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Bruce Hearn
University of Bradford and University of Southampton

Igor Filatotchev
King's College London and Vienna University of Economics and Business

Marc Goergen
IE Business School and ECGI

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Keywords: CAPM, free float, ownership and control, investor protection, Japan, USA

JEL Classifications: G11, G12, G15, O55

Bruce Hearn*
Professor (Chair) in Accounting & Finance
University of Bradford
Bradford
West Yorkshire, BD7 1DP, UK
phone: +44 1274 234015
e-mail: b.hearn@bradford.ac.uk

Igor Filatotchev
Professor of Corporate Governance and Strategy
King's College London
30 Aldwych
London WC2B 4BG, UK
phone: +44 2078365454
e-mail: igor.filatotchev@kcl.ac.uk

Marc Goergen
Professor of Finance
IE Business School, Department of Finance
María de Molina 11
28006 Madrid, Spain
phone: +34 917 875 182
e-mail: marc.goergen@ie.edu

*Corresponding Author

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Bruce Hearn*

University of Bradford, School of Management, University of Bradford, Bradford BD7 1DP, UK, and University of Southampton, UK
Email: b.hearn@bradford.ac.uk
Tel: +44 1274 234015

Igor Filatotchev

King's Business School, King's College London, Bush House, 30 Aldwych, London WC2B 4BG, UK,
and Vienna University of Economics and Business, Austria
Email: igor.filatotchev@kcl.ac.uk
Tel: +44 2078365454

Marc Goergen

IE Business School, IE University, Madrid, Spain, and
European Corporate Governance Institute, Brussels, Belgium
Email: marc.goergen@ie.edu
Tel: +34 91 787 51 82

Abstract

We explore differences in the levels of dispersed ownership that lead to a second returns-based free float hedging factor, which augments the capital asset pricing model (CAPM) in explaining the cross-section of stock returns. Using a comprehensive sample of stocks from Japan and the constituents of the S&P1500 in the US between 2000 and 2020, the results support the advantages of our proposed two-factor CAPM over alternative models based on liquidity, size, and book to market value, as well as momentum. We further document dispersed ownership premiums for Japanese regional stocks and discounts for the blue-chip Tokyo counterparts.

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1 Introduction

Dispersed ownership is fundamental to the Anglo-American governance model centered on shareholder value (Iliev, Lins, Miller, and Roth, 2015), which dominates international investment norms. In turn, its systematic variation across firms and countries is an outcome of heterogeneity in investor protection at both the national institutional (La Porta, Lopez-de-Silanes and Shleifer, 1999; La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 2000; Doidge, Karolyi, and Stulz, 2007) and firm levels (Cremers and Ferrell, 2014), with greater levels of protection favoring a greater dispersion of ownership. Consequently, we propose an additional single, free float factor for the traditional capital asset pricing model (CAPM). This factor considers firm level dispersed ownership available and accessible to outside minority investors. The intuition behind this factor is based on Hearn, Phylaktis, and Piesse (2017), who highlighted the importance of accounting for formal institutional quality when explaining stock returns across countries. However, their study is predominantly focused on international comparisons thereby overlooking much of the fine-grained detail of heterogeneity in investor protection within countries.

Our focus on the US and Japan draws on the size of both economies, which form ideal contexts within which to study the degree of capital market integration using a more fine-grained, firm-level measure relating to dispersed ownership, or free float. We argue that this is determined by the cumulative influence of explicit and implicit barriers to national capital market integration. Errunza and Ta (2015: 1135) suggest that "explicit barriers include ownership restrictions, whereas implicit barriers encompass institutional, informational, governance, and market development variables (e.g., market size, liquidity, and regulations)". Our firm level free float measure overcomes shortcomings in previous studies related to aggregation bias from measuring integration at industry (e.g., Bekaert, Harvey, Lundblad, and

Siegel, 2011) or country levels (e.g., Carrieri, Chaieb, and Errunza, 2013). It also captures the cumulative influence on dispersed ownership by explicit and implicit barriers thereby avoiding thorny issues of interdependencies between them. These barriers include significant variation in communitarian culture (Choi, Park, and Yoo, 2007), political economy, and corporate governance (Pan and Zhou, 2018), as reflected in extensive cross-shareholdings of firms across Japan, which is very different from the US.

Our two-factor free float augmented CAPM model is tractable and theoretically parsimonious as it relates asset pricing to underlying characteristics of firms based on a single measure of ownership. This forms our first contribution to the literature. The simplicity of our approach addresses recent critiques of the asset pricing literature, which suffers from an ever-increasing number of "horse race" studies (e.g., Fama and French, 2015, 2018), applying different factors drawn from an increasing number of balance sheet financial ratios. This has led scholars such as Cochrane (2011) to refer to them as a "zoo" of factors. A related concern is the increasing number of factors jointly included in asset pricing models. Due to its theoretical derivation, our measure circumvents potential data mining issues related to the use of a plethora of new factors based on balance sheet ratios. Our measure rationalizes differences in minority investor welfare across the cross-section of stock returns being attributable to underlying insider and block owner motivations towards expropriation and potential infringements of minority investor rights. Our model addresses these concerns as it is a simple two-factor free float augmented CAPM. Our free float metric is based on Fama and French (2018). We subject it to a battery of asset pricing tests using the traditional CAPM and its variants. These are the single-factor CAPM; the Fama and French three-factor (henceforth FF3F) CAPM, which includes size and book-to-market terms; the Carhart (1997) four-factor CAPM, which adds a momentum term

to FF3F; and the liquidity-augmented CAPM (Liu, 2006). We also subject our proposed two-factor free float augmented CAPM and its time-varying equivalent to the Kalman filter method (Grout and Zalewska, 2006) and evaluate their performance.

The results suggest that there is an unpriced premium associated with free float. This premium is reflected in statistically significant alphas in all the augmented CAPMs and their time-varying parameter equivalents. The focus of our study is the Japanese equity market, comprised of a comprehensive sample of 2,988 listed firms from all five regional securities exchanges, alongside its US counterpart, which is comprised of the constituents of the US Standard & Poor's (S&P) 1500 benchmark index. For Japan, we include the Tokyo Topix 2000 constituents, as well as all primary listed firms from Osaka's Jasdaq, and the Sapporo, Fukuoka, and Nagoya exchanges. The sample time frame is January 2000 to June 2020. Japan and the US form ideal laboratories within which to test our new free float augmented two-factor CAPM since, while being the first and third largest economies in the world, they exhibit considerable heterogeneity in terms of corporate ownership (Anderson, Mansi, and Reeb, 2003; Anderson, Duru, and Reeb, 2009) or exhibit characteristics that collectively account for significant variation in the levels of dispersed ownership or free float. This is especially true of Japan where corporate governance is largely shaped by powerful cultural factors emphasizing extensive networks of cross-shareholdings (Franks, Mayer, and Miyajima, 2014; Pan and Zhou, 2018). Our study is the first of its kind to provide a comparison between liberal market and coordinated economies in terms of their firm level ownership-based governance arrangements. This is our second contribution to the literature.

Our empirical evidence reveals consistent variation in levels and types of block owner across free float sorted decile portfolios as well as across both the Japanese and US aggregate

market universes. Notably for Japan, there are premiums associated with free float for the stocks from the regional exchanges of Sapporo, Fukuoka, and Nagoya, while there are corresponding discounts on the top tier blue chip market segments of Tokyo's Core30, Topix70, and Topix Mid400 constituents. The former in being more peripheral are subject to elevated cultural embeddedness in governance arrangements while the latter in Tokyo are subject to increased international influence both through the scope of firms' operations and the presence of foreign investors.

The paper proceeds as follows. Section 2 outlines the theoretical framework, including the institutional characteristics of the Japanese and US corporate governance environments. Section 3 describes the sample selection and data sources. Sections 4 and 5 discuss the data and summary statistics and outline the techniques used to construct the factor mimicking portfolios, henceforth FMPs. Section 6 reviews the results from the time-invariant augmented CAPM models and their time-varying parameter counterparts. The final section concludes.

2 Theory

Our proposed factor is based on the notion of perfectly integrated capital markets by incorporating the assumption of mild segmentation (Errunza and Losq, 1985; Giannetti and Koskinen, 2010) through heterogeneity in minority investor protection (Giannetti and Koskinen, 2010). To capture minority investor protection, we use a proxy, i.e., the percentage of "free float" capitalization, namely that proportion of the issued shares that are not tied up in concentrated block holdings and that are accessible for immediate trading. The "free float" therefore captures the degree of adoption of the Berle and Means (1932) dispersed shareholder

ownership model by the firm, central to Anglo-American shareholder value governance (Cremers and Ferrell, 2014) and increasingly dominant in international capital markets.

La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) and La Porta et al. (1999) argue that the level of dispersed ownership, mirrored by the underlying level of concentrated ownership, varies in accordance with the quality of protections afforded to minority investors, via the firm's own governance commitments as well as national institutional support. There is some consternation in the literature about the role of block owners within firms. On the one hand, their more concentrated holdings underscore the greater amount of their wealth at stake of potential expropriation by incumbent block holders, which motivates their being more effective monitors (Jensen and Meckling, 1976; Fama, 1980), which would also benefit minority investors. On the other hand, these potential monitoring benefits are more than offset by the downside risks associated with their owners' preferential access to information within the firm that is largely unavailable to widely dispersed and predominantly disenfranchised minority owners (Iliev, Lins, Miller, and Roth, 2015). These risks are particularly pronounced in the presence of insider, as opposed to outsider, block ownership where this concentrated control in the hands of the insiders faces little credible resistance from powerless minority outsiders. There is a range of additional arrangements that accentuate control rights over the cash flow entitlements associated with direct ownership holdings, namely pyramiding and cross-shareholdings (Khanna and Yafeh, 2007)[1].

Our approach draws on the preceding views of the restricted CAPM of Errunza and Losq (1985), Merton (1987), and Heinkel, Krauss, and Zechner (2001), which emphasizes the implications arising from a subset of investors within a given universe. Central to these studies is the assumption that at any given time there is a finite number of listed firms alongside a finite pool of investors. Following Giannetti and Koskinen (2010), we argue that two categories of

[1] Note that we exclude firms with dual class shares from our analysis.

investor exist, with these being controlling block owners and outside minority owners. These earn two payoffs arising from shares. The first is attributable to all security holders in the form of dividends and capital gains, while the second is preferential access to private benefits that accrue only to the controlling block owners.

Our model focuses on the welfare implications for minority portfolio investors arising from the need to diversify by optimizing portfolios that draw on a wide cross-section of stocks from weak to strong investor protection firms, where this is reflected in their level of free float. Critically, the mild segmentation assumption implies that arbitrage trading is impeded by closing price differentials occurring within the market, leading to the assumption that prices are determined locally by the laws of supply and demand (Errunza and Losq, 1985; Heinkel et al., 2001). Therefore, we argue that at low levels of investor protection, firms' ownership will be concentrated with minimal free float. The lower supply of available shares on to the market, as free float, is offset by a reduced demand from minority portfolio investors who are cautious of the downside risks associated with buying into such firms. This leads to lower prices for the shares of firms with reduced free floats, and ultimately higher expected returns to compensate minorities for holding such stock. Conversely, where investor protection is high then similarly free float is high too. This leads to a reduction in the holdings of block owners since the improved investor protection renders expropriation prohibitively costly. Therefore, the capital gains associated with the traded shares will be distributed mostly to minority owners, with this leading to an accentuated demand for the shares. This drives up stock prices as the reduced risk of expropriation by block owners is reflected in lower expected returns associated with the lower downside risk.

Our model considers a continuum of investor protection ranging from weak to strong, mirrored by free float ranging from small to large. However, we implicitly consider a notional average level where minority investors expect a premium when participating in weak investor protection (low free float) stocks and a discount when participating in high investor protection stocks (high free float). These differences lead us to anticipate a persistent difference in the cross-section of stock returns, attributable to the free float. Next, we consider the application of this theory on to the national capital markets of Japan and the US.

The corporate governance landscape of Japan and the US

Japan's corporate governance landscape is defined by a juxtaposition between formal legal, judicial, and governmental institutions modelled on their Western counterparts on the one hand, and a powerful communitarian culture emphasizing mutual reciprocity and dense social networks on the other (Mitchener and Ohnuki, 2009). Franks, Mayer, and Miyajima (2014) argue that there have been consistently high levels of dispersed ownership throughout the twentieth century. Nevertheless, there has been a fundamental transition from family control over *zaibatsu* (財閥) conglomerates of firms, accompanied by outsider block ownership in the first half of the last century to a wholly insider-orientated system in the later half centered on bank and insurance company control. The authors argue that, despite the underdeveloped legal system and the absence of formalized protections, investor protection was strong through family control and outside investors were sufficiently protected to be able to actively participate in firms. However, as reforms took hold through the middle and later part of the twentieth century, family involvement diminished alongside a strengthening of formalized protections in the form of the legal system. Notably, banks and insurance companies stepped into the cultural mold or

template of extended family firm constellations. The important takeaway from this is that while levels of dispersed ownership were consistently high, this was despite the underlying system being inherently network-based and centered on expansive conglomerates. The immediate aftermath of WW2 saw the transition of former *zaibatsus* into modern *keiretsus* (系列) where these expansive networks now overwhelmingly dominate the top 200 listed firms on Japan's largest stock exchange in Tokyo.

The pressures on larger, more internationally orientated firms listed on the country's largest stock exchange, Tokyo, underscore their elevated adoption of the Berle and Means (1932) dispersed ownership model of corporate governance (Securities Market in Japan, 2018). This is despite the overwhelming majority of these larger firms being constituents to *keiretsus*. However, across much of the wider economy powerful cultural factors have led to the existence of extensive and dense networks of cross-shareholdings (Aggarwal, 1994; Mitchener and Ohnuki, 2009). Individual firms are typically interwoven into a dense network of cross-ownership with suppliers, customers, and wider external stakeholders, including banks or insurance companies. While this promotes monitoring by banks within the cross-shareholding networks, facilitating lending, it also engenders wider monitoring by peer group firms and external constituencies, with this mirroring contractual governance and forming a durable and sustainable social and economic welfare system (Mitchener and Ohnuki, 2009). Consequently, smaller firms on the largest stock exchange, Tokyo, alongside their counterparts on Osaka's small and medium enterprise exchange, Jasdaq, and across the more distant regional exchanges are much more embedded within the cultural context. These are markedly less likely to follow the dispersed ownership governance model, reflected in lower free float capitalization. Collectively, these influences have led to a heterogeneous corporate governance landscape across Japan with a number of

distinct regimes present (Yoshikawa, Tsui-Auch, and McGuire, 2007; Sohn, 2008). At the polar extremes are the dispersed ownership model embedded in Anglo-American shareholder value governance versus the Japanese insider-orientated system based on extensive cross-shareholdings. Together, these arguments support free float as a metric, which parsimoniously captures differences in underlying governance. This is reflected in the degree of contextual embeddedness of firms, such as levels of cross-shareholdings vis-à-vis their international orientation and the consequent adoption of the dispersed ownership model.

Similarly, a significant minority of small and medium sized US firms have concentrated ownership, typically by entrepreneurial founders, the state, and families or other block owners (Anderson, Mansi, and Reeb, 2003; Anderson, Duru, and Reeb, 2009). These too are extensively embedded within the indigenous economy of the US. Anderson et al. (2003) cite over one third of all S&P500 constituents having high levels of block ownership by families. More generally, across the US and particularly amongst the larger firms in the US ownership is widely held or dispersed (Aminadav and Papaioannou, 2020). Shleifer and Vishny (2012:743) argue that "[in] the United States, the role of courts is more extensive than anywhere else in the world……" in terms of effective protection afforded to minority investor property rights, where this is supportive of dispersed owners having legal recourse from disenfranchisement by insiders. This evidence from the US also points toward the percentage free float in being indicative of the level of firm adherence to the dispersed ownership model – where this systematically varies across listed firms and the wider economy.

Together, these theoretical arguments point toward the assumption that welfare losses arising from minority investor diversification between firms with high and contrastingly low proportions of free float capitalization are reflected in a premium.

