asia-Pacific regions including Japan for the period from July 1990 to December 2015. For the Japanese market in particular, Chan, Hamao, and Lakonishok (1991) are probably the first to find that value premium not only exists in the Japanese market, but is in fact larger than in the US market, while size premium had been mostly insignificant.

By the mid-2010s, however, the finance industry has recognized that there have been significant declines in the value premium of US and Japanese stock markets. Fama and French (2017) have already acknowledged that the value premium in the US became smaller in their latter subsample. In retrospect, the decline started in Japan and in the US around the time of the Global Financial Crisis (GFC) which was triggered by the failure of Lehman Brothers in September 2008. Having observed the value premium diminish in the 2010s, some researchers on the mechanism underlying the recent decline. This includes Arnott et al. (2020), Fama and French (2021), Israel et al. (2021), Lee (2020), Lev and Srivastava (2022), Linnainman and Roberts (2018).

In this paper, we use the analytical frameworks by Fama and French (2021) and Arnott et al. (2020) to analuyze how the value premium has declined in Japan and discuss the similarities

[1] Often the "value premium" and the "HML factor" refer to the same thing, so the distinction between the two is not very strict in the general discussions in the introduction and the conlusion of this paper. On the other hand, in Fama and French (2021), the value premium is defined as the excess return of a portfolio of high BM stocks over a market portfolio.

and the differences from the decline in HML's return in the US. The remainder of this paper is organized as follows. Section 2 reports the averages of Fama-French factors and the portfolios sorted by size/book-to-market ratio, in the full sample and various subsamples. Section 3 explains how we adopt the framework of Fama and French (2021) to examine if the predictability of HML returns using the BM ratio varies over time. Section 4 explains how we use return decomposition proposed by Arnott et al. (2020) to consider the same problem through a different methodology. Section 5 concludes the paper.

2 The Value Premium in the Japanese Market: An Overview

2.1 Data

We use the NPM Japanese Fama-French benchmark data from *Financial Data Solutions, Inc.* in this paper. [2] The stocks included in the universe of the market to be analyzed are all individual stocks provided in *Financial Data Solutions, Inc.* data, which consists of all the stocks in the First and Second sections of the Tokyo Stock Exchange, the TSE. The sample period is September 1977 to March 2021.

In examining the effectiveness of systematic trading strategies such as the Fama-French three-factor model, we have to take it into account that large institutional investors employing sophisticated trading strategies in Japanese market, in particular major foreign financial institutions, only consider stocks of relatively large firm size in their actual investments.[3] This is due to the extremely low liquidity of the shares of smallest companies, the lack of mandatory dissemination of accounting information in English for such companies, or the time lag before such information is included in public records. See Kang and Stultz (1997) and Kamesaka et al. (2003) for the analyses of foreign investors' trading patterns in the Japanese stock market. There is no clear information on the firm size that is the dividing line for inclusion or exclusion from the investment universe of large financial institutions, and such a line should be considered to vary over time. However, we believe

[2] For the detailed description refer to the following URL: https://fdsol.co.jp/npm.html

[3] We thank several practitioners for pointing out the importance of this issue during our discussion with them on earlier versions of this paper.

that stocks in the smallest quartile of the Tokyo Stock Exchange's Second Section, for example, to be unlikely targets for frequent trading by major financial institutions.

For this reason, our analyses also use data for two additional sub-universes of stocks which exclude the smallest firms in the TSE. The benchmark universe comprises the entire individual stocks provided in *Financial Data Solutions, Inc.* data, which we call *Entire Market*. Our first narrower universe consists of individual stocks in the top 80% subgroup of *Entire Market* in terms of firm size, hence is called *TOP 80 %*. The second narrower universe consists of individual stocks included in the Nikkei 225 index, and thus, is called *Nikkei 225*. The universe of stocks with the largest average firm size is *Nikkei 225*, followed by *TOP 80 %*, then *Entire Market*. On the other hand, *Entire Market* contains the largest number of the individual stocks: about 1,600 in 1990, 1,540 in 2000, 1,970 in 2010, and 2,400 in 2020. Owing to the ways in which they have been constructed, the number of the individual stocks in *TOP 80 %* is 80% of *Entire Market* and the number in *Nikkei 225* is 225. *Nikkei 225* contains about 9% to 14% of *Entire Market* depending on the time periods.

Following Fama and French (2021), our analyses use the return data for seven portfolios, including market portfolio and six size-BM sorted portfolios. When considering a particular universe of individual stocks discussed above, market portfolio is defined as the value-weighted average of all individual stocks in the corresponding universe. In calculating the data of the six individual portfolios, first, the sample of individual stocks are divided into two groups based on firm size. Small stocks are those whose market capitalization at the end of the month is below the median of the corresponding universe of individual stocks, while big stocks are classified as those whose market capitalization is above the median. Second, stocks are divided into three groups based on BM ratio. Value stocks are those with BM values above the 70th percentile, while growth stocks are those below the 30th percentile. As a result, we have three BM-sorted portfolios: Small Value (SV), Big Value (BV), and their combination, Market Value (MV). Similarly, the three growth stock portfolios are Small Growth (SG), Big Growth (BG), and Market Growth (MG).

2.2 Value premium in the full sample

In Table 1, we present average excess returns of six size-BM sorted portfolios over the market portfolio as well as three Fama-French factors for the full sample, for three different universes of individual stocks described in the previous subsection.