3 Sample selection and data sources

Our final sample is the outcome of a series of screening stages, first at the market level, then in terms of data availability, and finally at the individual stock level. All data are exclusively sourced from Refinitiv Datastream. In terms of the four smaller regional exchanges in Japan, namely Sapporo, Nagoya, Fukuoka, and Osaka's Jasdaq, we source data on all primary listed firms. However, for the Tokyo based market of the Japan Exchange, we source data on the constituents of the various TOPIX indices given the size of this market. Therefore, we include the elite blue-chip constituents of TOPIX30 and TOPIX70, and then the remaining four hundred listed firms that form TOPIX500. Next, we include the remaining five hundred listed firms' constituent to TOPIX1000, followed by the remaining one thousand listed firms' constituent to the TOPIX2000 index. Constituency of the TOPIX2000 index includes the majority of firms listed on the first and second sections of the Japan Exchange's main market.

For the US, we include all the listed US firms that are constituent to the S&P1500 benchmark index. Additionally, we disaggregate this into listed firms constituent to the large cap S&P500, the mid cap S&P400, and finally the small cap S&P600 indices that comprise the aggregate S&P1500 index.

Stocks are screened on the basis of their inclusion in major local blue-chip indices, in the case of Tokyo and the US equity markets, where constituent lists are maintained within Datastream (see Appendix Table 1). Note that we exclude foreign firms. We use the constituent stocks of blue-chip indices as these conform to international, and to a lesser extent domestic, investors' "investability" requirements, in terms of marketability and accessibility (minimal foreign ownership restrictions), while at the same time avoiding the thorny issue of imposed bias

from pre-screening stocks based upon pre-determined minimum price criteria. This price pre-screening is evident in the study of Hou et al. (2011) focusing on a sample of 49 countries. The use of the blue-chip index constituent stocks also facilitates conformity with asset diversification assumptions regarding asset market integration, which is essential to the CAPM, and thus avoids thorny issues regarding intra-market segmentation, which is particularly prevalent in very large stock markets.

The data are from January 2000 to June 2020. The data include single class ordinary shares only and excludes preference shares, dual class shares, warrants, convertibles, REITs, closed-end funds, exchange traded funds, and depository receipts. Finally, following Ince and Porter (2003), any return above 300% that is reversed within one month is treated as *missing*, that is, if R_t or R_{t-1} is greater than 300%, and $(1 + R_t)*(1 + R_{t-1}) - 1 < 50\%$, then both R_t and R_{t-1} are set to *missing*.

Following Hou, Karolyi, and Kho (2011), we ensure the accounting ratios are known before the returns and thus match the end of year financial statement data for year t-1 with monthly returns from July of year t to June of year t + 1. We use the inverse of the market-to-book-ratio (see Appendix Table 2) to calculate the Book to Market Value ratio. In addition, size is defined as the market value of equity at the end of June of year t, while momentum (Mom) for month t is the cumulative return from month t – 6 to month t – 2, skipping month t – 1 to avoid microstructure biases such as bid-ask bounce or non-synchronous trading (Roll, 1984).

The final sample comprises 2,988 common stocks from the three independent Japanese regional markets of Sapporo, Nagoya, and Fukuoka, and then the two Japanese exchange markets of Osaka's Jasdaq and Tokyo's equity market, the latter including all the constituents of the TOPIX blue-chip indices. Additionally, the US market, based on the constituents of the

S&P1500 benchmark index, comprises 1,506 common stocks. These have been further disaggregated into the three constituent blue chip indices of the S&P500, S&P400, and S&P600. In turn, a distinction is being made between stocks listed on the New York Stock Exchange (NYSE) and those listed on Nasdaq.

Figure 1 shows the distribution of the sample of Japanese companies over the period January 2000 to June 2020. One observation is immediately apparent, which is that the sample is visibly comprised of three categories of stocks. The first of these is "small cap", which comprises approximately 59% of the sample. It includes predominantly small and medium enterprises (SMEs) constituent to the bottom 1000 of the TOPIX2000 index, as well as Osaka's Jasdaq market. Next is the sizeable "mid cap" category, accounting for 31% of the sample and comprising Tokyo's 400 stocks constituent within the TOPIX500 but outside the top 100, alongside the bottom 500 stocks within Tokyo's TOPIX1000 index. The final, third category is all the smaller markets and segments, with these including Sapporo, Nagoya, Fukuoka, and Tokyo's large cap TOPIX30 and TOPIX70 where these together account for the remaining 10% of the sample size. Figure 2 shows the evolution of the universe over time, showing a gradual and steady increase by 1000 stocks over the 20-year sample time frame.

Figures 1 and 2

We also construct a similar figure documenting the evolution of our US sample and this is not displayed due to brevity concerns[2]. This reveals a relatively even dispersion of sample stocks across the NYSE and Nasdaq and across each of the three benchmark indices, namely the S&P500, S&P400, and S&P600. A second plot of the cross-section of stocks per month shows a

[2] These are Figures 1 and 2 in the Online Supplementary Appendix.

gradual increase in sample size of approximately 500 additional stocks across the 20-year sample time frame.

Free float metric

We define free float as the mean monthly percentage of free float shares for each primary listed firm in a given securities market. We only include primary listings to avoid potential double counting, given many of the listings in the three smaller Japanese regional markets of Sapporo, Fukuoka, and Nagoya are also listed in Tokyo or Osaka. Additionally, our focus on primary listings reflects a version of the "bonding" hypothesis of Coffee (1999, 2002) and Charitou, Louca, and Panayides (2007), whereby firms are institutionally tied to the governance arrangements associated with the location of their primary listing.

Free float shares are the percentage of total issued shares of the firm not held by block holders. Information on the percentage free float is easy to access for a wide cross-section of stocks and is used here. Transparency in reporting such ownership in Japanese firms is amongst the highest worldwide, which mitigates concerns over the sheer complexity of what is often a myriad of intricate cross-shareholdings characterizing such firms. Datastream categorizes block holders into the following seven types: government, cross-shareholding networks, pension funds, investment companies, employees and family, other block entities, and foreign block holders (see Appendix Table 2). Prior to August 2009, data on shareholdings and free float was reported on a monthly basis, but more recently it is reported on the 10^{th} and 30^{th} of each month. One further point should be noted, namely that after April 2005 the SEC threshold of 5% in defining block ownership was universally adopted and applied worldwide by Datastream.

4 Descriptive statistics

A number of distinct trends are apparent across both the Japanese (panel 1) and US (panel 2) sub-samples in Table 1. The first is that in progression from large cap stocks, such as Tokyo's Core 30 and the US S&P500, through to their mid-cap then small cap counterparts, where in Japan this is Osaka-Jasdaq, Fukuoka, and Sapporo, and in the US this is the S&P600, the percentage free float reported in the first column decreases. This trend is more pronounced in Japan than in the US, where it is visibly accompanied by systematic co-trends in variation amongst the three largest ownership categories. In Japan, the progression from large to mid to small cap is accompanied by an increase in both the "cross-shareholding network" and "employee/ family" ownership categories, while a gradual decrease in "investment company" ownership is visible. It is also notable that the overwhelming majority of block ownership in Japan is accounted for by the first two categories with the third category, namely "investment company" accounting for minimal holdings across Japan. A very different picture is apparent in the US, where "cross-shareholding network" ownership is minimal compared to Japan with no visible trend. Conversely, "employee/ family" and "investment company" ownership increase substantially in progression from the large to mid to small cap indices, namely from the S&P500 to S&P400 and then S&P600. Moreover, the US equity market is dominated by holdings by the "investment company" category. Together, this evidence substantiates the differences in the corporate governance regime between the two countries, where Japan is more network-based while the US is market-orientated and based on the dispersed shareholder model.

In terms of the last five columns, which report trading statistics, in Japan (panel 1) there is a visible transition from large to mid to small cap, with the average market capitalization and momentum substantially decreasing while there is a corresponding increase in the book to

market value ratio, monthly returns, and the Liu (2006) illiquidity metric. This is consistent with the smallest cap firms, namely the constituents of the TOPIX 1000 excl. 500 and the TOPIX bottom 1000, being SME firms that are more contextually embedded within local institutional frameworks and that exhibit the greatest informational asymmetries. Similarly, in the US (panel 2) there is a transition from large to mid to small cap listing segments accompanied by a steady reduction in market capitalization and momentum while the book to market value ratio steadily increases.

Transitions across the progressively smaller and more peripheral regional securities exchanges are also apparent. The Osaka-Jasdaq exchange is the largest, focusing on the SME financing market for the metropolitan Osaka prefecture and wider Kansai region in central Japan. Its trading statistics are largely comparable to those of the Tokyo SME constituents to TOPIX bottom 1000, although notably it has almost double the illiquidity. Of the remaining three fully independent securities exchanges, there is a progressive increase in the average book to market value ratio and illiquidity from Nagoya to Fukuoka, and finally Sapporo, alongside a corresponding decrease in momentum. This transition mirrors the much greater contextual embeddedness of each exchange's own governance arrangements.

Finally, in the US universe we considered differences within each of the S&P500, S&P400, and S&P600 indices according to stocks listed on the NYSE as opposed to Nasdaq, where the constituents of the former have a higher market capitalization, percentage free float, and book to market value ratio than their latter counterparts. This contrast is reflective of the more outwardly focused internationally orientated blue-chip stocks, listed in New York, as opposed to the smaller SME firms, predominantly listed on Nasdaq. A similar picture is visible in Japan where the internationally orientated blue-chip stocks of Tokyo's Core30 and TOPIX70

indices are markedly different in terms of their ownership and trading statistics than their counterparts listed on the smaller regional exchanges where these are more contextually embedded.

Table 1

5 Factor mimicking portfolios

5.1 Value effects in Japan and the US

The long-standing intuition (see Liu, Stambaugh, and Yuan, 2019) regarding value effects is that these scale a firm's equity price by a predominantly accounting, or balance sheet derived, fundamental through its impact on expected returns. A scaled price is viewed as an effective proxy for the expected return, i.e., a higher (lower) expected return implies a lower (higher) current price.

In this sub-section we undertake a horse-race style comparison among valuation ratios through an application of cross-sectional Fama and MacBeth (1973) regressions of individual monthly stock returns on the ratios. This exercise serves as a pre-screening differentiation of the most likely candidate ratios to be included in later asset pricing tests. The selection of the ratios to be included in the tests is made on the basis of data availability and suitability for the heterogeneity of the sample. First, we include a pre-ranking CAPM beta (β) estimated on the rolling window of the past year's daily returns, alongside the firm's market capitalization (size) and book to market value ratio, as well as momentum. We then include Liu's (2006) trading speed measure of liquidity and finally the percentage free float.

Table 2 reports the average slopes from the month-by-month Fama-MacBeth regressions. Across both panels 1 (Japan) and 2 (US) and across all columns, β does not enter significantly.

In contrast, and across both panels 1 and 2 in models (2) to (8) the natural logarithmically transformed size variable, "log ME", enters with a significantly negative coefficient. These results confirm a consistent size effect across both Japan and the US.

Columns (3) to (7) of both panels 1 and 2 in Table 2 report results when each valuation ratio is included recursively in its own regression. In particular, in columns (3) and (4), the natural logarithm of the book to market value ratio, "log BM", enters with a significantly positive coefficient, where this signifies an effect attributable to the persistent differences between accounting and market valuation of stocks across both Japan and the US. However, the addition of momentum in column (4) lacks any significance, implying the lack of a momentum effect in the valuation of stock returns across Japan and the US. This evidence is so far consistent with prior findings for the US by Fama and French (1992), as well as more recently by Liu, Stambaugh, and Yuan (2019).

Next, we consider the addition of the Liu (2006) liquidity metric on top of size and β in column (5). Across panels 1 and 2, in column (5) there is a highly significant association with the Liu (2006) trading speed metric, which is negative for Japan (panel 1) and positive for the US (panel 2). Additionally, we recursively include the Amihud (2002) price impact liquidity measure and the volume-based turnover metric, where both lack the statistical significance of the Liu (2006) metric, thereby confirming the superiority of the Liu metric in later asset pricing tests [3].

Finally, columns (6) and (7) of Table 2 report the results of the inclusion of the percentage of free float ("Free Float") first in conjunction with both beta and the size effect in column (6) and then without the size effect in column (7). Some observations are apparent. In column (6), log ME is highly significant while Free Float is barely significant. Also, Free Float

[3] These results are not displayed due to brevity but are available in Table 2 of the Online Supplementary Appendix.

changes its sign from column (6) to column (7) in panel 1 (Japan). This suggests that Free Float might just be a proxy for size as once size is excluded, Free Float takes on the sign of size. Interestingly, there is no such change in sign for the US. This can be rationalized since firms' issuance of shares is relatively unrelated to the percentage of either closely held shares or that available for trading at any given time in the US. However, the opposite is true for Japan, where institutionalized cultural inhibitions toward external contracting given the inherently networked economy and the dominance of cross-shareholdings amongst firms implies individual firms will seek to raise less capital from a stock market listing. This is reflected in lower levels of shares issued and associated market capitalizations, while a much greater proportion of what little is issued will be closely held and will therefore be unavailable for free float. As a consequence, we only include Free Float in the two-factor asset pricing models and avoid any three- or multi-factor augmentation through an initial double-sort with size. Moreover, it is notable that there are very low correlations between free float and size for the entire sample and for both the disaggregated Japan and US universes. However, this evidence justifies our inclusion of a new valuation factor formed from the residuals of a regression of free float on size within later asset pricing tests.

Table 2

5.2 The construction of factor mimicking portfolios (FMPs)

To study the influence of factors such as size, book to market value, momentum, liquidity, and free float on the variation of stock returns, we follow Fama and French (1993) in constructing returns-based proxies using zero-investment portfolios. These portfolios go long on stocks with high values of a given characteristic and short on stocks with low values for that characteristic.

We use the time-series regressions of Black, Jensen, and Scholes (1972), following Fama and French (1993) and more recently Liu (2006) and Hearn et al. (2017), to assess the pricing implications arising from the liquidity and investor protection metrics. In this approach, the excess returns on the test portfolios are regressed on the returns of FMPs. The time series slopes are interpreted as factor loadings that inform how various combinations of these FMPs explain the average returns across the portfolios. We form market portfolios based on both equal and value weighted returns of all stocks within a universe at a given time and use the yield on the 10-year US Treasury bill as our risk-free rate.

We use two different techniques to form the FMPs. The first relies on a double sort, where stocks are sorted according to their size into five quintile portfolios, where each is then further sorted according to the book to market value of the constituent stocks into five more portfolios. This 5x5 double sort procedure results in twenty-five quintile portfolios. At any time, those stocks with missing values for either characteristic are omitted, as are stocks with negative book to market values. FMPs relating to size are created from average returns on small size portfolios minus those on big size portfolios (SMB factor) and similarly with high book to market value portfolios minus low book to market portfolios (HML factor). Portfolio rebalancing takes place annually in June, following Fama and French (1993). The SMB and HML factors are formed from value-weighted returns.

The second technique involves sorting stocks into ten decile portfolios based on momentum, defined as the cumulative return over the preceding six months. The FMP for momentum follows the Jegadeesh and Titman (1993) six-month/six-month strategy, where monthly returns are an equally weighted average of six individual strategies of buying the

winning decile portfolio and selling the losing decile portfolio. Rebalancing occurs monthly[4]. In order to minimize the bid-ask bounce effect, we skip one month between ranking and holding periods when constructing the momentum FMP. This FMP is formed from equal-weighted returns.

Both the liquidity and free float FMPs are created by ranking stocks by their liquidity metric (Liu, 2006) and then by their free float percentage. This single pass procedure involves monthly rebalancing, with annual holding periods. Each is sorted into ten decile portfolios and the FMP formed from the returns difference between high illiquidity (low free float) decile portfolios and low illiquidity (high free float) decile portfolios. Then, the FMPs are created based on annual rebalancing each December, as in Liu (2006). An additional procedure was also undertaken involving monthly rebalancing, with annual holding periods for both liquidity and free float with the FMP returns formed from the averages across each of twelve annually held liquidity FMPs, similar to the method used for the momentum portfolio in Jegadeesh and Titman (1993)[5]. This was also used as a robustness check in Liu (2006).