[Table 1 about here]

Averages of market portfolio over risk-free rate are almost equal regardless of which universe of individual stocks have been considered, and are approximately 0.3% on a monthly basis, and 3.6% on an annual basis. The average of the HML factor for *Entire Market* is 0.79% (annualized, 9.5%), which is almost equal to that of *Top 80%* at 0.76% and slightly higher for *Nikkei 225*, at 0.85%. The average of SMB (size premium) is 0.04% for *Entire Market* and −0.07% for *Top 80%*. Average SMB for *Nikkei 225* is slightly higher at 0.15%. While size premium has never been clearly observed in the Japanese stock market, value premium has definitely existed and has been larger compared to the US. These results are consistent with those reported in previous studies of the Japanese stock market, such as Chan et al. (1991).

Next, we turn our attention toward the excess returns of six size-BM sorted portfolios over the market portfolio. The value-growth spread for market average $MV - MG$ is 0.85% for *Nikkei 225*, 0.77% for *Top 80%*, and 0.80% for *Entire Market.* [4] Therefore no significant difference in the value-growth spread was observed, regardless of the size of the universes of stocks.

2.3 Value premium in subsamples before and after the Global Financial Crisis

To examine the decline of the value premium in recent years, we present Table 2 where we perform the same calculations as in Table 1 for several subsamples. We split subsamples into two different dates. The first split date is at the end of 1998 and the beginning of 1999. We chose this as the first split date because the mean and volatility of Japanese BM ratios are very different before

[4] The value-growth spread for market average is $MV - MG$ and calculated as $MV - MG = (MV - Rm) - (MG - Rm)$.

and after this point, approximately, as we will discuss in detail later. The second split date is in August and September of 2008 which roughly corresponds to the onset of the Global Financial Crisis (GFC) following the collapse of Lehman Brothers in mid-September. We checked robustness of our empirical analyses, using data delimited by several other neighboring dates such as at the end of 2007 and the end of 2008. The main empirical results have been discussed in detail in the following sections, and were not affected by the delimitating dates, which were until approximately one year before and after these dates.

In Table 2, we report the averages of Fama-French's three factors in Panel A and excess returns of six size-BM sorted portfolios over the market portfolio in Panel B, for five different time periods, namely: (1) September 1977 to the end of 1998, (2) the beginning of 1999 to September 2008, (3-1) September 2008 to the end of 2019, (3-2) September 2008 to the end of sample, March 2021, and (4) the beginning of 2020 to the end of sample, March 2021.

[Table 2 about here]

The SMB and HML averages in Panel A of Table 2 reveal some interesting findings. First, a comparison of two subsamples prior to the global financial crisis shows that the average HML is slightly larger in the Subsample (2) immediately before GFC than in the earlier Subsample (1) ending at 1998. In particular, for the *Top 80%* universe, the average HML increased by 0.20 percentage point (= 1.09% − 0.89%) from Subsample (1) to Subsample (2). Then, HML declined after GFC in Subsample (3-1) by 0.67 percentage point (= 0.42% − 1.09%). The decline from the subsample before GFC to after GFC is observed for all three universes of stocks considered here, but is largest for the *Nikkei 225* universe at 0.96 percentage point (= 0.42% − 1.38%), which corresponds to a difference of more than 10 between percentage points on an annual basis.

On the other hand, the averages of SMB remain relatively stable over time for the *Nikkei 225* universe. However, the SMB factor for *Entire Market* has increased from −0.13% in the 1999-2007 sample to 0.37% in the 2009-2019 sample, resulting in a 0.5 percentage point increase.

Next, we look at averages of six portfolios' excess returns shown in Panel B of Table 2. We found that the difference between the performance of value and growth stocks among large-cap stocks is the main cause of the large value premium in over the 10-year period prior to the global financial crisis. If we take the *Top 80%* universe as an example, $BV - Rm$ increases from 0.66% in Subsample (1) to 0.88% in Subsample (2). Then, it goes down to 0.36% in the Subsample (3-1) after GFC. In the same time periods, $BG - Rm$ goes down from -0.25% in the subsample (1) to -0.37% to the Subsample (2) before GFC, and rebounds to -0.11% in the post GFC Subsample (3-1). As the result, the return difference between value stocks and growth stocks among large-cap stocks, $BV - BG$, is a 0.91 percentage point in the Subsample (1). It climbs up to 1.25 percentage point in the Subsample (2), then goes down to 0.47 percentage point in Subsample (3-1) after the GFC. In the same time periods, $SV - SG$ starts from 0.87 percentage point, went up slightly to 0.93 percentage point in Subsample (2), then declined to 0.38 percentage point in Subsample (3-1) after the GFC.

Overall, HML factor's return was apparently substantially higher before GFC and it was particulary higher in the period from 1999 to the summer of 2008. The increase of HML return from the sample before 1999 is mainly due to the higher performance of large-cap value stocks. The difference in returns between value and growth stocks among large-cap stocks and among small-cap stocks fluctuates over time, but the pattern of change is similar regardless of the universe of stocks we are considering. However, time variation is more pronounced for the universe consists of largest stocks only, *Nikkei 225*.

2.4 Covid-19 subsample

For researchers conducting empirical analyses today using long-term stock market data, handling the latest data period since the onset of the global pandemic caused by Covid-19 in early 2020 is troublesome. It is difficult to interpret the outcome of including post-2020 data in the empirical analysis until the impact of the current pandemic has sufficiently attenuated or after the new normal state of the economy has been established. Thus, the remainder of the paper focuses mainly on the analyses using data until the end of 2019. In this subsection, we will summarize empirical results of the subsample using data after 2020, specifically until the end of March 2021.