5.3 Descriptive statistics of factor mimicking portfolios

The means, standard deviations, autocorrelations, and cross-correlations of the monthly returns of the FMPs using the entire Japanese universe are reported in Table 3. Several observations are apparent. The first in panel 1 is that the largest average monthly returns are also those with the highest statistical significance. The excess returns of the market portfolio are 1.01% (t-statistic: 3.02; $p \leq 0.01$), while those of SMB (size) and HML (book to market value ratio) are 0.67% (t-

[4] That is, the momentum FMP return for January 2001 is 1/6 of the return spread between the winners and losers from July to November 2000, 1/6 of the return spread between winners and losers from June to October 2000, etc.
[5] That is, the liquidity FMP return for January 2005 is formed from 1/12 of the return spread between high liquidity ranked stocks and low liquidity ranked stocks for January 2003 through January 2004, 1/12 of the return spread between high and low liquidity stocks for February 2003 through February 2004, etc.

statistic: 2.84; $p \leq 0.01$) and 0.62% (t-statistic: 3.29; $p \leq 0.01$), respectively, those of the free float FMP (1-year rebalancing) are 0.60% (t-statistic: 3.33; $p \leq 0.01$) and (1 month rebalancing) 0.59% (t-statistic: 3.32; $p \leq 0.01$). Also, these specific FMP return distributions largely conform with statistical normal distributional assumptions as evidenced by their very low skewness, kurtosis near to a value of 3, and extremely low Jarque-Bera statistics.

Contrastingly, for the liquidity FMPs formed on both 1-year and 1-month rebalancing as well as the momentum and FMP returns are very low, with at best minimal statistical significance in the case of liquidity (t-statistic: 1.29; $p \leq 0.10$) and lacking significance in the case of momentum. The returns distribution of the momentum FMP also has a high Jarque-Bera statistic, indicating a lack of conformity with statistical normality, with this being accompanied by high levels of kurtosis (or "fat tails" of the distribution). Importantly, we also find very similar evidence regarding the various FMPs for the US market universe[6]. Together, and across both the Japan and US universes, the evidence indicates strong support for potential premia associated with the market factor, as well as the FMPs for size, book to market value, and free float. In contrast, there is very little support for the FMPs associated with momentum and liquidity.

Analysis in panel 2 of the correlations of annual with monthly liquidity (0.991, $p \leq 0.01$) and annual with monthly free float (0.995, $p \leq 0.01$) FMPs reveals almost perfect correlation, implying these FMPs are effectively capturing the same underlying factors. This led us to omit the monthly FMPs while retaining their annual counterparts. Finally, in panel 3, concerns regarding autocorrelations are mitigated due to their low absolute size and negligible statistical significance over the 1, 6, and 12 month lagged periods.

Table 3

[6] These results are not reported for brevity here but are provided in Table 1 of the Online Supplementary Appendix.

5.4 Descriptive statistics of free float portfolios

Detailed descriptive statistics for each of the ten free float sorted portfolios drawn from both the Japanese and the US universes are reported in Table 4. The distribution of stocks across the free float decile portfolios in Japan in panel 1 reveals that there is an increasing concentration of stocks drawn from Tokyo's blue chip TOPIX30, TOPIX70, TOPIX Mid400, and even the TOPIX1000 excluding the top 500 in the highest free float deciles D8 to D10. Contrastingly, the TOPIX bottom 1000 stocks are much more evenly distributed across all ten free float sorted deciles. As expected, the concentration of stocks is in the opposite direction toward the lowest free float deciles (D1 to D3) for each of the regional exchanges. This is especially apparent for Osaka's Jasdaq but also Nagoya, Fukuoka, and Sapporo. This evidence points strongly to the more international orientation of Tokyo listed firms, with these being much more heavily influenced by prevailing international norms of governance. Conversely, in the Japanese regions there is a much stronger regional influence, leading to significantly lower levels of dispersed ownership.

The evidence from panel 2 of Table 4 regarding the distribution of stocks across the US S&P500, S&P400, and S&P600 – and for each index between the NYSE and Nasdaq listings – reveals similar distribution patterns. Here, for each index stocks listed on the NYSE progressively concentrate in higher free float deciles (D8 to D10) while the opposite is true for stocks listed on Nasdaq in the S&P400 and S&P600 indices. This is reflective of Nasdaq listed firms being more growth orientated firms with more volatile earnings, in contrast to their more stable counterparts listed on the NYSE. In addition, Nasdaq is primarily a dealer market, having an average of 14 market making brokers per listed stock as compared to NYSE's single

designated and contractually obliged market maker per stock. Consequently, given the preponderance of smaller growth firms listed on Nasdaq, these characteristics imply elevated informational asymmetries and increased embeddedness in cultural norms, such as family and insider ownership concentration with reduced free float.

Table 4

A comparison of the trading and descriptive statistics for stocks sorted into the ten free float decile portfolios is provided in panel 3 of Table 4 for Japan and panel 4 for the US. A number of observations are apparent across both universes. There is evidence of a statistically significant difference in average monthly returns between the lowest free float decile (D1) and its highest free float counterpart (D10). However, only in the case of value-weighted returns in Japan, and equal-weighted returns in the US is a premium visible for low free float stocks ($p \leq 0.01$) as compared to their high free float counterparts. This implies only limited statistical support for a free float returns-based premium.

However, across both the Japanese and US universes there are large and statistically significant differences ($p \leq 0.01$) between all the various trading and descriptive statistics of the stocks sorted into the lowest free float decile (D1) as compared to those sorted into the highest free float decile (D10). Average momentum, the illiquidity metrics of the daily zero returns, Liu's trading speed indicator, and the bid-ask spreads are much higher in the low free float (D1) decile portfolios across both universes compared to their high free float (D10) counterparts. This indicates that while there is momentum persistence in returns, there is associated higher illiquidity and some price rigidity. Conversely, the average percentage free float, book to market value ratio, market capitalization, and traded volume are statistically significantly ($p \leq 0.01$)

lower in the low free float sorted decile (D1) than in the highest free float sorted decile (D10). This is indicative that smaller firms attract reduced trading activity where these factors indirectly proxy for informational asymmetry (see Stoll, 2000) and increased contextual embeddedness of governance arrangements reflected in lower levels of dispersed ownership.

As an additional test, we study the dispersion of industries and levels of block ownership across the ten free float decile portfolios. Industry variation is similar across both Japan and the US[7], where consumer services, healthcare, and technology all dominate the lowest free float portfolios, while consumer goods, financials, and industrials all dominate the highest free float counterparts. We also study block ownership between Japan and the US[8]. Our evidence shows that in Japan the lowest free float decile (D1) has an average 40.09% holding attributable to cross-shareholding networks, and a 13.26% average holding of employee and family ownership, where these are statistically different ($p \leq 0.01$) and much higher than in the high free float decile (D10). Cross-shareholding ownership in the lowest free float decile (D1) is almost double that in the highest decile (D10). Contrastingly, in the US levels of employee and family ownership as well as investment company ownership dominate, where both are statistically significantly ($p \leq 0.01$) higher in the lowest free float (D1) decile than in the highest (D10). Ownership by employees and families is over four times higher in D1 than in D10. Notably foreign and cross-shareholding ownership is also apparent, although the dispersion across categories is much smaller in value.

In summary, the evidence regarding differences in trading and descriptive statistics is largely consistent across both the market universes of Japan and the US. This reveals that there

[7] Industry statistics for Japan (the US) are displayed in panel 1 of Table 4 (5) of the Online Supplementary Appendix.
[8] Block ownership statistics for Japan (the US) are displayed in panel 2 of Table 4 (5) of the Online Supplementary Appendix.

are persistent and statistically significant differences between firms with lower levels of free float and those with higher levels.

6. Results

Our results are divided between time invariant augmented CAPM asset pricing models and time varying equivalent models, employing a Kalman filter. These involve being applied on to up to four categories of test assets, namely ten decile sorted portfolios from rebalancing using free float, liquidity, size, and book to market value.

6.1 Time-invariant empirical results

The multifactor CAPM models used in our empirical analysis are outlined in Appendix Table 3. These are the CAPM, the Fama and French three factor model (FF3F), the Carhart (1997) four factor model, that is, the FF3F model augmented with an additional momentum factor (Carhart 4F), the Liu liquidity two-factor model (Liquidity 2F), the modified free float four factor model, that is, the FF3F model augmented by the residuals of the regression of free float on size, followed by our new free float two-factor model (Free Float 2F). The modified free float factor is generated to mitigate concerns of collinearity between size and free float, despite the relatively low correlation between free float and size. All models are estimated using time series OLS, following Black et al. (1972), Fama and French (1993), Pastor and Stambaugh (2003), and Liu (2006). The expectation is that the Jensen alpha is not statistically different from zero, given the relationship between an individual portfolio's expected returns and the market (Markowitz 1959)[9].

[9] One caveat is that the sample includes stocks from much smaller regional exchanges where this is potentially problematic due to inactive trading. The Dimson (1979) and Dimson and Marsh (1983) proposed trading inactivity

The empirical results reported in Table 5 are from the application of all of the multifactor asset pricing models on first the ten free float sorted decile portfolios, and then a further two free float difference portfolios or FMPs, where these are equal and value weighted, respectively. Our first observation across both the Japanese (panel 1) and US (panel 2) universes is that there is an initial jump in explanatory power or adjusted-R^2 from the one-factor CAPM (panel 1A) to the FF3F (panel 1B), where this is followed by a negligible difference between the FF3F and the Carhart 4F (panel 1C). Then, for Japan there is a slight reduction in explanatory power or adjusted-R^2 between the Carhart 4F (panel 1C) and Liquidity 2F models (panel 1D), while this is negligible in the US. Together, this evidence reveals that the FF3F is optimal in explaining the cross-section of stock returns, as is the Liquidity 2F model but only for the case of the US and not Japan. Next, we observe that in both Japan and US there is a marked increase in the adjusted-R^2 from the Liquidity 2F models (panel 1D and 2D) and the modified free float 4F models (panels 1E and 2E), with this increase amounting to between 2 and 5 percentage points in Japan and barely one percentage point in the US. This evidence points to the superiority of the free float factor, or its modified form, which takes into account size. Next, we observe across both the Japanese (panel 1) and US (panel 2) universes that the adjusted-R^2 associated with the Free Float 2F models (between panels 1F and 2F) are between 3 and 9 percentage points higher than those of all other preceding models (across models 1A to 1E and then 2A to 2E). This evidence substantiates the benefits from using the Free Float 2F model over all other rival models in terms of explanatory power or adjusted-R^2.

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correction is noted but not used here in favor of the recent literature, such as Liu (2006), and Pastor and Stambaugh (2003). A further limitation to the use of standard OLS time series has been noted in the literature on CAPM beta instability that results from structural breaks in the underlying data generating process (see Bollerslev and Zhang, 2003; Braun, Nelson, and Sunier, 1995; Lettau and Ledvigson, 2001). Thus, we also examine time-varying parameter CAPM models explained in Section 6.3.

Our second observation is that the absolute size of the regression alpha and its statistical significance is the least in the Free Float 2F models (panels 1F and 2F) as compared to all other models, and this holds across both the Japanese and US universes. This is the most direct empirical evidence supporting the superiority of the Free Float 2F model over the other rival asset pricing models.

Our third observation is regarding the equal and value weighted difference portfolios, or FMPs, in the farthest two right hand columns in Table 5. These correspond to the returns generated from a strategy of a long position in low free float stocks and shorting those with high free float. Across both panels 1 (Japan) and 2 (US) the estimation results reveal that the CAPM, FF3F, and Carhart 4F across equal and value weighted difference portfolios (D1-D10) reveal statistically significant regression alphas, i.e., *abnormal returns* that cannot be attributed to any of the included FMPs. Gompers et al. (2003) describe these as "… the return in excess of what could have been achieved by passive investments in any of the factors" (p. 122). This reveals further statistical support for the Free Float 2F asset pricing model that is consistent across both the Japanese and US universes.

Our fourth observation is the progressive transition in the direction (sign) of the free float coefficient in the Free Float 2F model from the lowest free float sorted decile (D1) through to the highest counterpart (D10). Consistent across both panels 1F and 2F, the free float coefficients on stocks within the lowest free float decile portfolios (D1 to D5) for Japan in panel 1E and portfolios D1 to D3 for the US in panel 2E are large and positive, evidencing a premium. This pattern transitions through to portfolios D8, D9, and D10, with increasingly larger negative coefficients, indicating increasing returns-based discounts on stocks with higher percentages of free float. Notably, a similar trend is visible in the free float betas in the preceding modified Free

Float 4F models (panel 1E and 2E), though this only becomes negative in Japan in portfolio D6 while in the US in portfolio D3. Together, this evidence is indicative of a consistent effect relating to free float. We argue that given the universality of common institutions within a given single market universe, this evidence is compelling as it is reflective of an underlying state variable within asset pricing where greater ownership diversification is associated with reduced informational asymmetries. Conversely, lower percentages of diversified ownership, or free float, are accompanied by increased uncertainties regarding the motivations toward expropriation by insider block owners who are strategically positioned to exploit the greater informational asymmetries.

In summary, the evidence so far points to an unpriced premium for free float, and the inclusion of this premium in the form of an FMP leads to statistically superior augmented CAPM models compared to rival models, such as the single factor CAPM, FF3F, Carhart 4F including additional momentum, and the Liquidity 2F. It also points to the superiority of the Free Float 2F model compared to larger multifactor counterparts, such as the modified Free Float 4F. We argue that this is largely reflective of free float being a proxy for an underlying state variable, following a similar argument in Hearn et al. (2017) in relation to their investor protection factor, which is formed from free float multiplied by national institutional quality and therefore in a single country setting is the same as free float alone.

Table 5

As a final additional robustness test, we apply each of our asset pricing models to three further groupings of ten decile portfolios, sorted in accordance with (1) liquidity, (2) size, and (3) the book to market value ratio. This is undertaken for Japan and then the US universe. The full

results are not reported due to brevity, but they are available from the authors upon request[10]. Generally, the evidence suggests that the Free Float 2F model has lower values and statistical significance of the regression alpha terms across all three categories of decile sorted portfolios. This is also generally true of the adjusted-R^2, where this is generally higher across the Free Float 2F models applied to all three categories of decile portfolios. However, some differences are apparent between the Japan and US universes in terms of the lack of statistical significance of the regression alpha terms for the D1-D10 difference FMP portfolios. In the Japanese context, the evidence suggests that the FF3F is at least as good as the Free Float 2F models in the context of the liquidity FMPs, while the Free Float 2F model is better than all rival models in the decile size FMPs. Conversely, in the US universe the Liquidity 2F model is superior to all other rival models in application to the liquidity-sorted FMPs, while the Free Float 2F model is better than the rival models in explaining the book to market value ratio FMPs. So, across the three alternative categories of decile sorted portfolios, namely liquidity, size, and book to market value ratio, there is more mixed evidence in support of the Free Float 2F model.

The Jensen alphas and accompanying t-statistics along with the beta coefficients for the free float FMP, and their t-statistics, and the adjusted-R^2 for only the Free Float 2F models as applied to each decile portfolio (D1 through D10) sorted by free float, liquidity, size, and book to market value are displayed in Table 6. The Japanese universe is in panel 1 while the US universe is in panel 2. Generally, the overwhelming majority of the regression alphas are small in absolute size, and they lack statistical significance at any discernible confidence margin. However, a distinct trend in the absolute size and direction of the free float beta coefficient is clearly visible for the decile portfolios sorted by free float, size, and book to market value for

[10] These tables are available in the supplementary appendices of the online version of our manuscript. These are in Table 6 for Japan and Table 7 for the US in the Online Supplementary Appendix.

both Japan and the US. This ranges from large and positive on the lower value decile portfolios (towards D1) and trending first to smaller sized coefficients for intermediate value deciles (range of D3 to D6), before reversing and progressively becoming large and negative for higher value decile portfolios (toward D10). While there is a plausible association between free float and size, at the same time the systematic change in sign from high-ranking decile portfolios to their low-ranking counterparts in book to market value points to the superiority of the Free Float 2F model.

Table 6

6.2 Time-invariant empirical results – GRS

We use the F-statistic from Gibbons, Ross, and Shanken (1989) (henceforth GRS) to formally test the hypothesis that a set of explanatory variables produces regression intercepts for a set of test assets or portfolios that are all jointly equal to zero. We use five sets of explanatory variables in all, with each corresponding to one of the augmented CAPM-based models. These are employed on a set of test assets, or portfolios, which are the individual decile portfolios sorted on the basis of 1-year rebalanced free float and liquidity, then size, and the book to market value ratio. It should be noted that a complication arises due to collinearity between the formation of the GRS test statistic and the valuation factors implicitly used within the models where it is employed. As such we run GRS tests across eight of the decile portfolios in each case, omitting the extreme portfolios (D1 and D10) from which the liquidity and free float valuation factors are formed.

The results from Table 7 overwhelmingly reject the null hypothesis ($p \leq 0.005$) of all regression intercepts being jointly equal to zero. However, this largely uniform rejection of the GRS test statistic is in line with prior literature, with Fama and French (1993) for a universe of

US stocks, with Hou et al. (2011) for a multi-country sample comprised of 49 major equity markets worldwide, and with Hearn (2016) for an Asian equity market sample. While this uniform rejection of the null hypothesis of joint intercepts equaling zero underscores the inability to use the GRS effectively to discriminate between comparable models, it does reveal the weakness of time invariant methods as a class of model in being robust to intra- and inter-market segmentation. However, for both the Japan (panel 1) and US (panel 2) universes and across the free float, size (SMB), and the book to market value ratio (HML) decile sorted portfolios, the GRS statistic associated with the Free Float 2F model is consistently the lowest of all the rival models.

Table 7

6.3 Time varying parameter empirical evidence

The final set of asset pricing tests is for the Kalman filter time-varying parameter coefficient models. We apply the Kalman filter estimation, which relies on the notion of state space to estimate the conditional constant term and market beta of the investor protection augmented CAPM, as well as of the comparison models[11]. The Kalman filter estimation allows the relaxation of the assumptions on the data generating processes as a stochastic time trend accounts for structural breaks. This is preferred to formal switching-regression models as it is not necessary to define the exact point of the switch. This is particularly important for the present study as although the timing of changes is known, the exact date of implementation is not, particularly with respect to changes in formal institutions and regulatory environments. A further

[11]Applications of this method include Grout and Zalewska (2006), who examine the effects of regulation on UK and US stocks, and Brooks, Faff, and McKenzie (1998) who investigate Australian industry portfolios. This approach is appropriate to the measurement of time evolving risk premiums for market and investor protection factors (Grout and Zaleswska, 2006).

benefit of Kalman filter estimation is that it is less demanding of the data compared with Markov-switching models that are generally incompatible with short sample periods (see Grout and Zalewska, 2006). The process consists of an observation equation and a transition or state equation, which in combination express the structure and dynamics of a time varying system. A state space model is specified where an observation at time *t* is a linear combination of a set of state variables that compose the state vector. The time-varying parameter coefficient models of the Free Float 2F augmented CAPM and our comparison models are outlined in Appendix Table 3.

The results are reported in Table 8. The four test assets are the same as those in the preceding GRS test, being the individual decile portfolios sorted on the basis of 1-year rebalanced free float, and liquidity, then size, and book to market value ratio portfolios. These provide a diverse range of test assets to assess the efficiency of our models. Some notable observations are apparent. The first is a complete lack of statistical maximum likelihood convergence for all time varying models based on the FF3F, the Carhart 4F and modified Free Float 4F framework. Moreover, across all models the lower standard error bands of the alphas are negative (generally over 90% of the sample period), indicating a lack of statistical significance for the majority of the sample time period. Furthermore, the average z-statistics for the final period alphas are generally extremely low and outside any discernible confidence margin. Model selection is based on two sets of statistics: the information criterion (Akaike Information Criterion, AIC), and the time series profile of the alpha across models. The results reveal the lowest average AIC criterion is for the Free Float 2F model for the case of the liquidity and size test portfolios for Japan (panel 1) and the free float and size test portfolios for the US (panel 2). This provides further statistical support for the superiority of the Free Float 2F model.

Table 8

As a final exercise we estimate the time varying coefficient loci of the alpha and both the betas for the market and the free float factors in the Free Float 2F model, which are not displayed here due to brevity[12]. Evidence of a premium is visible from the time varying free float betas for the regional equity markets of Sapporo, Fukuoka, and Nagoya. This is anticipated given the much higher contextual embeddedness of regional firms mirrored in their elevated block ownership and corresponding minimal free float. Contrastingly, evidence of a discount is visible in the time varying free float betas for the Tokyo segments of the TOPIX Mid400, TOPIX70, and TOPIX30 blue chip benchmark constituents. This is anticipated given the greater international orientation of blue-chip Tokyo listed firms, which is reflected in their reduced block ownership and correspondingly higher free float.

7. Conclusions

The motivations of insiders within the firm toward expropriating outside minority investors exert a profound influence on the degree to which the firm diversifies its ownership base (Berle and Means, 1932). Block owners, including insiders, face a trade-off between utilizing their concentrated control to motivate improved monitoring and disincentivize potential appropriation of rents by managers, and engaging in misappropriation where the risks of this leads to a higher cost of capital. Such misappropriation may take the form of a seemingly benign redirection of cash flows and dividends to satisfy internal capital infusions across groups of firms under the

[12] They are displayed in the Online Appendix and include Figures 3 to 20 for each Japanese market segment and regional market, and Figures 21 to 35 for the US S&P500 Nasdaq, S&P400 NYSE, S&P400 Nasdaq, S&P600 NYSE, and S&P600 Nasdaq in the Online Supplementary Appendix. There was no maximum likelihood convergence for the S&P500 NYSE.

joint control of a common ultimate owner such as a family, or dense networks of cross-shareholdings as is the case in Japan. It may also take the form of a mismatch in payoff time horizons, where the very durability of such families or cross-shareholdings emphasizes longevity and long-term value creation, while minority investors have contrastingly short-term horizons (Gaspara, Massa, and Matos, 2005). These issues underscore the difficulty for minority investors in estimating the potential impact of concentrated block ownership on their welfare, where we argue this reflects an overlooked state variable in asset pricing. We propose that the percentage free float is a useful metric in a single country universe, and that this more theoretically driven asset pricing measure supersedes an evolving plethora of ratios and metrics based on various aspects of the firm's balance sheet and financial reporting.

We propose a new two-factor asset pricing model based on the CAPM framework, where the single market factor is augmented with a second factor based on differentiating the cross-section of stock returns by each stock's free float. We argue that this yields a useful means to effectively hedge against risks associated with the fundamental underlying likelihood of expropriation in a given firm based on its ownership structure. Extensive tests of variants of the augmented CAPM, including time-varying parameter Kalman filter methods, show that the CAPM augmented with a factor mimicking portfolio based on our new free float metric yields the highest explanatory power for a cross-section of stock returns. The evidence supports our initial propositions after extensive testing and application to large universes formed from comprehensive stock listings across Japan and the constituents of the US S&P1500 benchmark index. Empirical evidence is remarkably consistent across both large single market universes in supporting the presence of the free float metric in being effective within asset pricing. This is

important to minority outside investors who command a premium to compensate for potential welfare losses when buying into firms characterized by concentrated insider holdings.

References

Aggarwal, R. "Characteristics of Japanese Finance: A review and Introduction". *Global Finance Journal*, 5(2) (1994), 141-167

Amihud, Y. "Illiquidity and stock returns: cross section and time series effects". *Journal of Financial Markets*, 5 (2002), 31-56.

Aminadav, G., and Papaioannou, E. "Corporate Control around the World". *The Journal of Finance*, 75(3) (2020), 1191-1246

Anderson, R. C., Duru, A., and Reeb, D. M. "Founders, heirs, and corporate opacity in the United States". *Journal of Financial Economics*, 92(2) (2009), 205-222

Anderson, R. C., Mansi, S. A., and Reeb, D. M. "Founding family ownership and the agency cost of debt". *Journal of Financial Economics*, 68(2) (2003), 263-285

Bekaert, G., Harvey, C. R., Lundblad, C. T., and Siegel, S. "What Segments Equity Markets?" *Review of Financial Studies*, 24(12) (2011), 3841-3890

Berle, A., and Means, G. "The Modern Corporation and Private Property". New York, Macmillan (1932)

Black, F., Jensen, M. C., and Scholes, M. "The capital asset pricing model: Some empirical tests". In M. C. Jensen (ed.), *Studies in the Theory of Capital Markets*. New York, NY: Praeger (1972)

Bollerslev T., and Zhang, B. "Measuring and Modeling Systematic Risk in Factor Pricing Models using High-Frequency Data". *Journal of Empirical Finance*, 10 (2003), 533-558

Braun P., Nelson, D., and Sunier, A. "Good News, Bad News, Volatility, and Betas". *The Journal of Finance*, 50 (1995), 1575-1603

Brooks, R. D., Faff, R. W., and McKenzie, M. D. "Time-varying beta risk of Australian industry portfolios: A comparison of modelling techniques". *Australian Journal of Management*, 23 (1998), 1-22

Carhart, M. M. “On persistence in mutual fund performance”. *The Journal of Finance,* 52 (1997), 57-82

Carrieri, F., Chaieb, I., and Errunza, V. “Do Implicit Barriers Matter for Globalization?” *The Review of Financial Studies*, 26(7) (2013), 1694–1739

Charitou, A., Louca, C., and Panayides, S. “Cross-Listing, Bonding Hypothesis and Corporate Governance”. *Journal of Business Finance & Accounting,* 34(7) (2007), 1281-1306

Choi, J. J., Park, S. W., and Yoo, S. S. “The Value of Outside Directors: Evidence from Corporate Governance Reform in Korea”. *Journal of Financial and Quantitative Analysis*, 42(4) (2007), 941-962

Cochrane, J. H. “Presidential Address: Discount Rates”. *The Journal of Finance*, 66(4) (2011), 1047-1108

Coffee, J. “The future as history: The prospects for global convergence in governance and its implications”. *Northwestern University Law Review,* 93 (1999), 641–708

Coffee, J. “Racing towards the top? The impact of cross-listing and stock market competition on international corporate governance”. *Columbia Law Review,* 102 (2002), 1757–831

Cremers, M., and Ferrell, A. “Thirty Years of Shareholder Rights and Firm Value”. *The Journal of Finance,* 69(3) (2014), 1167-1196

Dimson, E. “Risk measurement when shares are subject to infrequent trading”. *Journal of Financial Economics*, 7 (1979), 197-226.

Dimson, E., and Marsh, P. “The stability of UK risk measures and the problem of thin trading”. *The Journal of Finance,* 38 (1983), 753-783.

Doidge, C., Karolyi, A., and Stulz, R. “Why do countries matter so much for corporate governance?” *Journal of Financial Economics*, 86 (2007), 1-39

Errunza, V., and Losq, E. “International asset pricing under mild segmentation: Theory and test”. *The Journal of Finance,* 40(1) (1985), 105-124

Errunza, V., and Ta, H. “The Impact of Investability on Asset Valuation”. *Journal of Financial and Quantitative Analysis*, 50(5) (2015), 1135-1163

Fama, E. F., “Agency problems and the theory of the firm”. *Journal of Political Economy*, 88 (1980), 288-306

Fama, E., and French, K. “The cross section of expected stock returns”. *The Journal of Finance,* 47 (1992), 427-465

Fama, E., and French, K. “Common risk factors in the returns on stocks and bonds”. *Journal of Financial Economics*, 33 (1993), 3-56

Fama, E., and French, K. “Incremental variables and the investment opportunity set”. *Journal of Financial Economics*, 117 (2015), 470-488

Fama, E., and French, K. “Choosing factors”. *Journal of Financial Economics,* 128 (2018), 234–252

Fama, E. F., and Macbeth, J. D. “Risk, Return & Equilibrium: Empirical Tests”. *Journal of Political Economy*, 81(3) (1973), 607-636

Franks, J., Mayer, C., and Miyajima, H. “The ownership of Japanese corporations in the 20th century”. *Review of Financial Studies*, 27(9) (2014), 2580-2625

Gaspara, J-M., Massa, M., and Matos, P. “Shareholder investment horizons and the market for corporate control”. *Journal of Financial Economics*, 76(1) (2005), 135-165

Giannetti, M., and Koskinen, Y. “Investor protection, equity returns, and financial globalization”. *Journal of Financial and Quantitative Analysis*, 45(1) (2010), 135-168

Gibbons, M. R., Ross, S. A., and Shanken, J. “A test of the efficiency of a given portfolio”. *Econometrica*, 57 (1989), 1121-1152

Gompers, P., Ishii, J., and Metrick, A. “Corporate governance and equity prices”. *The Quarterly Journal of Economics*, 118(1) (2003), 107-155

Grout, P. A., and Zalewska, A. “The impact of regulation on market risk”. *Journal of Financial Economics*, 80 (2006), 149-184

Hearn, B. “A Comparison of the Efficacy of Liquidity, Momentum, Size and Book-to-Market Value Factors in Equity Pricing on a Heterogeneous Sample: Evidence from Asia”. *Financial Markets, Institutions & Instruments*, 25(4) (2016), 253-330

Hearn, B., Phylaktis, K., and Piesse, J. “Expropriation risk by block holders, institutional quality and expected stock returns”. *Journal of Corporate Finance*, 45 (2017), 122–149

Heinkel, R., Krauss, A., and Zechner, J. “The effect of green investment on corporate behaviour”. *Journal of Financial and Quantitative Analysis,* 36(4) (2001), 431-449

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

Iliev, P., Lins, K. V., Miller, D. P., and Roth, L. “Shareholder Voting and Corporate Governance Around the World”. *The Review of Financial Studies,* 28(8) (2015), 2167-2202

Ince, O., and Porter, R. B. “Individual equity return data from Thomson Datastream: Handle with care!” *Journal of Financial Research*, 29 (2003), 463-479

Jegadeesh, N., and Titman, S. “Returns to buying winners and selling losers: Implications for stock market efficiency”. *The Journal of Finance,* 48(1) (1993), 65-91

Jensen, M. C., and Meckling, W. “Theory of the firm: managerial behavior, agency costs, and ownership structure”. *Journal of Financial Economics,* 3 (1976), 305-360

Khanna, T., and Yafeh, Y. “Business groups in emerging markets: Paragons or Parasites?” *Journal of Economic Literature*, 45(2) (2007), 331-372.

La Porta, R., Lopez-de-Silanes, F., Schliefer, A., and Vishny, R. “Law and Finance”. *Journal of Political Economy*, 106(6) (1998), 1113-1155

La Porta, R., Lopez-de-Silanes, F., and Shleifer, A. “Corporate ownership around the World”. *The Journal of Finance*, 54 (1999), 471-518

La Porta, R., Lopez-de-Silanes, F., Schliefer, A., and Vishny, R. “Investor protection and corporate governance”. *Journal of Financial Economics*, 58 (2000), 3-27

Lettau, M., and Ledvigson, S. “Consumption, Aggregate Wealth, and Expected Stock Returns”. *The Journal of Finance,* LVI (3) (2001), 815 - 849

Liu, W. “A Liquidity-augmented capital asset pricing model”. *Journal of Financial Economics*, 82 (2006), 631-671

Liu, J., Stambaugh, R. F. and Yuan, Y. “Size and value effects in China”. *Journal of Financial Economics*, 134 (2019), 48-69

Markowitz, H. “Portfolio Selection: Efficient Diversification of Investments”. John Wiley and Sons, New York; Chapman and Hall, London. (1959).

Merton, R. C. “An Intertemporal Capital Asset Pricing Model”. *Econometrica,* 41(5) (1973), 867-887

Mitchener, K. J., and Ohnuki, M. “Institutions, competition and capital market integration in Japan”. *The Journal of Economic History,* 69(1) (2009), 138-171

Pan., L., and Zhou, X. “CEO Compensation in Japan: Why So Different from the United States?” *Journal of Financial and Quantitative Analysis*, 53(5) (2018), 2261-2292

Roll, R. “A simple implicit measure of the effective bid–ask spread in an efficient market”. *The Journal of Finance,* 39 (1984), 1127–1139

Securities Market in Japan “Illustrated Guide: 2018 Securities Markets in Japan” [English translation from Japanese]. Japan Securities Research Institute: Tokyo, Japan. (2018)

Shleifer, A., and Vishny, R. W. “A Survey of Corporate Governance”. *The Journal of Finance*, 52(2) (2012), 737-783

Sohn, Y. “Whither the Japanese Model? Institutional Change and Emergence of “Many Japans””. *Journal of International and Area Studies*, 15(1) (2008), 79-92

Stoll, H.R. “Friction”. *Journal of Finance,* 55(4) (2000),1479-1514.