In Table 2, subsample (3-2) is the entire period after GFC including the Covid-19 subsample, while Subsample (4) is a 15-month subsample of Covid-19. Sometime after the pandemic had started in the second half of 2020, the fact that mRNA vaccines were successfully being developed by pharmaceutical companies led to increased financial news and reports by financial institutions predicting a recovery in stock prices in general and resurrection of value investments.[5] However, the Japanese data for the Covid-19 subsample in this paper does not support such wishful thinking about value investment. We found that the averages of market portfolio's excess returns in Subsample (4) are all positive, but both SMB and HML are negative in all universes of individual stocks reported in Table 2, Panel A. Hence, large-cap stocks have outperformed small-cap stocks and growth stocks have outperformed value stocks in the Covid-19 subsample until early 2021.

When comparing the performance of small-value and large-value stocks, the latter have outperformed for *Entire Market* and *TOP 80%*. Both are negative, but the absolute value is greater for small-cap value. For individual stocks in the *Nikkei 225* universe, on the other hand, small-value stocks have performed slightly better. However, in all cases, the difference between small-value and large-value is not statistically significant.

We observe a similar pattern for growth stocks. Large growth stocks have performed better for *Entire Market* and *TOP 80%*. For *Nikkei 225* stocks, small growth stocks have performed slightly better. Since the *Nikkei 225* universe contains only the largest 10% in the Tokyo market, these results suggest that it is large-cap growth stocks that have led the market recovery in Covid-19. This result is in contrast with the result in the post-GFC sample ending in 2019, Subsample (3-1), in which small growth stocks outperformed large growth stocks.

[5]However, as for the US market from the spring of 2021 onwards, growth stocks have caught up and the resurgence of value investment proved to be very short-lived. See, for example, Bloomberg's report in November 19, 2021, titled "A Year After Vaccine Jolt, Bet on Value Stocks Disappoints"
URL: https://www.bloomberg.com/news/articles/2021-11-09/a-year-after-vaccine-jolt-the-bet-on-value-stocks-disappoints.

3 Predictive Regression

3.1 Predictive regression for excess return over the market portfolio benchmark

Our analyses in section 2 have focused on the unconditional HML return and excess return of size-BM sorted portfolios relative to the market portfolio. After Cohen, Polk and Vuolteenaho (2003), many studies have used the regressions for value premiums on lagged BM ratio. Here, we follow Fama and French (2021) and estimate the following type of predictive regression:

$$R_{i,t} - R_{M,t} = \alpha_i + \beta_i(BM_{i,t-1} - BM_{M,t-1}) + \epsilon_t. \tag{1}$$

In order to make a direct comparison with Table 3 in Fama and French (2021), we estimated equation (1) for six size-BM sorted portfolios: SV, BV, MV, SG, BG, and MG. We confirmed in the previous section that there is in fact value premium in the Japanese market in the sample prior to the GFC and its size is larger than that of the US market. Thus, we hypothesize that the coefficients of the predictor variables, one-month lagged excess BM ($BM_{i,t-1} - BM_{M,t-1}$) is positive.

Table 3 show the estimation results of equation (1) for using the data of *TOP 80 %* universe. For all six portfolios, the estimated coefficients are insignificant and R^2 are much smaller than those reported in Fama and French (2021) for the US data. However, given the magnitude of the HML factor in the pre-GFC sample in Table 2, we cannot accept the result that there is no predictability using the BM ratio in the same period without further investigation. It is more plausible to interpret the results in Table 3 as the consequence of the fact that the predictive ability using the BM ratio is changing through time. Therefore, the analysis using subsamples is our next task.

[Table 3 about here]

3.2 Predicting ability of BM ratio in different sample periods

Fama and French (2021) estimate a variation of the equation (1) that includes dummy variables both constant term α_i and the coefficients of the predicting variable β_i.[6] However, our preliminary analysis suggests that this empirical strategy does not work with the Japanese data since there is a significant change in the behavior of the predicting variable, excess BM ratio, $BM_{i,t-1} - BM_{M,t-1}$, in the late 1990s. Determining the exact break point of the series is a somewhat complicated matter since there are many potential events which caused this in the second half of the 1990s and the early 2000s, including the collapse of the bubble economy in early 1990s, the domestic banking crisis in 1998, as well as Takenaka plan which involves restructuring of many banks and non-financial companies in the early 2000s. [7]

From a statistical point of view, on the other hand, it is evident that there was a significant structural change in both the average and volatility of excess BM ratio in late 1990s as shown in Figure 1 and Figure 2. We plot the time series of the BM ratios of the market portfolio, the portfolio of value stocks, and the portfolio of growth stocks using the data of *TOP 80%* universe in Figure 1. We show excess BM ratios of value stocks and growth stocks over the BM ratio of market portfolio in Figure 2. In Figure 1, both the average and volatility of the BM ratio of the value stock portfolio increased significantly in 1998/99. As a result, the excess BM ratio of value stocks in Figure 2 has also increased significantly since 1998/99, both in level and in volatility. The excess BM ratio of growth stocks exhibits a downward trend since late 1990, but the magnitude of the change is subtle compared with the change in value stocks.

[Figure 1 and Figure 2 about here]

[6] Fama and French (2021) estimate a model that allows for structural changes in both the constant term α_i and the coefficients β_i of the predictors in equation (1), and test whether there is a statistically significant decline in the value premium in the recent sample:

$$R_{i,t} - R_{M,t} = \alpha_i + \alpha_i^D D + \beta_{i,t}(BM_{i,t-1} - BM_{M,t-1}) + \beta_{i,t}^D D(BM_{i,t-1} - BM_{M,t-1}) + \epsilon_t.$$

where D is a dummy variable that takes 0 in the first half and 1 in the second half of the sample. Their choice of a break point is not obvious, but it is plausible that Fama and French picked 1991 because their earliest paper on the three-factor model (Fama and French 1992, 1993) used the data until approximately 1990 and 91.

[7] We perform the structural break test (Bai and Perron [1998]) which allows unknown multiple break points, instead of a predetermined break point. Though estimation results are not reported here, we find different break points for value stock and growth stock portfolios, and several structural breaks that were not related to any specific economic events.

Therefore, we estimate the predictive regression, equation (1), dividing the sample at the end of 1998. We further divide the latter subsample at the onset of GFC, August and September of 2008. Table 4 reports these subsample estimation results for the *TOP 80%* universe. For the early pre-GFC Subsample (1), predictive regression for large value stocks work well: the estimated coefficient of excess BM ratio is 2.698 and statistically significant at 1%. On the other hand, the estimated coefficient is negative and statistically insignificant for small value stocks ($SV - Rm$). In the second pre-GFC Subsample (2), the coefficients of excess BM ratio in the regression for large-cap value stocks is still positive at 1.658, but becomes insignificant. However, the estimated coefficient is 3.199 and significant at 1% for small value stocks.

[Table 4 about here]

In the post-GFC sample (3-1) for 2008:9-2019:12, the predicting ability of excess BM ratio for small-cap value stocks remains strong, with the estimated coefficient being 3.485 and statistically significant at 1%. Compared with Subsample (2), the predictability of large value stocks somewhat regained with the estimated coefficient bounced back to 4.368, though it fell by too little to be statistically significant at the 10% level since standard error also becomes larger.

The estimate of large-cap value stocks' constant term α_i declined significantly for large value stocks, from -0.429 in Subsample (2) to -3.125 in Subsample (3-1). At the same time, small-cap value stocks' α_i increased from 0.263 in Subsample (2) to 2.150 in Subsample (3-1), and the latter estimate is statitically significant at 5%. The estimated coefficient of excess BM ratio for small-cap growth stocks in Subsample (3-1) also becomes much larger and statitically siginificant 5% compared to Subsample (2) to in Subsample (3-1). Finally, in the post-GFC sample (3-2) for 2008:9-2021:3 including Covid-19 period, the predictive ability completely vanishes for both small and large value portfolios.

4 Return Decomposition

In this section, we adopt to the framework of Arnott et al. (2021) to investigate the mechanism behind the time-variation of HML's return, particularly the decline of its performance after GFC in 2008-2010. Arnott et al. decompose the difference of the performance between value and growth portfolios into three components, (1) migration, (2) income yield, and (3) changes in value-versus-growth relative valuation. In the following, we briefly discuss each of these three components.

The first component, "migration", captures the process in which the price of some stock in the value (growth) portfolio appreciates (depreiciates) and moves into the neutral or growth (value) portfolios. Through the migration process, value stocks achieve relatively higher returns and growth stocks achieve lower returns, so that the difference between their performances contributes towards the HML factor positively. The second component, "income yield", captures the difference in the change in the book value of equity and dividend yield between the value and growth portfolios. Growth stocks typically pay out more dividends than value stocks, hence the difference in "income yield" will take on a negative value and contributes negatively to HML's return. Arnott et al. call the sum of "migration" and "income yield", "structural premium".

Finally, the third item is called the "revaluation premium" component and refers to the return coming from changes in relative valuations between the growth and value portfolios. As seen in the accounting identity below, the sum of the "revaluation premium" and the "structural premium" constitutes HML return.

$$
\begin{aligned}
\text{HML Return} &= \text{Revaluation Premium} + \text{Income Yield} + \text{Migration} \\
&= \text{Revaluation Premium} + \text{Structural Premium}
\end{aligned}
$$

Table 6 reports the above decomposition of HML returns for the periods of Subsample (1), (2) and (3-1) in the previous section. Averages of HML factor slightly increased from Subsample (1) before 1999 to Subsample (2) from 1999 to the summer of 2008. Then, it decreased significantly in Subsample (3-1) after the fall of 2008 to the end of 2019. The time-variation of average HML return is more prominent among larger stocks. Overall, patterns of time-variation in the averages of HML factor reported in Table 6 are consistent with the variations reported in Table 2 and Table 3.

[Table 5 about here]

Next, we discuss the time-valuations of individual components of HML factor returns. We start our discussion from “structural premium”. The average values of “structural premium” among both small-cap stocks and large-cap stocks declines from Subsample (1) to Subsample (2). In Subsample (3-1) after GFC in the fall of 2008, they slightly decline but remain approximately equal in Subsample (2). The differences in the values of “structural premium” before and after GFC are equal or slightly lower compared with the corresponding difference in the US market reported in Table 3 of Arnott et al. (2021). It should also be noted that, in the US market, the spread between value and growth stock returns has been larger among small-cap stock than among large-cap stocks. On the other hand, the spreads are mostly equal regardless the size of stocks or even slightly higher among large-caps in the Japanese market. In addition, among the components of the “structural premium”, the decline of “income yield” and the increase of “migration” components are pronounced for large-cap stocks from Subsample (1) to Subsample (2).