Yoshikawa, T., Tsui-Auch, L. S., and McGuire, J. “Corporate Governance Reform as Institutional Innovation: The Case of Japan”. *Organization Science*, 18(6) (2007), 973-988

Table 1 Descriptive statistics

This table reports descriptive statistics for Japan and the US. N is the sample size, typically the constituents of the index. Free Float is the percentage free float capitalization, while the average levels of ownership are reported across the three largest categories of owner, namely cross shareholder networks, employee/ family and investment company, where this includes financial services and institutional investors. Monthly returns are the average returns of each stock over a monthly interval. Market capitalization is measured at 1 January for each country and is the equity market value for each firm in US$ billions. Book to market value is reported as the average across index constituent firms over the sample period. Momentum is the time series average of the percentage cumulative return for each stock over the prior six months, omitting the most recent month, and is monthly, following Jegadeesh and Titman (1993). Liu (1 year) is the liquidity measure of Liu (2006) estimated over the prior 1-year ranking period. Median values are in brackets.

	N	Ownership				Trading and liquidity descriptive statistics				
		Free Float	Three largest ownership categories			Monthly returns, %	Mkt. Cap., US$b	Book to Mkt. value	Mom, %	Liu (1 year)
			Cross shareholder, %	Employee/ Family, %	Investment Co., %					
Panel 1: Japan										
Tokyo TOPIX										
Core 30	30	84.66 [93.50]	5.04 [0.00]	1.89 [0.00]	1.79 [0.00]	0.57 [0.41]	35.31 [22.67]	0.685 [0.60]	0.236 [0.01]	15.95 [15.44]
Large 70	70	87.06 [93.50]	5.88 [0.00]	0.90 [0.00]	1.63 [0.00]	0.78 [0.31]	21.82 [11.08]	0.717 [0.67]	0.160 [0.01]	15.97 [15.44]
Mid 400	397	81.19 [89.00]	10.72 [0.00]	2.25 [0.00]	2.15 [0.00]	0.89 [0.54]	6.33 [2.69]	0.875 [0.79]	0.121 [0.02]	17.90 [15.44]
1000 ex. 500	498	72.69 [77.00]	14.60 [9.00]	7.87 [0.00]	2.04 [0.00]	1.25 [0.00]	1.15 [0.47]	1.016 [0.93]	0.107 [0.01]	22.02 [15.44]
bottom 1000	1,166	68.30 [69.00]	17.52 [13.00]	10.64 [0.00]	1.43 [0.00]	1.02 [0.00]	0.50 [0.14]	1.197 [1.11]	0.082 [0.00]	27.99 [15.45]
Osaka-Jasdaq	702	57.98 [58.00]	22.82 [19.00]	16.98 [13.0]	0.89 [0.00]	1.02 [0.00]	0.11 [0.03]	1.432 [1.11]	0.082 [-0.01]	55.31 [24.14]
Nagoya	68	64.26 [66.00]	26.04 [20.00]	8.37 [0.00]	0.28 [0.00]	0.45 [0.00]	0.15 [0.06]	2.217 [1.64]	0.222 [-0.05]	94.52 [83.03]
Fukuoka	37	60.50 [60.00]	21.40 [11.50]	12.61 [0.00]	0.14 [0.00]	0.42 [0.00]	0.29 [0.07]	1.345 [1.37]	0.081 [-0.07]	118.55 [133.24]
Sapporo	20	53.47 [51.00]	31.78 [30.50]	11.14 [0.00]	0.04 [0.00]	0.55 [0.00]	0.09 [0.01]	9.621 [1.48]	0.049 [0.00]	125.10 [130.34]
Japan overall	2,988	68.18 [70.00]	17.55 [12.00]	10.34 [0.00]	1.44 [0.00]	0.99 [0.00]	2.08 [0.16]	1.279 [0.98]	0.097 [0.04]	36.77 [15.45]
Panel 2: US										
S&P 500										
NYSE	367	85.66 [91.00]	4.29 [0.00]	6.81 [0.00]	9.00 [6.00]	1.20 [1.35]	32.18 [10.86]	0.458 [0.38]	0.166 [0.05]	13.23 [8.68]
Nasdaq	137	83.08 [87.50]	5.00 [0.00]	8.35 [0.00]	10.02 [6.50]	1.57 [1.40]	28.49 [7.13]	0.354 [0.27]	0.178 [0.06]	12.53 [8.68]
Overall	505	84.91 [90.00]	4.49 [0.00]	7.24 [0.00]	9.31 [6.00]	1.31 [1.37]	30.64 [9.92]	0.430 [0.33]	0.169 [0.06]	13.06 [8.69]
S&P 400										
NYSE	263	81.26 [85.00]	4.77 [0.00]	9.75 [5.00]	11.02 [8.00]	1.22 [1.20]	3.09 [2.33]	0.629 [0.49]	0.121 [0.05]	14.61 [8.68]
Nasdaq	138	77.99 [82.00]	5.99 [0.00]	13.15 [6.00]	12.35 [9.00]	1.59 [1.15]	2.50 [1.55]	0.429 [0.34]	0.132 [0.05]	13.26 [8.68]
Overall	400	80.09 [84.00]	5.23 [0.00]	11.00 [5.00]	11.47 [8.00]	1.35 [1.19]	2.88 [2.09]	0.562 [0.43]	0.125 [0.05]	14.14 [8.69]
S&P 600										
NYSE	296	77.57 [83.00]	6.86 [0.00]	12.40 [6.00]	13.93 [9.00]	1.20 [0.92]	2.63 [0.82]	0.641 [0.56]	0.113 [0.03]	17.83 [8.68]
Nasdaq	305	75.16 [79.00]	6.60 [0.00]	16.41 [9.00]	12.84 [9.00]	1.83 [0.84]	1.08 [0.57]	0.552 [0.49]	0.153 [0.04]	16.59 [8.68]
Overall	601	76.33 [81.00]	6.75 [0.00]	14.47 [7.00]	13.36 [9.00]	1.53 [0.86]	1.84 [0.70]	0.595 [0.54]	0.133 [0.03]	17.23 [8.69]
US S&P 1500	1,506	79.93 [85.00]	5.58 [0.00]	11.10 [5.00]	11.51 [8.00]	1.40 [1.14]	11.76 [1.82]	0.532 [0.45]	0.143 [0.04]	14.99 [8.69]

Table 2 Fama–MacBeth (two-step procedure) regressions of stock returns on beta, size, and valuation ratios

The table reports average slope coefficients from month-by-month Fama–MacBeth regressions for both the Japanese aggregate market and the US S&P 1500 market universe. Individual stock returns are regressed cross-sectionally on stock characteristics as of the previous month. The columns correspond to different regression specifications, with nonempty rows indicating the included regressors. The regressors include pre-ranking CAPM β_t estimated using the past 12 months of daily returns; the log of month-end market cap (log ME); the log of book-to-market (log BM); Mom, namely momentum, i.e., the time series average of the percentage cumulative return for each stock over the prior six months, omitting the most recent month, and is monthly, following Jegadeesh and Titman (1993); Liu (1 year) being the liquidity measure of Liu (2006) estimated over the prior 1 year ranking period; and FF or the percentage free float of listed market capitalization. The last row reports the average adjusted-R^2 for each specification. The sample period is January 2001 through June 2020. T-statistics based on Newey and West (1987) standard errors are reported in brackets.

Panel 1: Japan	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	0.009 [4.64]	0.048 [6.10]	0.045 [5.56]	0.044 [5.78]	0.067 [8.12]	0.048 [6.10]	0.015 [5.11]
β_t	0.001 [0.26]	0.002 [0.93]	0.003 [1.07]	0.003 [1.09]	0.001 [0.15]	0.002 [0.84]	0.001 [0.47]
Log ME	-- --	-0.002 [-5.27]	-0.002 [-5.11]	-0.002 [-5.42]	-0.003 [-6.24]	-0.002 [-5.88]	-- --
Log BM	-- --	-- --	0.001 [4.46]	0.001 [4.56]	-- --	-- --	-- --
Momentum	-- --	-- --	-- --	0.001 [-0.03]	-- --	-- --	-- --
Liu Liquidity	-- --	-- --	-- --	-- --	-0.003 [-4.45]	-- --	-- --
Free Float	-- --	-- --	-- --	-- --	-- --	0.003 [1.83]	-0.008 [-2.65]
F (prob)	0.07 [0.79]	17.35 [0.00]	26.28 [0.00]	20.60 [0.00]	23.48 [0.00]	20.16 [0.00]	4.05 [0.00]
Adj-R^2	0.0336	0.0503	0.0524	0.0575	0.0513	0.0563	0.0391
Panel 2: US S&P 1500							
Intercept	0.007 [1.29]	0.086 [6.78]	0.079 [6.78]	0.076 [6.59]	0.066 [4.07]	0.088 [6.83]	0.020 [3.10]
β_t	0.008 [1.12]	0.006 [0.94]	0.003 [0.58]	0.002 [0.37]	0.008 [1.09]	0.007 [0.96]	0.008 [1.11]
Log ME	-- --	-0.004 [-7.87]	-0.003 [-7.47]	-0.003 [-7.36]	-0.003 [-6.97]	-0.004 [-7.76]	-- --
Log BM	-- --	-- --	0.007 [2.57]	0.008 [2.58]	-- --	-- --	-- --
Momentum	-- --	-- --	-- --	0.001 [0.15]	-- --	-- --	-- --
Liu Liquidity	-- --	-- --	-- --	-- --	0.006 [3.01]	-- --	-- --
Free Float	-- --	-- --	-- --	-- --	-- --	-0.004 [-1.69]	-0.016 [-5.34]
F (prob)	1.26 [0.00]	31.10 [0.00]	24.50 [0.00]	19.52 [0.00]	26.83 [0.00]	21.09 [0.00]	14.77 [0.00]
Adj-R^2	0.0505	0.0627	0.0735	0.0873	0.0687	0.0639	0.0530

Table 3 Factor mimicking portfolio summary statistics – for aggregate Japan market universe

This table reports the descriptive statistics, autocorrelations (at 1, 6 and 12 lags) for returns-based valuation factors including the market, the Fama and French (1993) size (SMB) and book to market value (HML), the Jegadeesh and Titman (1993) momentum factor and the Liu (2006) liquidity factor used to explain cross section of stock returns across the market universe. The market universe is the aggregate world and is equal-weighted. All factors are obtained from equal-weighted portfolios while the FF size (SMB) and book-to-market value (HML) factors are value-weighted. Summary statistics are also reported, with t-difference in means, for the highest and lowest liquidity sorted portfolios (used to create the liquidity-based valuation factor). These are based on stock returns, book-to-market value, size (market capitalization US$), stock price, traded volume, monthly bid-ask spread and monthly percentage daily volatility in daily stock returns. Liquidity and Free Float portfolios D1 and D10 are formed from annual rebalancing. †, *, ** indicates significance at the 10%, 5%, and 1% level, respectively.

Panel 1: Descriptive statistics	**Market**	**SMB**	**HML**	**Liquidity (1 year)**	**Liquidity (1 Month)**	**Momentum**	**Free Float (1 year)**	**Free Float (1 Month)**
	Equal weight	Value weight	Value weight	Equal weight	Equal weight	Equal weight	Equal weight	Equal weight
Mean (%)	1.01	0.67	0.62	-0.35	-0.35	-0.23	0.60	0.59
t-statistic	3.02**	2.84**	3.29**	-1.29†	-1.29†	-0.52	3.33**	3.32**
Standard Deviation (%)	4.54	3.49	3.09	4.31	4.28	3.86	2.75	2.71
Skewness	0.100	0.106	-0.014	-0.343	-0.358	-0.952	0.386	0.375
Kurtosis	4.260	2.897	4.740	3.518	3.674	6.301	3.040	2.953
Jarque-Bera statistic	15.87 [0.00]	0.54 [0.76]	29.51 [0.00]	7.21 [0.03]	9.44 [0.01]	141.57 [0.00]	5.82 [0.05]	5.51 [0.06]
Number of months	234	234	234	234	234	234	234	234
Panel 2: Pearson correlations								
Market	1.000							
SMB	0.480**	1.000						
HML (Book to Market value)	-0.085†	-0.192**	1.000					
Liquidity (1-year rebalance)	-0.655**	-0.221**	0.277**	1.000				
Liquidity (1-month rebalance)	-0.659**	-0.230**	0.289**	0.991**	1.000			
Momentum	-0.068	0.204**	0.110*	0.198**	0.192**	1.000		
Free Float (1-year rebalance)	0.276**	0.690**	-0.310**	-0.140*	-0.142*	0.099†	1.000	
Free Float (1-month rebalance)	0.292**	0.695**	-0.305**	-0.152*	-0.156*	0.085†	0.995**	1.000
Panel 3: Autocorrelations								
1-Lag	0.160	0.009	0.202	0.156	0.153	0.239	-0.145	-0.144
6-Lags	0.039	0.091	-0.013	0.034	0.028	-0.025	0.110	0.108
12-Lags	-0.029	0.139	0.114	-0.110	-0.136	0.012	0.209	0.201

Table 4 Factor mimicking portfolio summary statistics – for Japan universe

This table reports the stock counts by country and ownership descriptive statistics for all ten-decile sorted free float portfolios (D1 – D10). Panels 1 and 2 are a breakdown of stock counts per portfolio with respect to free float decile-sort portfolios. Panels 3 and 4 report the descriptive statistics for all ten decile portfolios of free float portfolios (D1 - D10). These show summary statistics for several stock-characteristic variables per decile-sorted portfolio. These are returns (equally and value weighted decile portfolios), momentum, the Liu-liquidity metric, market capitalization (US$ billions), traded volume (US$ millions), the monthly proportion of daily zero returns (%), mean daily stock closing price (US$), book-to-market value, free float proportion (%) and the investor protection metric. In the first column of panels 3 and 4 a t-difference in means statistical significance confidence level is provided for mean values in decile portfolio D1 in relation to the differences between these and D10. †, *, ** indicates significance at the 10%, 5%, and 1% level, respectively.

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**
Panel 1: Stock count Japan (#)										
Tokyo TOPIX										
Core 30	1.51	0.46	1.13	0.95	1.97	1.74	1.41	2.95	3.97	12.82
Large 70	0.82	0.54	1.62	2.08	3.36	3.82	5.38	11.28	7.51	22.87
Mid 400	10.77	17.67	16.05	16.62	25.00	28.85	35.31	51.21	69.69	75.13
1000 excl. 500	26.90	31.85	37.23	38.56	42.31	47.36	49.38	50.33	44.21	45.95
bottom 1000	72.62	81.03	93.95	99.00	91.69	94.67	103.96	90.88	101.25	66.46
Osaka-Jasdaq	107.84	90.98	81.25	73.11	64.60	52.76	37.42	25.30	12.53	9.11
Nagoya	16.99	13.16	8.58	8.17	10.26	10.49	8.94	10.26	1.87	4.95
Fukuoka	8.45	5.64	1.54	2.69	2.46	3.21	1.33	0.82	1.41	4.26
Sapporo	7.28	2.15	2.10	2.27	1.86	0.62	0.36	0.51	1.05	1.00
Total	253.18	243.47	243.45	243.44	243.51	243.50	243.49	243.54	243.50	242.54
Panel 2: Stock count US (#)										
US S&P 500 NYSE	15.95	15.74	20.31	22.90	26.56	29.41	31.97	37.97	56.44	65.05
US S&P 500 Nasdaq	8.56	8.79	10.95	11.10	10.38	13.41	12.97	12.90	13.56	19.10
US S&P 400 [Mid cap] NYSE	16.64	20.05	23.21	23.85	23.79	23.97	23.69	24.92	18.31	14.59
US S&P 400 [Mid cap] Nasdaq	14.46	14.49	13.21	13.90	13.41	9.97	9.23	10.90	9.46	5.08
US S&P 600 [Small cap] NYSE	28.82	26.23	25.97	23.87	24.05	23.72	21.26	18.69	11.90	10.21
US S&P 600 [Small cap] Nasdaq	48.56	37.36	29.03	27.05	24.46	22.18	23.54	17.28	13.00	7.64
Total	133.00	122.67	122.67	122.67	122.67	122.67	122.67	122.67	122.67	121.67