Finally, we discuss the time-variation of “revaluation premium”. The average values of “revaluation premium” are actually negative in Subsample (1) before 1999. They go up about 5 percentage point in Subsample (2) in the 2000s before GFC, then drop significantly about 9.5 percentage point after GFC. Given that the time-variations of “structural premium” are relatively mild, these results suggest that the biggest contribution to the significant decline of HML returns after GFC is the decline of “revaluation premium”.

To illustrate this point, Figure 4 shows the relative valuation of value and growth portfolios, plotting the ratio of BM for the growth portfolio to BM for the value portfolio. While there are some significant declines of relative valuation of value stocks in the past, in the first half of 1987 and around the turn of the century, previously, value stocks tended to bounce back in relatively short periods of time. On the other hand, the decline in the 2010s toward the end of the sample has been mild, but prolonged for nearly ten years.

[Figure 4 about here]

The fact that the "revaluation premium" explains the majority of the decline of HML returns after GFC is consistent with the finding by Arnott et al. (2021) for the US Market. Drawing on the works of Fama and French (2002) and Arnott and Bernstein (2002), Arnott et al. (2021) claim that "the returns induced by the changes in the valuations should be purged from the estimates of the risk premium because no a priori reason exists to explain why any trend in valuation should persist." However, the fact that the relative level of value stock prices has declined recently both in Japanese and US markets suggests the importance of explaining such a phenomenon in future research.

5 Conclusions

In this paper, we examined the decline of value premium in the Japanese stock market. We compare the performances of HML return and the returns of the size-BM ratio sorted portfolios in the period from the end of the 1990s until around the time of Global Financial Crisis with the performances in the period after. We find that performance of value stocks declined significantly and the performance of growth stocks increased slightly.

We investigate the mechanism behind the recent decline of HML returns using predictive regression and found that while the constant term declined after GFC in late 2000s, the estimated coefficients of the predicting variable, excess BM ratio, remain at the same level or even slightly higher. The decline of constant term is consistent with the declining relative valuation of value stocks compared with growth stocks, dubbed as "revaluation premium" in the HML return decomposition by Arnott et al. (2021). Similarly, the fact that predicting ability of excess BM ratio stays at the similar level before and after GFC is consistent with the little variation of "structural premium" obtained by the return decomposition over time.

The empirical results of this paper imply that recent underperformance value investing in the Japanese market is caused by similar mechanism as in the US market. However, why the relative valuation of value stocks has declined after GFC in both countries for a decaderemains unsolved and is, therefore a potential subject of future research.

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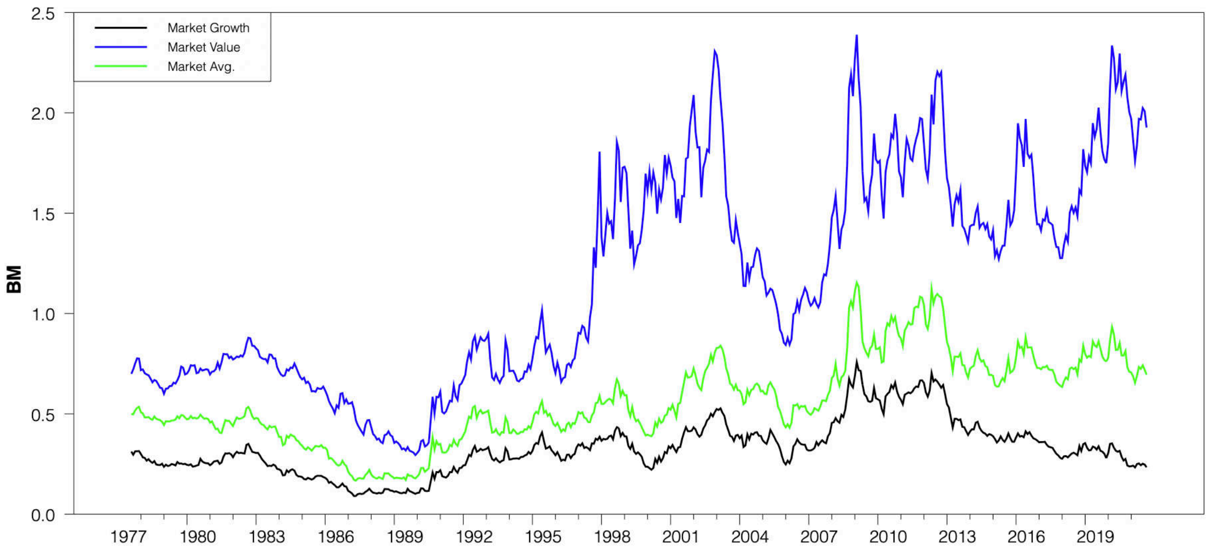
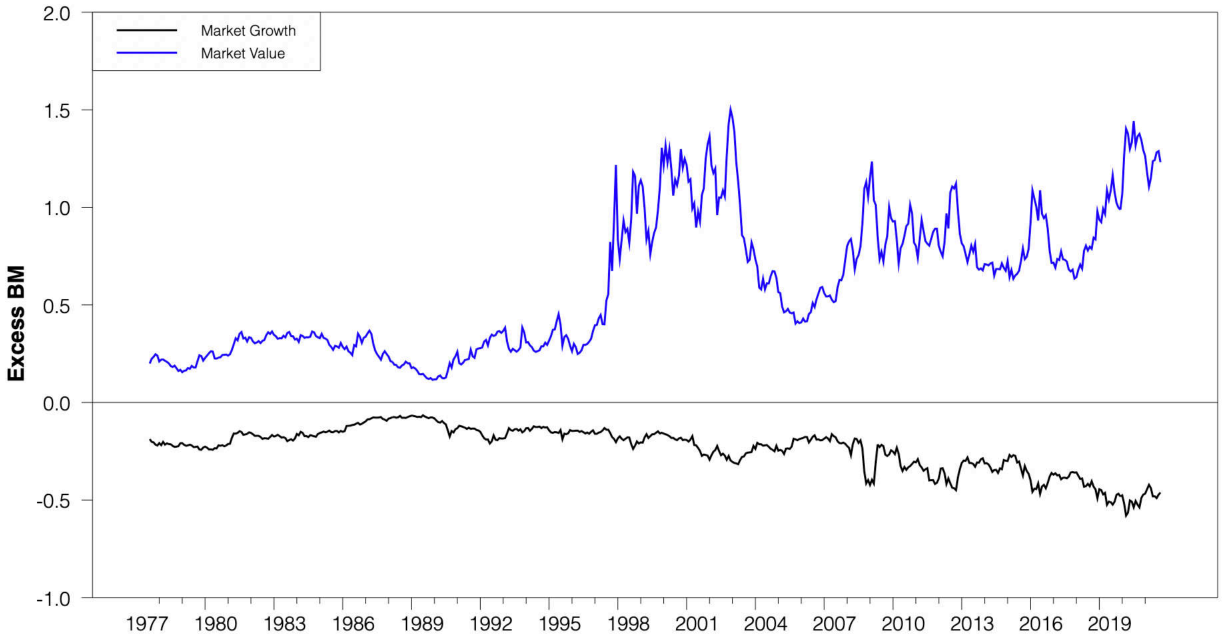
Figure 1: Book to Market ratio for Market Average, Market Value, and Market Growth in Japan: September 1977 - March 2021



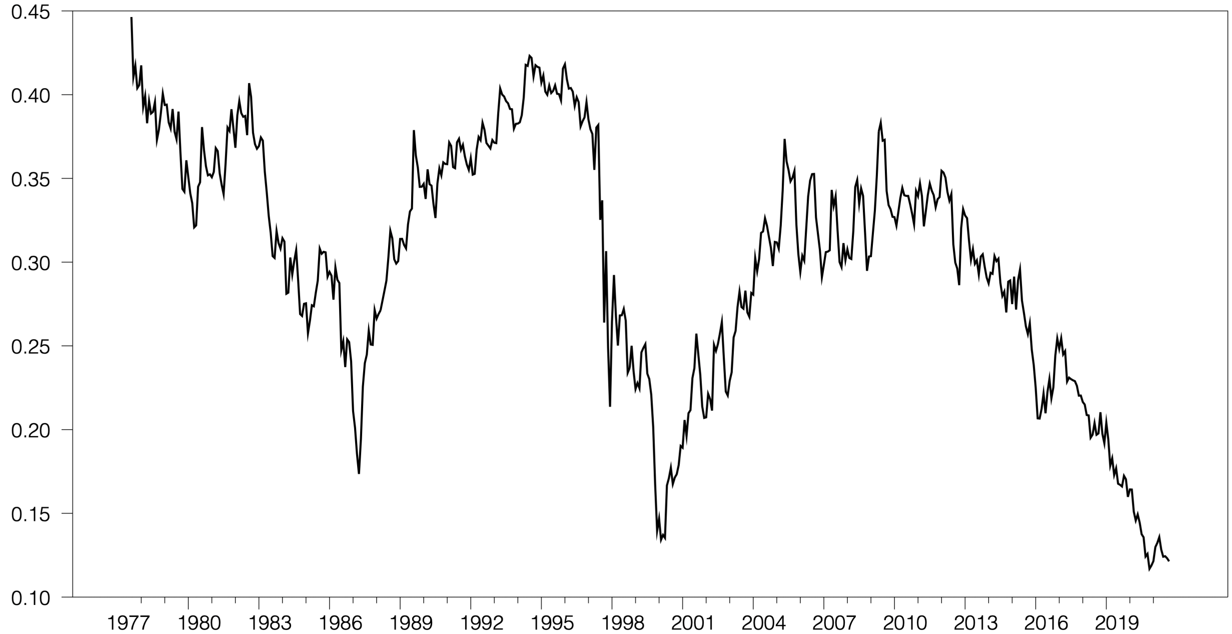
Book-to-Market ratios for Market Average: BM_M (green line), Market Value: BM_{MV} (blue line), and Market Growth: BM_{MG} (black line) are poltted.

Figure 2: Excess Book to Market ratio for Market Value and Market Growth



Excess book-to-market ratios ($BM_i - BM_M$) for Market Value ($i = MV$) and for Market Growth ($i = MG$) are plotted.

Figure 3: Relative Valuations of Growth and Value



The ratio of the BM for the growth portfolio to the BM for the value portfolio (BM_{MG}/BM_{MV}) is plotted.

Table 1: Averages of Fama-French factors and Returns of Size-BM sorted portfolios

We report averages of Fama-French factors and excess returns of six Size-BM sorted portfolios relative to market portfolio for the full sample, September 1977-March 2021. We repeat same calcurations for three different size-based universes of indvidual stocks, namely *Entire Market*, *Top 80%*, and *Nikkei 225*.