	D1 (Low)	D2	D3	D4	D5	D6	D7	D8	D9	D10 (High)
Panel 3: Summary statistics										
Japan										
Returns – equal weight (%)	**0.75***	0.87	0.95	0.99	0.99	0.99	1.07	1.24	1.14	1.34
Returns – value weight (%)	**0.39†**	0.34	0.47	0.33	0.59	0.27	0.50	0.41	0.48	0.18
Free Float (%)	**36.02****	49.36	57.08	64.41	71.22	77.84	83.69	88.94	92.17	94.27
Momentum	**0.0659****	0.0557	0.0604	0.0454	0.0461	0.0447	0.0444	0.0440	0.0405	0.0331
Book to Market value	**1.0141****	1.1968	1.1888	1.2798	1.3346	1.3076	1.3882	1.2881	1.2752	1.2426
Liu Illiquidity (1 year)	**44.52****	41.69	36.99	34.62	34.84	31.47	26.57	23.77	19.65	20.56
Bid Ask Spread (%)	**2.45****	2.72	2.72	2.32	2.43	2.33	1.79	1.08	0.86	0.90
Market Cap. (US$ billions)	**0.67****	0.53	0.74	0.90	1.26	1.22	1.62	3.23	4.11	8.40
Traded volume (shares millions)	**6.30****	4.05	5.12	4.76	5.60	5.47	7.43	12.53	18.33	26.53
Daily zero returns per month (%)	**31.16****	27.39	23.80	22.99	22.36	21.38	19.07	16.85	15.13	14.81
Price (mean month, US$)	**42.14****	11.18	12.57	12.91	13.84	14.25	14.84	16.37	16.72	18.11
Panel 4: Summary statistics										
US										
Returns – equal weight (%)	**2.02***	1.60	1.48	1.46	1.35	1.28	1.19	1.08	1.07	1.01
Returns – value weight (%)	0.56	0.66	0.04	0.53	0.39	0.47	0.62	0.41	0.53	0.54
Free Float (%)	**54.76****	70.18	76.07	80.29	83.47	85.99	88.44	90.37	92.47	93.96
Momentum	**0.1172****	0.0927	0.0808	0.0812	0.0759	0.0750	0.0673	0.0570	0.0571	0.0500
Book to Market value	**0.4953****	0.5169	0.5187	0.5307	0.5086	0.5073	0.5239	0.5173	0.5158	0.5348
Liu Illiquidity (1 year)	**12.19****	9.80	9.83	9.54	9.32	9.72	9.57	9.51	9.34	9.38
Bid Ask Spread (%)	**1.47****	0.50	0.82	0.95	0.64	0.81	0.67	0.83	1.19	2.03
Market Cap. (US$ billions)	**4.77****	4.72	13.65	6.19	9.34	8.47	8.37	10.74	17.62	41.15
Traded volume (shares millions)	**22.12****	28.30	33.01	29.01	33.89	43.95	46.40	56.33	77.46	122.00
Daily zero returns per month (%)	**7.03****	5.58	5.53	5.27	5.18	5.32	5.27	5.12	5.04	4.86
Price (mean month, US$)	**35.69****	38.92	39.41	40.51	44.52	45.79	45.09	47.69	46.58	53.61

Table 5 Empirical results for 10 free float (1 year rank and holding period) decile portfolios for the Japan and US S&P 1500 universes

This table reports the beta coefficients for valuation factors with t-statistics, explanatory power (adjusted-R^2) and standard errors for the Fama and French (1993) three factor model (size and book to market value), the Carhart (1997) four factor model (size, book to market value and momentum) and the Liu (2006) two-factor liquidity model in modelling returns of 10 free float sorted decile portfolios. 1y indicates annual rebalancing used in factor formation (as opposed to monthly rebalancing). D1 is the lowest illiquidity and D10 the highest. These portfolios are formed from annual rebalancing using the free float metric. The 10-year US Treasury yield is used as the risk-free rate. Heteroskedasticity and autocorrelation consistent (HAC) standard errors & covariance. Numbers in square brackets are t-statistics. †, *, ** indicates significance at the 10%, 5%, and 1% level, respectively.

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**	**D1 - D10**	**D1 - D10**
Weighting:	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Value**
Panel 1: Free Float deciles (Japan universe)												
Panel 1A: CAPM												
Alpha (%)	0.003	0.001	0.002	0.001	0.000	0.000	0.000	0.000	-0.001	-0.002	**0.002**	**-0.006**
	[3.35]	[1.46]	[3.54]	[1.46]	[0.01]	[0.15]	[-0.04]	[-1.56]	[-1.36]	[-2.04]	**[1.37]†**	**[-1.78]***
Beta: Market (excess return)	1.075	1.047	1.056	0.993	0.983	0.972	0.985	0.988	0.987	0.907	0.170	0.195
	[48.01]	[54.38]	[64.97]	[70.90]	[84.35]	[67.63]	[58.97]	[54.16]	[41.89]	[41.62]	[4.08]	[2.48]
Adjusted-R^2	0.9191	0.9488	0.9645	0.9621	0.9760	0.9720	0.9560	0.9470	0.9141	0.8926	0.0742	0.0312
Panel 1B: FF3F												
Alpha (%)	0.002	0.001	0.002	0.001	0.001	0.000	0.000	0.000	-0.001	-0.001	0.001	**-0.005**
	[3.47]	[1.30]	[3.03]	[1.43]	[-0.04]	[-0.11]	[-1.38]	[0.23]	[-0.89]	[-2.15]	[0.98]	**[-1.46]†**
Beta: Market (excess return)	0.988	0.993	1.007	0.960	0.973	0.959	1.014	1.059	1.087	1.030	-0.041	0.086
	[50.27]	[49.77]	[67.93]	[62.58]	[72.35]	[64.16]	[55.08]	[63.12]	[52.49]	[56.81]	[-1.21]	[0.88]
Beta: SMB	0.224	0.139	0.126	0.084	0.024	0.034	-0.067	-0.187	-0.260	-0.318	0.543	0.233
	[7.18]	[6.56]	[8.07]	[4.12]	[1.26]	[2.05]	[-2.42]	[-9.37]	[-9.21]	[-11.72]	[10.69]	[1.51]
Beta: HML	-0.074	-0.042	-0.030	-0.021	-0.012	-0.002	0.071	0.038	0.072	0.089	-0.170	-0.368
	[-2.82]	[-1.91]	[-1.84]	[-1.14]	[-0.70]	[-0.09]	[4.39]	[1.79]	[2.50]	[3.02]	[-3.48]	[-1.30]
Adjusted-R^2	0.9408	0.9576	0.9715	0.9653	0.9762	0.9723	0.9607	0.9639	0.9477	0.9510	0.5085	0.1171
Panel 1C: Carhart 4F												
Alpha (%)	0.002	0.001	0.002	0.001	0.000	0.000	0.000	0.000	-0.001	-0.001	**0.001**	**-0.004**
	[3.27]	[0.83]	[3.09]	[1.33]	[-0.08]	[0.03]	[0.05]	[1.37]	[-0.76]	[-2.05]	**[1.86]***	**[-1.33]†**
Beta: Market (excess return)	0.985	0.985	1.011	0.963	0.972	0.962	1.024	1.062	1.091	1.031	-0.045	0.109
	[47.13]	[56.42]	[63.05]	[61.53]	[67.00]	[64.87]	[62.74]	[63.8]	[52.2]	[56.78]	[-1.29]	[1.08]
Beta: SMB	0.229	0.155	0.119	0.078	0.026	0.029	-0.088	-0.193	-0.268	-0.321	0.551	0.186
	[7.20]	[7.64]	[6.35]	[4.12]	[1.37]	[1.79]	[-3.62]	[-9.92]	[-10.11]	[-11.94]	[10.88]	[1.13]
Beta: HML	-0.071	-0.034	-0.034	-0.023	-0.011	-0.004	0.060	0.035	0.068	0.088	-0.166	-0.392
	[-2.68]	[-1.44]	[-1.95]	[-1.30]	[-0.65]	[-0.26]	[3.90]	[1.60]	[2.43]	[2.91]	[-3.32]	[-1.39]
Beta: Momentum	-0.014	-0.041	0.020	0.014	-0.004	0.015	0.055	0.015	0.019	0.006	-0.021	0.123
	[-0.56]	[-1.84]	[0.99]	[0.88]	[-0.25]	[0.75]	[3.39]	[0.75]	[0.73]	[0.31]	[-0.54]	[1.51]
Adjusted-R^2	0.9407	0.9583	0.9716	0.9653	0.9761	0.9723	0.9625	0.9639	0.9477	0.9508	0.5072	0.1225

Panel 1D: Liquidity 2F(1y)												
Alpha (%)	0.003	0.001	0.002	0.001	0.000	0.000	0.000	0.000	-0.001	-0.002	**0.002**	**-0.007**
	[3.32]	[1.50]	[3.58]	[1.47]	[-0.12]	[0.06]	[-0.06]	[-0.52]	[-1.28]	[-1.99]	**[1.43]†**	**[-1.88]***
Beta: Market (excess return)	1.081	1.034	1.044	0.989	1.011	0.995	0.991	0.973	0.946	0.884	0.198	0.337
	[41.36]	[48.29]	[72.05]	[64.63]	[81.77]	[73.48]	[52.51]	[46.65]	[32.71]	[34.02]	[4.20]	[2.87]
Beta: Liquidity	0.010	-0.020	-0.020	-0.006	0.045	0.037	0.010	-0.024	-0.065	-0.038	0.045	0.229
	[0.28]	[-0.83]	[-0.81]	[-0.37]	[2.96]	[2.23]	[0.45]	[-0.88]	[-1.82]	[-1.22]	[0.73]	[2.12]
Adjusted-R^2	0.9188	0.9488	0.9646	0.9619	0.9770	0.9726	0.9559	0.9470	0.9158	0.8929	0.0730	0.0522
Panel 1E: Mod-FF 4F												
Alpha (%)	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	**0.002**	**-0.003**
	[2.16]	[0.97]	[2.59]	[1.27]	[-0.19]	[0.22]	[-0.05]	[0.42]	[-0.67]	[-0.81]	**[1.93]***	**[-1.59]†**
Beta: Market (excess return)	1.049	0.998	1.019	0.960	0.980	0.956	1.001	1.046	1.067	0.983	0.066	0.090
	[53.31]	[49.93]	[72.78]	[57.97]	[69.18]	[66.36]	[54.12]	[59.38]	[47.24]	[55.83]	[2.12]	[0.94]
Beta: SMB	0.200	0.137	0.122	0.084	0.021	0.035	-0.062	-0.182	-0.253	-0.300	0.500	0.231
	[7.65]	[6.56]	[7.75]	[4.11]	[1.12]	[2.09]	[-2.24]	[-9.53]	[-9.47]	[-13.55]	[13.42]	[1.52]
Beta: HML	0.033	-0.031	-0.010	-0.020	0.001	-0.007	0.049	0.013	0.035	0.005	0.028	-0.348
	[1.25]	[-1.33]	[-0.62]	[-0.99]	[0.06]	[-0.36]	[2.59]	[0.56]	[1.22]	[0.21]	[0.71]	[-1.12]
Beta: Mod-FF	0.593	0.060	0.110	0.001	0.071	-0.033	-0.122	-0.137	-0.201	-0.465	1.058	0.079
	[9.88]	[1.05]	[2.77]	[0.02]	[1.69]	[-0.83]	[-2.68]	[-3.10]	[-3.08]	[-9.55]	[12.85]	[0.31]
Adjusted R^2	0.9615	0.9574	0.9720	0.9651	0.9764	0.9722	0.9615	0.9650	0.9503	0.9684	0.7352	0.1111
Panel 1F: Free Float 2F(1y)												
Alpha (%)	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.000	-- --	-- --
	[1.27]	[-0.25]	[2.32]	[0.53]	[-0.42]	[0.48]	[1.80]	[1.23]	[1.14]	[1.27]		
Beta: Market (excess return)	0.990	1.007	1.026	0.976	0.976	0.978	1.017	1.036	1.052	0.990	-- --	-- --
	[127.51]	[60.86]	[75.25]	[67.21]	[82.61]	[67.16]	[56.46]	[87.57]	[60.23]	[127.51]		
Beta: Free Float	0.504	0.236	0.176	0.098	0.037	-0.034	-0.192	-0.285	-0.391	-0.496	-- --	-- --
	[28.83]	[9.06]	[7.83]	[3.64]	[1.99]	[-1.83]	[-6.90]	[-15.29]	[-17.95]	[-28.38]		
Adjusted-R^2	0.9874	0.9650	0.9735	0.9651	0.9764	0.9723	0.9682	0.9734	0.9625	0.9828	-- --	-- --
Panel 2: Free Float deciles (US universe)												
Panel 2A: CAPM												
Alpha (%)	0.005	0.001	0.000	0.000	0.000	-0.001	-0.002	-0.003	-0.002	-0.002	**0.004**	**-0.004**
	[4.92]	[1.44]	[0.14]	[0.18]	[-0.61]	[-1.80]	[-2.75]	[-3.74]	[-2.56]	[-1.91]	**[2.64]****	**[-1.92]***
Beta: Market (excess return)	1.100	1.101	1.078	1.054	1.002	1.029	0.980	0.959	0.886	0.804	0.296	0.151
	[55.79]	[71.71]	[58.41]	[34.18]	[71.44]	[39.78]	[55.21]	[42.68]	[48.29]	[64.24]	[10.85]	[2.41]
Adjusted-R^2	0.9357	0.9660	0.9691	0.8584	0.9696	0.9407	0.9719	0.9674	0.9629	0.9391	0.3411	0.0497
Panel 2B: FF3F												

Alpha (%)	0.004	-0.001	0.000	0.000	-0.001	-0.001	-0.001	-0.002	-0.001	0.001	**0.001**	**-0.006**
	[3.34]	[-0.82]	[-0.57]	[-0.32]	[-1.26]	[-2.01]	[-1.88]	[-2.60]	[-1.25]	[0.80]	**[1.58]** †	**[-3.16]****
Beta: Market (excess return)	1.087	1.097	1.062	1.054	0.979	1.026	0.980	0.962	0.884	0.847	0.242	0.148
	[37.85]	[56.34]	[58.31]	[25.46]	[60.13]	[40.91]	[49.35]	[40.59]	[45.53]	[46.03]	[5.64]	[1.66]
Beta: SMB	0.102	0.107	0.054	0.042	0.054	0.002	-0.047	-0.069	-0.067	-0.191	0.286	0.156
	[2.49]	[4.87]	[2.48]	[1.48]	[2.20]	[0.06]	[-2.44]	[-3.27]	[-3.40]	[-6.89]	[4.62]	[1.86]
Beta: HML	-0.055	-0.105	0.008	-0.048	0.041	0.009	0.053	0.064	0.082	0.023	-0.082	-0.163
	[-1.12]	[-2.82]	[0.30]	[-1.41]	[1.46]	[0.34]	[1.97]	[3.33]	[3.36]	[0.83]	[-1.17]	[-1.14]
Adjusted-R^2	0.9380	0.9701	0.9698	0.8579	0.9712	0.9402	0.9729	0.9694	0.9659	0.9576	0.4469	0.0709
Panel 2C: Carhart 4F												
Alpha (%)	0.004	-0.001	-0.001	-0.001	0.000	-0.001	-0.001	-0.002	0.000	0.001	**0.000**	**-0.007**
	[3.20]	[-1.11]	[-0.74]	[-1.77]	[-0.66]	[-1.91]	[-1.19]	[-3.01]	[-0.47]	[1.30]	**[1.43]** †	**[-3.16]****
Beta: Market (excess return)	1.061	1.085	1.052	0.971	1.010	1.032	1.021	0.952	0.930	0.873	0.191	0.124
	[36.17]	[59.18]	[51.68]	[22.88]	[62.41]	[40.16]	[64.31]	[35.23]	[70.76]	[36.15]	[3.90]	[1.62]
Beta: SMB	0.124	0.117	0.062	0.114	0.027	-0.002	-0.082	-0.060	-0.107	-0.214	0.331	0.177
	[3.05]	[5.51]	[2.63]	[2.03]	[1.22]	[-0.06]	[-4.10]	[-2.46]	[-6.15]	[-6.56]	[5.08]	[2.24]
Beta: HML	-0.062	-0.108	0.005	-0.072	0.050	0.010	0.064	0.061	0.095	0.031	-0.097	-0.170
	[-1.32]	[-3.00]	[0.20]	[-1.15]	[1.95]	[0.39]	[2.97]	[3.04]	[4.95]	[1.26]	[-1.52]	[-1.17]
Beta: Momentum	0.040	0.018	0.015	0.128	-0.048	-0.008	-0.062	0.016	-0.072	-0.040	0.079	0.038
	[1.13]	[0.84]	[0.64]	[1.10]	[-4.09]	[-0.31]	[-5.70]	[0.81]	[-7.65]	[-2.50]	[1.88]	[0.87]
Adjusted-R^2	0.9391	0.9703	0.9699	0.8707	0.9734	0.9400	0.9770	0.9695	0.9724	0.9599	0.4707	0.0704
Panel 2D: Liquidity 2F (1y)												
Alpha (%)	0.005	0.001	0.001	0.000	0.000	-0.002	-0.002	-0.002	-0.002	-0.001	**0.003**	**-0.005**
	[4.44]	[1.45]	[0.76]	[0.28]	[-0.63]	[-3.02]	[-2.88]	[-3.34]	[-1.94]	[-1.54]	**[2.09]***	**[-2.33]***
Beta: Market (excess return)	1.124	1.099	1.062	1.051	1.003	1.056	0.986	0.947	0.875	0.792	0.330	0.169
	[47.27]	[73.62]	[73.92]	[29.23]	[68.86]	[24.94]	[63.54]	[39.50]	[46.44]	[54.97]	[10.33]	[3.12]
Beta: Liquidity	0.082	-0.005	-0.054	-0.011	0.004	0.092	0.021	-0.041	-0.038	-0.039	0.116	0.062
	[1.84]	[-0.25]	[-2.56]	[-0.41]	[0.20]	[1.12]	[0.84]	[-1.85]	[-2.07]	[-1.86]	[2.01]	[0.80]
Adjusted-R^2	0.9381	0.9659	0.9702	0.8578	0.9694	0.9443	0.9720	0.9681	0.9637	0.9400	0.3657	0.0503
Panel 2E: Mod-FF 4F												
Alpha (%)	0.005	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001	0.001	**0.005**	**-0.002**
	[8.18]	[-1.08]	[-0.79]	[-0.80]	[-1.40]	[-2.13]	[-1.99]	[-2.82]	[-1.41]	[0.32]	**[7.82]****	**[-1.32]**†
Beta: Market (excess return)	0.917	1.088	1.064	1.087	0.997	1.027	1.004	0.984	0.919	0.932	-0.016	-0.066
	[59.13]	[55.57]	[49.28]	[18.55]	[49.93]	[40.04]	[49.18]	[50.67]	[55.47]	[77.38]	[-1.42]	[-0.84]
Beta: SMB	0.172	0.110	0.053	0.028	0.047	0.002	-0.057	-0.078	-0.080	-0.225	0.397	0.250
	[8.68]	[5.08]	[2.42]	[0.83]	[1.85]	[0.05]	[-2.95]	[-4.04]	[-4.23]	[-12.37]	[16.57]	[3.21]
Beta: HML	0.035	-0.100	0.007	-0.066	0.031	0.009	0.040	0.052	0.064	-0.021	0.056	-0.047
	[1.63]	[-2.69]	[0.24]	[-1.63]	[1.13]	[0.33]	[1.79]	[2.52]	[3.44]	[-1.33]	[3.21]	[-0.44]