Panel A: *Entire Market*

	Rm-Rf	SMB	HML
Average	0.31	0.04	0.79
Standard Deviation	5.08	3.31	3.27

	SV-Rm	MV-Rm	BV-Rm	SG-Rm	MG-Rm	BG-Rm
Average	0.62	0.63	0.63	−0.11	−0.17	−0.22
Standard Deviation	3.96	3.41	3.71	3.83	1.82	1.49

Panel B: *Top 80%*

	Rm-Rf	SMB	HML
Average	0.30	−0.07	0.76
Standard Deviation	5.11	2.98	3.44

	SV-Rm	MV-Rm	BV-Rm	SG-Rm	MG-Rm	BG-Rm
Average	0.49	0.55	0.60	−0.22	−0.22	−0.22
Standard Deviation	3.69	3.21	3.49	3.44	1.71	1.55

Panel C: *Nikkei 225*

	Rm-Rf	SMB	HML
Average	0.30	0.15	0.85
Standard Deviation	5.47	3.58	3.89

	SV-Rm	MV-Rm	BV-Rm	SG-Rm	MG-Rm	BG-Rm
Average	0.68	0.58	0.48	−0.17	−0.27	−0.37
Standard Deviation	4.47	3.61	3.81	4.10	2.14	2.03

Table 2: Averages of Fama-French factors and Portfolios in Subsamples

Panel A: Fama-Frnch factors

Panel A-I: *Entire Market*

		Rm-Rf	SMB	HML
(1)	1977:09 - 1998:12	0.16	-0.04	0.93
(2)	1999:01 - 2008:08	0.24	-0.13	1.14
(3-1)	2008:09 - 2019:12	0.54	0.37	0.41
(3-2)	2008:09 - 2021:03	0.57	0.47	0.37
(4)	2020:01 - 2021:03	1.25	-0.29	-0.73

Panel A-II: *Top 80%*

		Rm-Rt	SMB	HML
(1)	1977:09 - 1998:12	0.15	-0.23	0.89
(2)	1999:01 - 2008:08	0.26	-0.10	1.09
(3-1)	2008:09 - 2019:12	0.52	0.28	0.42
(3-2)	2008:09 - 2021:03	0.60	0.20	0.30
(4)	2020:01 - 2021:03	1.26	-0.48	-0.82

Panel A-III: *Nikkei 225*

		Rm-Rt	SMB	HML
(1)	1977:09 - 1998:12	0.21	0.05	0.95
(2)	1999:01 - 2008:08	0.17	0.24	1.38
(3-1)	2008:01 - 2019:12	0.46	0.25	0.42
(3-2)	2008:01 - 2021:03	0.55	0.24	0.27
(4)	2020:01 - 2021:03	1.32	0.18	-1.06

Table 2: Continued

Panel B: Excess Returns of Size-BM sorted portfolios relative to Market Portfolio

Panel B-I: *Entire Market*

		SV-Rm	MV-Rm	BV-Rm	SG-Rm	MG-Rm	BG-Rm
(1)	1977:09 - 1998:12	0.60	0.61	0.62	−0.34	−0.32	−0.29
(2)	1999:01 - 2008:08	0.75	0.87	0.99	−0.29	−0.27	−0.31
(3-1)	2008:09 - 2019:12	0.70	0.58	0.45	0.44	0.17	−0.09
(3-2)	2008:09 - 2021:03	0.57	0.47	0.37	0.38	0.17	−0.03
(4)	2020:01 - 2021:03	−0.63	−0.53	−0.42	−0.09	0.21	0.50

Panel B-II: *Top 80%*

		SV-Rm	MV-Rm	BV-Rm	SG-Rm	MG-Rm	BG-Rm
(1)	1977:09 - 1998:12	0.41	0.54	0.66	−0.46	−0.35	−0.25
(2)	1999:01 - 2008:08	0.70	0.79	0.88	−0.23	−0.30	−0.37
(3-1)	2008:09 - 2019:12	0.60	0.48	0.36	0.22	0.06	−0.11
(3-2)	2008:09 - 2021:03	0.45	0.37	0.29	0.19	0.07	−0.04
(4)	2020:01 - 2021:03	−0.89	−0.59	−0.30	−0.13	0.23	0.59

Panel B-III: *Nikkei 225*

		SV-Rm	MV-Rm	BV-Rm	SG-Rm	MG-Rm	BG-Rm
(1)	1977:09 - 1998:12	0.56	0.54	0.52	−0.35	−0.42	−0.49
(2)	1999:01 - 2007:12	1.22	1.11	1.00	−0.05	−0.27	−0.50
(3-1)	2008:01 - 2019:12	0.57	0.23	0.09	−0.03	−0.09	−0.15
(3-2)	2008:01 - 2021:03	0.47	0.25	0.03	0.05	−0.02	−0.09
(4)	2020:01 - 2021:03	−0.37	−0.44	−0.51	−0.37	0.62	0.49

Table 3: Preditive Regression for the Excess Return over the Market Portfolio for *Top 80%* Stocks: Full Sample

This table reports the following forecasting regression for the full sample:

$$R_{i,t} - R_{M,t} = \alpha_i + \beta_{i,t}(BM_{i,t-1} - BM_{M,t-1}) + \epsilon_t$$

Subscript i denotes six portfolios sorted by firm size and BM ratio, $\{SV, MV, SG, BG, MV, MG\}$. The estimation period is September 1977 to March 2021 (523 obs.). Standard errors by Newey-West (with 6 lags) are reported in parentheses. (***) denotes that estimated coefficient is significant at 1% level, (**) denotes 5% level, and (*) denotes 10% level.