Beta: Mod-FF	0.678	0.038	-0.007	-0.133	-0.073	-0.001	-0.093	-0.089	-0.139	-0.340	1.018	0.843
	[13.89]	[0.88]	[-0.16]	[-1.72]	[-1.73]	[-0.02]	[-2.58]	[-2.23]	[-3.92]	[-11.68]	[24.6]	[4.63]
Adjusted R^2	0.9807	0.9702	0.9697	0.8589	0.9717	0.9400	0.9739	0.9703	0.9687	0.9777	0.9310	0.2702
Panel 2F: Free Float 2F (1y)												
Alpha (%)	0.001	0.000	0.000	0.001	0.000	-0.001	-0.001	-0.002	-0.001	0.001	-- --	-- --
	[1.11]	[0.38]	[-0.12]	[0.43]	[-0.27]	[-1.92]	[-1.62]	[-1.68]	[-0.88]	[1.11]		
Beta: Market (excess return)	0.916	1.068	1.070	1.073	1.010	1.030	1.015	0.993	0.939	0.916	-- --	-- --
	[70.03]	[57.95]	[52.60]	[23.38]	[48.10]	[42.66]	[51.73]	[48.24]	[47.80]	[70.03]		
Beta: Free Float	0.621	0.109	0.027	-0.063	-0.027	-0.005	-0.116	-0.115	-0.178	-0.379	-- --	-- --
	[18.33]	[3.06]	[0.75]	[-1.08]	[-0.66]	[-0.11]	[-3.32]	[-3.89]	[-5.76]	[-11.18]		
Adjusted-R^2	0.9865	0.9675	0.9690	0.8583	0.9695	0.9404	0.9741	0.9696	0.9695	0.9746	-- --	-- --

Table 6 Empirical results for 10 decile portfolios sorted on free float, liquidity, size and book to market value for the Japan and US S&P 1500 universes

This table reports regression Jensen alpha coefficients with t-statistics, the beta coefficients for free float FMP with t-statistics and explanatory power (Adjusted-R^2) for the Free Float 2F model applied to the returns of 10 decile portfolios sorted on free float, liquidity, size and book to market value. This is for the universes of Japan (panel 1) and the US (panel 2). The 10-year US Treasury yield is used as the risk-free rate. Heteroskedasticity and autocorrelation consistent (HAC) standard errors & covariance. Numbers in square brackets are t-statistics. †, *, ** indicates significance at the 10%, 5%, and 1% level, respectively.

Panel 1: Japan	**Free Float**			**Liquidity**		
	Alpha	**Beta**	**Adj-R^2**	**Alpha**	**Beta**	**Adj-R^2**
D1 (Low)	0.000 [1.27]	0.504 [28.83]	0.9874	-0.002 [-1.67]*	0.373 [4.92]	0.8778
D2	0.000 [-0.25]	0.236 [9.06]	0.9650	0.001 [0.51]	-0.179 [-3.75]	0.9155
D3	0.001 [2.32]**	0.176 [7.83]	0.9735	0.000 [0.57]	-0.264 [-7.92]	0.9573
D4	0.000 [0.53]	0.098 [3.64]	0.9651	0.001 [1.17]	-0.406 [-11.06]	0.9525
D5	0.000 [-0.42]	0.037 [1.99]	0.9764	0.001 [1.54] †	-0.398 [-8.20]	0.9388
D6	0.000 [0.48]	-0.034 [-1.83]	0.9723	0.000 [0.05]	-0.255 [-7.02]	0.9378
D7	0.001 [1.80]*	-0.192 [-6.90]	0.9682	0.001 [0.68]	0.091 [1.36]	0.9161
D8	0.001 [1.23]	-0.285 [-15.29]	0.9734	0.001 [1.10]	0.197 [2.80]	0.8930
D9	0.001 [1.14]	-0.391 [-17.95]	0.9625	0.001 [1.61] †	0.272 [7.05]	0.9134
D10 (High)	0.000 [1.27]	-0.496 [-28.38]	0.9828	-0.002 [-1.58] †	0.446 [10.37]	0.8362
	Size			**BTMV**		
D1 (Low)	0.004 [1.30] †	0.949 [11.68]	0.8829	-0.001 [-1.36] †	0.559 [22.04]	0.9803
D2	0.002 [3.64]***	0.342 [12.83]	0.9504	0.000 [0.61]	0.267 [11.96]	0.9665
D3	0.001 [1.54] †	0.212 [7.80]	0.9426	0.000 [0.41]	0.198 [8.85]	0.9754
D4	0.000 [0.35]	0.089 [2.83]	0.9492	0.000 [-0.02]	0.110 [5.21]	0.9687
D5	0.000 [-0.54]	-0.038 [-1.50]	0.9507	0.000 [0.16]	0.036 [1.76]	0.9719
D6	0.000 [-0.59]	-0.142 [-5.92]	0.9574	0.000 [-0.20]	-0.004 [-0.26]	0.9743
D7	-0.001 [-0.91]	-0.321 [-11.59]	0.9625	0.001 [1.87]*	-0.177 [-6.73]	0.9738
D8	-0.001 [-1.45] †	-0.417 [-15.82]	0.9617	0.001 [2.58]***	-0.264 [-17.24]	0.9759
D9	-0.001 [-1.26]	-0.417 [-16.75]	0.9538	0.000 [0.67]	-0.366 [-15.33]	0.9643
D10 (High)	-0.002 [-1.12]	-0.429 [-11.51]	0.8840	0.000 [0.58]	-0.460 [-26.56]	0.9814
Panel 2: US	**Free Float**			**Liquidity**		
D1 (Low)	0.001 [1.11]	0.621 [18.33]	0.9865	0.000 [0.34]	0.075 [1.13]	0.8899
D2	0.000 [0.38]	0.109 [3.06]	0.9675	-0.003 [-2.87]***	0.113 [1.30]	0.9387
D3	0.000 [-0.12]	0.027 [0.75]	0.9690	-0.003 [-3.06]***	0.007 [0.17]	0.9615
D4	0.001 [0.43]	-0.063 [-1.08]	0.8583	-0.003 [-3.97]***	-0.055 [-1.94]	0.9746
D5	0.000 [-0.27]	-0.027 [-0.66]	0.9695	-0.002 [-2.18]*	-0.145 [-3.81]	0.9683
D6	-0.001 [-1.92]*	-0.005 [-0.11]	0.9404	-0.001 [-2.19]*	-0.108 [-3.61]	0.9630
D7	-0.001 [-1.62] †	-0.116 [-3.32]	0.9741	-0.001 [-0.99]	-0.119 [-2.66]	0.9534
D8	-0.002 [-1.68]*	-0.115 [-3.89]	0.9696	0.003 [1.71]*	-0.190 [-3.02]	0.7896
D9	-0.001 [-0.88]	-0.178 [-5.76]	0.9695	0.002 [2.26]*	-0.061 [-1.05]	0.9036
D10 (High)	0.001 [1.11]	-0.379 [-11.18]	0.9746	0.006 [4.61]***	0.439 [5.29]	0.8480
	Size			**BTMV**		
D1 (Low)	0.015 [7.30]***	0.600 [5.89]	0.8301	0.002 [3.86]***	0.513 [9.34]	0.9720
D2	0.001 [1.12]	0.216 [3.52]	0.9398	0.000 [0.21]	0.139 [3.60]	0.9709
D3	0.000 [0.25]	0.104 [2.28]	0.9515	-0.001 [-1.64] †	0.018 [0.53]	0.9701
D4	-0.003 [-4.17]***	0.062 [1.34]	0.9597	0.000 [0.18]	-0.012 [-0.20]	0.8481
D5	-0.003 [-5.17]***	0.007 [0.21]	0.9688	0.000 [-0.35]	-0.029 [-0.68]	0.9746
D6	-0.003 [-4.44]***	-0.098 [-3.27]	0.9707	0.000 [-0.58]	0.018 [0.23]	0.9278
D7	-0.002 [-2.30]**	-0.201 [-4.34]	0.9555	-0.001 [-2.30]*	-0.090 [-3.34]	0.9717
D8	-0.002 [-3.10]***	-0.167 [-5.77]	0.9598	-0.001 [-1.57]	-0.075 [-1.88]	0.9697
D9	-0.002 [-1.82]*	-0.266 [-4.83]	0.9334	-0.001 [-0.88]	-0.181 [-7.79]	0.9703
D10 (High)	-0.003 [-2.03]*	-0.317 [-5.10]	0.8610	0.001 [1.36] †	-0.354 [-10.35]	0.9683

Table 7 Time series regression tests on CAPM and multifactor models using monthly excess returns for decile liquidity-sorted portfolios through annual and monthly rebalancing, momentum and country portfolios for January 2004 – June 2020

The regressions use the CAPM, three factor Fama and French (1993) size and book-to-market augmented CAPM, the Carhart (1997) four-factor CAPM including size, book-to-market and momentum factors and the Liu (2006) two-factor liquidity-augmented CAPM which uses two separate liquidity factors – one from annual rebalancing and holding periods and the second from monthly rebalancing and annual holding periods. The GRS statistic tests whether all intercepts in a set of test portfolios (assets) regressions are zero; |a| is the average absolute intercept for a set of regressions; R^2 is the average adjusted-R^2; and SE (model) is the average standard error of the overall models. In order to avoid collinearity issues in estimation we have dropped the extreme D1 and D10 portfolios in each case – where these have been used to form the aggregate returns-based valuation factors. Collinearity is an issue given the GRS statistic is of the same dimensions as factors – in being focused on the cross section of the stock returns.

Panel 1: Japan universe	**Decile (FF-1y) portfolios**				**Decile (Liquidity-1y) portfolios**			
	R^2	SE (model)	|a|	GRS	R^2	SE (model)	|a|	GRS
CAPM	0.9452	0.00065	0.00101	22.93***	0.8837	0.00101	0.00110	15.03***
FF3F CAPM	0.9606	0.00057	0.00077	20.52***	0.9074	0.00093	0.00088	**10.77*** **
Carhart 4F (incl mom) CAPM	0.9609	0.00057	0.00073	26.20***	0.9075	0.00094	0.00082	13.33***
Liquidity (1yr) 2F CAPM	0.9455	0.00065	0.00100	24.78***	0.9084	0.00088	0.00095	12.12***
Mod-FF 4F CAPM	0.9649	0.00057	0.00055	17.62***	0.9103	0.00096	0.00077	11.06***
Free Float (1yr) 2F CAPM	0.9726	0.00048	0.00055	**13.44*** **	0.9138	0.00089	0.00104	21.66***
	Decile (SMB) portfolios				**Decile (HML) portfolios**			
	R^2	SE (model)	|a|	GRS	R^2	SE (model)	|a|	GRS
CAPM	0.8992	0.00095	0.00294	34.97***	0.9466	0.00066	0.00091	18.88***
FF3F CAPM	0.9297	0.00081	0.00213	32.13***	0.9615	0.00058	0.00073	17.68***
Carhart 4F (incl mom) CAPM	0.9303	0.00080	0.00201	34.98***	0.9617	0.00057	0.00068	22.07***
Liquidity (1yr) 2F CAPM	0.9037	0.00091	0.00292	106.48***	0.9468	0.00066	0.00091	20.10***
Mod-FF 4F CAPM	0.9307	0.00083	0.00197	30.92***	0.9653	0.00058	0.00049	**13.60*** **
Free Float (1yr) 2F CAPM	0.9395	0.00079	0.00135	**14.40*** **	0.9732	0.00049	0.00039	16.41***

Panel 2: US universe	**Decile (FF-1y) portfolios**				**Decile (Liquidity-1y) portfolios**			
	R^2	SE (model)	|a|	GRS	R^2	SE (model)	|a|	GRS
CAPM	0.9480	0.00078	0.00159	41.74***	0.9144	0.00103	0.00276	66.06***
FF3F CAPM	0.9513	0.00076	0.00114	28.47***	0.9181	0.00100	0.00225	**47.08*** **
Carhart 4F (incl mom) CAPM	0.9542	0.00067	0.00113	32.69***	0.9211	0.00090	0.00223	55.96***
Liquidity (1yr) 2F CAPM	0.9489	0.00077	0.00158	41.66***	0.9387	0.00086	0.00234	59.47***
Mod-FF 4F CAPM	0.9582	0.00066	0.00136	149.88***	0.9217	0.00099	0.00243	64.14***
Free Float (1yr) 2F CAPM	0.9579	0.00071	0.00078	**23.02*** **	0.9190	0.00100	0.00237	52.70***
	Decile (SMB) portfolios				**Decile (HML) portfolios**			
	R^2	SE (model)	|a|	GRS	R^2	SE (model)	|a|	GRS
CAPM	0.9240	0.00111	0.00477	82.80***	0.9466	0.00076	0.00155	38.43***
FF3F CAPM	0.9475	0.00088	0.00345	74.54***	0.9502	0.00077	0.00105	26.96***
Carhart 4F (incl mom) CAPM	0.9544	0.00080	0.00305	86.10***	0.9526	0.00070	0.00110	35.39***

Liquidity (1yr) 2F CAPM	0.9271	0.00104	0.00420	78.98***	0.9476	0.00075	0.00153	43.04***
Mod-FF 4F CAPM	0.9478	0.00088	0.00349	106.48***	0.9548	0.00073	0.00119	77.45***
Free Float (1yr) 2F CAPM	0.9330	0.00107	0.00347	**68.97*** **	0.9543	0.00070	0.00080	**26.86*** **

Notes: *p<0.05; **p<0.01; ***p<0.005; (4) HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 5.0000)

Table 8 Time varying parameter model tests on CAPM-type and multifactor models using monthly excess returns for decile liquidity-sorted portfolios through annual and monthly rebalancing, momentum and country portfolios for January 2004 – June 2020

This table reports the average time varying alpha terms, the percentages of the sample for which the lower standard error band is negative (i.e., inferring the alpha lacks statistical significance while negative). Time-varying parameter Kalman filter CAPM-type and multifactor CAPM-based models are used where these are based on CAPM, three factor Fama and French (1993) Size and Book-to-Market augmented CAPM, and Liu (2006) two-factor liquidity-augmented CAPM. ** and bold font denotes the largest (most negative) value of the Akaike information criterion (i.e., the best performing model in accordance to this informational criterion). "N/C" indicates no convergence.