Dependent variable	α_i	$\beta_{i,t}$	R^2	adj.R^2
$SV - R_m$	0.140	0.505	0.003	0.001
	[0.447]	[0.597]		
$BV - R_m$	0.312	0.515	0.002	0.000
	[0.298]	[0.654]		
$MV - R_m$	0.185	0.604	0.004	0.002
	[0.320]	[0.591]		
$SG - R_m$	-0.376	-0.662	0.000	-0.001
	[0.356]	[1.194]		
$BG - R_m$	-0.483^{**}	-1.148	0.007	0.005
	[0.210]	[0.876]		
$MG - R_m$	-0.510^{***}	-1.255^{*}	0.007	0.005
	[0.177]	[0.742]		

Table 4: Preditive Regression for the Excess Return over the Market Portfolio for *Top 80%* Stocks: Subsamples

Subsample (1): Early Subsample, September 1977 - December 1998 (256 obs.)

Dependent variable	α_i	$\beta_{i,t}$	R^2	adj.R^2
$SV - R_m$	0.651	−0.670	0.001	−0.003
	[0.630]	[1.318]		
$BV - R_m$	−0.143	2.698	0.014	0.011
	[0.386]	[0.850]***		
$MV - R_m$	0.236	0.959	0.002	−0.002
	[0.503]	[1.078]		
$SG - R_m$	0.754	7.648	0.010	0.006
	[0.886]	[5.348]		
$BG - R_m$	−0.790**	−3.498*	0.008	0.004
	[0.371]	[2.120]		
$MG - R_m$	−0.265	0.575	0.000	−0.004
	[0.273]	[1.791]		

Subsample (2): Before GFC, Januray 1999 - August 2008 (116 obs.)

Dependent variable	α_i	$\beta_{i,t}$	R^2	adj.R^2
$SV - R_m$	−2.286***	3.199***	0.065	0.057
	[0.702]	[0.766]		
$BV - R_m$	−0.429	1.658	0.012	0.004
	[0.836]	[1.271]		
$MV - R_m$	−1.349**	2.533***	0.043	0.034
	[0.681]	[1.066]		
$SG - R_m$	0.263	2.323	0.002	−0.007
	[0.777]	[3.808]		
$BG - R_m$	0.601	4.507	0.023	0.015
	[0.835]	[3.501]		
$MG - R_m$	−0.158	0.665	0.000	−0.009
	[0.643]	[2.885]		

Table 4: Continued

Subsample (3-1): After GFC excluding Covid-19: September 2008 - December 2019 (136 obs.)

Dependent variable	α_i	$\beta_{i,t}$	R^2	adj.R^2
$SV - R_m$	-2.985^{***}	3.485^{***}	0.059	0.052
	[1.068]	[1.133]		
$BV - R_m$	-3.125	4.368	0.050	0.043
	[1.976]	[2.758]		
$MV - R_m$	-2.801^{*}	3.904^{*}	0.067	0.060
	[1.410]	[2.037]		
$SG - R_m$	2.150^{**}	5.227^{**}	0.020	0.012
	[0.850]	[2.295]		
$BG - R_m$	0.081	0.528	0.001	-0.007
	[0.452]	[1.452]		
$MG - R_m$	1.059^{*}	2.785^{*}	0.014	0.006
	[0.591]	[1.709]		

Subsample (3-2): After GFC including Covid-19, January 2008 - March 2021 (151 obs.)

Dependent variable	α_i	$\beta_{i,t}$	R^2	adj.R^2
$SV - R_m$	-0.639	1.022	0.007	0.000
	[1.520]	[1.598]		
$BV - R_m$	-0.738	1.219	0.007	0.000
	[1.603]	[2.169]		
$MV - R_m$	-0.313	0.774	0.005	-0.002
	[1.434]	[1.855]		
$SG - R_m$	1.687	3.947	0.011	0.005
	[0.961]	[2.608]		
$BG - R_m$	-0.634	-1.588	0.008	0.001
	[0.633]	[1.973]		
$MG - R_m$	0.341	0.715	0.001	-0.006
	[0.804]	[2.360]		

Table 5: Attribution of HML Factor Returns

Size	Valuation	Total Return (%)	Revaluation Premium (pps)	Structural Premium (pps)	Income Yield (pps)	Migration (pps)
(1) 1977:9-1998:12						
Small	Value-Growth	10.4	−2.4	12.9	−15.1	28.0
Big	Value-Growth	11.1	−3.0	14.0	−8.8	22.8
Average	HML	10.8	−2.7	13.5	−11.9	25.4
(2) 1999:1-2008:8						
Small	Value-Growth	11.8	2.9	8.9	−11.5	20.4
Big	Value-Growth	14.4	3.5	10.9	−17.0	27.9
Average	HML	13.1	3.2	9.9	−14.2	24.1
(3-1) 2008:9-2019:12						
Small	Value-Growth	4.4	−6.2	10.6	−10.0	20.5
Big	Value-Growth	5.3	−6.1	11.4	−10.4	21.8
Average	HML	4.9	−6.1	11.0	−10.2	21.2