	Time series		**Final state**		**AIC criterion**	**Time series**		**Final state**		**AIC criterion**
	Mean alpha	**% SE (alpha) negative**	**Mean alpha**	**Mean alpha z-statistic**		**Mean alpha**	**% SE (alpha) negative**	**Mean alpha**	**Mean alpha z-statistic**	
Panel 1: Japan universe	Decile (FF-1y) portfolios					Decile (Liquidity-1y) portfolios				
CAPM	0.00122	61.94%	0.00661	0.4353	**-5.359****	0.00146	65.68%	0.00899	0.4302	-4.596
FF3F CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Carhart 4F (incl mom) CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Liquidity (1yr) 2F CAPM	0.00185	59.31%	0.00202	0.3071	-4.402	0.00146	72.07%	0.00273	0.5482	-4.703
Mod-FF 4F CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Free Float (1yr) 2F CAPM	N/C	-- --	-- --	-- --	-- --	0.00104	70.27%	0.00394	0.2520	**-4.917****
	Decile (SMB) portfolios					Decile (HML) portfolios				
CAPM	0.00323	60.27%	0.01175	0.5859	-4.806	0.00110	60.59%	0.00567	0.3568	**-5.382****
FF3F CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Carhart 4F (incl mom) CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Liquidity (1yr) 2F CAPM	0.00395	73.69%	0.00578	0.3164	-4.263	0.00217	78.72%	0.00257	0.1534	-4.511
Mod-FF 4F CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Free Float (1yr) 2F CAPM	0.00254	68.13%	0.00416	0.6518	**-4.897****	N/C	-- --	-- --	-- --	-- --
Panel 2: US universe	Decile (FF-1y) portfolios					Decile (Liquidity-1y) portfolios				
CAPM	0.00127	72.12%	0.00587	0.4163	-5.245	0.00143	73.24%	0.01105	0.6088	-4.969
FF3F CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Carhart 4F (incl mom) CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Liquidity (1yr) 2F CAPM	0.00171	71.35%	0.00406	0.3222	-5.197	0.00140	67.95%	0.00297	0.4264	**-5.213****
Mod-FF 4F CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Free Float (1yr) 2F CAPM	0.00082	70.83%	0.00241	0.1802	**-5.315****	0.00119	73.70%	0.00401	0.2629	-4.858
	Decile (SMB) portfolios					Decile (HML) portfolios				
CAPM	0.00248	68.83%	0.01037	0.5378	-4.865	0.00131	67.82%	0.00606	0.4053	**-5.239****
FF3F CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Carhart 4F (incl mom) CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Liquidity (1yr) 2F CAPM	0.00286	74.07%	0.00545	0.2478	-4.746	0.00135	69.74%	0.00207	0.1331	-5.148
od-FF 4F CAPM	N/C	-- --	-- --	-- --	-- --	N/C	-- --	-- --	-- --	-- --
Free Float (1yr) 2F CAPM	0.00221	70.37%	0.00590	0.5658	**-4.894****	0.00119	73.70%	0.00400	0.2629	-4.858

Appendix Table 1. Datastream variable definitions

All data was sourced from Refinitiv Datastream and Worldscope (accessed through Datastream portal).

Coverage (Index)	No. listed firms	Description
Panel 1: Japan universe		
Tokyo TOPIX Core 30	30	Source: Japan Exchange Group (Tokyo)
Tokyo TOPIX Large 70	70	Source: Japan Exchange Group (Tokyo)
TOPIX 100	100	
Tokyo TOPIX Mid 400	397	Source: Japan Exchange Group (Tokyo)
TOPIX 500	497	
Tokyo TOPIX 1000 excl. 500	498	Source: Japan Exchange Group (Tokyo)
TOPIX 1000	995	
Tokyo TOPIX bottom 1000	1,166	Source: Japan Exchange Group (Tokyo)
TOPIX 2000 (all share)	2,161	
Osaka-Jasdaq	702	Source: Japan Exchange Group (Osaka)
Sapporo	20	Source: Sapporo Securities Exchange
Fukuoka	37	Source: Fukuoka Stock Exchange
Nagoya	68	Source: Nagoya Stock Exchange
Japan overall (incl. bottom 1000)	2,988	
Japan overall (excl. bottom 1000)	1,822	
Panel 2: US universe		
S&P 500	505	Source: Standard & Poors
S&P 400	400	Source: Standard & Poors
S&P 600	601	Source: Standard & Poors
S&P 1500	1,506	

Appendix Table 2. Datastream variable and World Bank governance indicator definitions

All data are from Refinitiv Datastream and Worldscope (accessed through Datastream) with the exception of the six World Bank Governance indices, which are from http://info.worldbank.org/governance/wgi/index.aspx#home

Variable	Definition	Datastream Mnemonic
Datastream items		
Free Float Number of Shares	The percentage of total shares in issue available to ordinary investors (NOSHFF). That means total number of shares (NOSH) less the strategic holdings (NOSHST). In general, only holdings of 5% or more are counted as strategic. Strategic ownership data are collected by the Refinitiv Reuters Ownership team, the data are derived from 11 primary sources, including SEC filings (such as schedule 13D and form 13FD) and the UK Register. Also annual, interim reports, stock exchanges, official regulatory bodies, third party vendors, company websites, approved news sources and direct contact with company investor relations departments. Ownership updates were obtained at end of month prior to August 2009 while after this date values are updated on the 10th and 30th of each month. Strategic holdings are defined as the sum of the following categories of shareholding: (1) Government: State (government) or state (government) institution (NOSHGV) (2) Cross Holdings: Holdings by one company in another (NOSHCO) (3) Pension Fund: Pension funds or Endowment funds (NOSHPF) (4) Investment Co.: Investment banks or institutions seeking a long-term return. Note that holdings by Hedge Funds are not included (NOSHIC) (5) Employees: Employees, or by those with a substantial position in a company that provides significant voting power at an annual general meeting, (typically family members) (NOSHEM) (6) Other holdings: Entities outside one of the above categories (NOSHOF) (7) Foreign block holders: Holdings by an institution domiciled in a country other than that of the issuer (NOSHFR)	NOSHFF
Price	This is the adjusted default official daily closing price. It is denominated in primary units of local currency. Prices are generally based on 'last trade' or an official price fixing. The 'current' prices taken at the close of market are stored each day. These stored prices are adjusted for subsequent capital actions, and this adjusted figure then becomes the default price available.	P
Book to Market Value	This is defined as the inverse of the market value of the ordinary (common) equity divided by the balance sheet value of the ordinary (common) equity in the company (Worldscope item 03501) which is available through Datastream.	BTMV
Traded Volume	This shows the number of shares traded for a stock on a particular day. The data type is reported in thousands. Both daily and non-daily figures are adjusted for capital events. However, if a capital event occurs in the latest period of a non-daily request, then the volume for that particular period only is retrieved as unadjusted.	VO
Number of Shares	This is the total number of ordinary shares that represent the capital of the company. The data type is expressed in thousands.	NOSH

Appendix Table 3. Empirical models

This table outlines the time invariant (Panel A) and the time varying parameter models (Panel B). The time invariant parameter models are estimated by OLS. The conditional betas of the Kalman-filter time-varying parameter models are estimated using the observation equation, where R_{it} and R_{Mt} are the excess returns of the individual and market portfolios, respectively, at time *t* and ε_t is the disturbance term. The exact form of the related transition equation depends on the nature of the stochastic process the betas are assumed to follow and in this case a simple random walk process is imposed, following Brooks et al. (1998). The observation equation and the transition equation constitute the Kalman filter state space model. However, a set of prior conditional values are necessary for the Kalman filter to forecast the future value. This technique uses the first two observations to establish the prior conditions and then estimates the entire series recursively providing conditional estimates of the parameters. The random walk specification imposes a filter on the data where parameters evolve smoothly and are contingent on the observations surrounding time *t*. The exact amount of data around time *t* needed to estimate the coefficients, that is, the dependent variable in state equations, is contingent on their variance and is estimated from the data. This approach is appropriate for the measurement of time evolving risk premiums for market and investor protection factors (Grout and Zalewska, 2006). Thus, one-step ahead predicted states and their associated standard errors are estimated for all FMPs.

Panel A: Time invariant parameter models	**Panel B: Time varying parameter models**
Model 1a: CAPM The standard CAPM can be estimated by OLS regression: $r_{pt} - r_{ft} = \alpha_i + \beta_M (r_{mt} - r_{ft}) + \varepsilon_{it}$	**Model 1b: CAPM** The conditional betas are estimated using the following observation equation: $R_{it} = \alpha_t + \beta_{it}^{Kalman} R_{Mt} + \varepsilon_t, \quad \varepsilon_t \sim N(0,\Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t}, \quad \eta_{\alpha t} \sim N(0,Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t}, \quad \eta_{\beta t} \sim N(0,Q)$ with a set of prior conditional values: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$
Model 2a: FF3F Following Fama and French (1993), additional SMB and HML terms are the size and book-to-market factors and estimated by OLS regression: $r_{pt} - r_{ft} = \alpha_i + \beta_M (r_{mt} - r_{ft}) + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \varepsilon_{it}$	**Model 2b: FF3F** The conditional betas are estimated using the following observation equation: $R_{it} = \alpha_t + \beta_{it}^{Kalman} R_{Mt} + s_i^{Kalman} SMB + h_i^{Kalman} HML + \varepsilon_t, \quad \varepsilon_t \sim N(0,\Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t}, \quad \eta_{\alpha t} \sim N(0,Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t}, \quad \eta_{\beta t} \sim N(0,Q)$ $s_{it}^{Kalman} = s_{it-1}^{Kalman} + \eta_{st}, \quad \eta_{st} \sim N(0,Q)$ $h_{it}^{Kalman} = h_{it-1}^{Kalman} + \eta_{ht}, \quad \eta_{ht} \sim N(0,Q)$ with prior conditional values denoted by: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$ $s_0^{Kalman} \sim N(s_0^{Kalman}, P_0)$

	$h_0^{Kalman} \sim N(h_0^{Kalman}, P_0)$
Model 3a: Carhart 4F Following Carhart (1997), we augment FF3F with the momentum term, which is estimated by OLS regression: $r_{pt} - r_{ft} = \alpha_i + \beta_M (r_{mt} - r_{ft}) + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \beta_{Mom} Mom_t + \varepsilon_{it}$	**Model 3b: Carhart 4F** The conditional betas are estimated using the following observation equation: $R_{it} = \alpha_t + \beta_{it}^{Kalman} R_{Mt} + s_i^{Kalman} SMB + h_i^{Kalman} HML + m_i^{Kalman} Mom + \varepsilon_t,$ $\varepsilon_t \sim N(0, \Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t,} \quad \eta_{\alpha t} \sim N(0, Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t,} \quad \eta_{\beta t} \sim N(0, Q)$ $s_{it}^{Kalman} = s_{it-1}^{Kalman} + \eta_{st,} \quad \eta_{st} \sim N(0, Q)$ $h_{it}^{Kalman} = h_{it-1}^{Kalman} + \eta_{ht,} \quad \eta_{ht} \sim N(0, Q)$ $m_{it}^{Kalman} = m_{it-1}^{Kalman} + \eta_{ht,} \quad \eta_{ht} \sim N(0, Q)$ with prior conditional values denoted by: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$ $s_0^{Kalman} \sim N(s_0^{Kalman}, P_0)$ $h_0^{Kalman} \sim N(h_0^{Kalman}, P_0)$ $m_0^{Kalman} \sim N(m_0^{Kalman}, P_0)$
Model 4a: Liquidity 2F Liu (2006) introduces a two-factor liquidity model, which is estimated by OLS regression: $r_{it} - r_{ft} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + \beta_{Illiq} ILLIQ_t + \varepsilon_{it}$ We use two versions of the investor protection factor, created from the two rebalancing methods, monthly and annual, both with annual holding periods.	**Model 4b: Liquidity 2F** The conditional betas are estimated using following the observation equation: $R_{it} = \alpha_t + \beta_{it}^{Kalman} R_{Mt} + z_i^{Kalman} ILLIQ + \varepsilon_t, \quad \varepsilon_t \sim N(0, \Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t,} \quad \eta_{\alpha t} \sim N(0, Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t,} \quad \eta_{\beta t} \sim N(0, Q)$ $z_{it}^{Kalman} = z_{it-1}^{Kalman} + \eta_{ht,} \quad \eta_{ht} \sim N(0, Q)$ with prior conditional values denoted by: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$ $z_0^{Kalman} \sim N(z_0^{Kalman}, P_0)$
Model 5a: Modified Free Float 4F	**Model 5b: Modified Free Float 4F**

The modified free float is obtained from the residuals from a regression regressing free float on size. These form the fourth factor augmenting the FF3F, which is then estimated by OLS regression: $r_{pt} - r_{ft} = \alpha_i + \beta_M(r_{mt} - r_{ft}) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{Mod\ FF}Mod\_FF_t + \varepsilon_{it}$	The conditional betas are estimated using the following observation equation: $R_{it} = \alpha_t + \beta_{it}^{Kalman}R_{Mt} + s_i^{Kalman}SMB + h_i^{Kalman}HML + m_i^{Kalman}Mod\_FF + \varepsilon_t,$ $\varepsilon_t \sim N(0, \Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t,} \quad \eta_{\alpha t} \sim N(0,Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t,} \quad \eta_{\beta t} \sim N(0,Q)$ $s_{it}^{Kalman} = s_{it-1}^{Kalman} + \eta_{st,} \quad \eta_{st} \sim N(0,Q)$ $h_{it}^{Kalman} = h_{it-1}^{Kalman} + \eta_{ht,} \quad \eta_{ht} \sim N(0,Q)$ $m_{it}^{Kalman} = m_{it-1}^{Kalman} + \eta_{ht,} \quad \eta_{ht} \sim N(0,Q)$ with prior conditional values denoted by: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$ $s_0^{Kalman} \sim N(s_0^{Kalman}, P_0)$ $h_0^{Kalman} \sim N(h_0^{Kalman}, P_0)$ $m_0^{Kalman} \sim N(m_0^{Kalman}, P_0)$
Model 6a: Free Float 2F A two-factor CAPM augmented with the free float factor to account for institutional differences across international markets is proposed and can be stated $E(r_{pt}) - r_{ft} = \beta_M[E(r_{mt}) - r_{ft}] + \beta_{FF}E(FF)$ where r_{pt} is the returns on a portfolio p of stocks at time interval t, r_{mt} is the returns on the market portfolio and r_{ft} the risk-free rate. FF is the free float factor. This can be rearranged and estimated by OLS regression $r_{pt} - r_{ft} = \alpha_i + \beta_M(r_{mt} - r_{ft}) + \beta_{FF}FF_t + \varepsilon_{it}$ where α_i is the constant, β_M is the market coefficient and ε_{it} is an *iid* disturbance term	**Model 6b: Free Float 2F** The conditional betas are estimated using the following observation equation $R_{it} = \alpha_t + \beta_{it}^{Kalman} * R_{Mt} + \beta_{FFit}^{Kalman} * (FF) + \varepsilon_t, \quad \varepsilon_t = N(0,\Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t}, \quad \eta_{st} \sim N(0,Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t}, \quad \eta_{\beta t} \sim N(0,Q)$ $\beta_{FFit}^{Kalman} = \beta_{FFit-1}^{Kalman} + \eta_{st}, \quad \eta_{st} \sim N(0,Q)$ with prior conditional values denoted by: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$ $\beta_{FF0}^{Kalman} \sim N(\beta_{FF0}^{Kalman}, P_0)$

Figure 1
Japan equity market firm sample by market, January 2000 to June 2020

The figure shows the average distribution over time of the sample stocks by market, with the sample size and percentage of the total for each. The sample selection criteria are described in the data section.

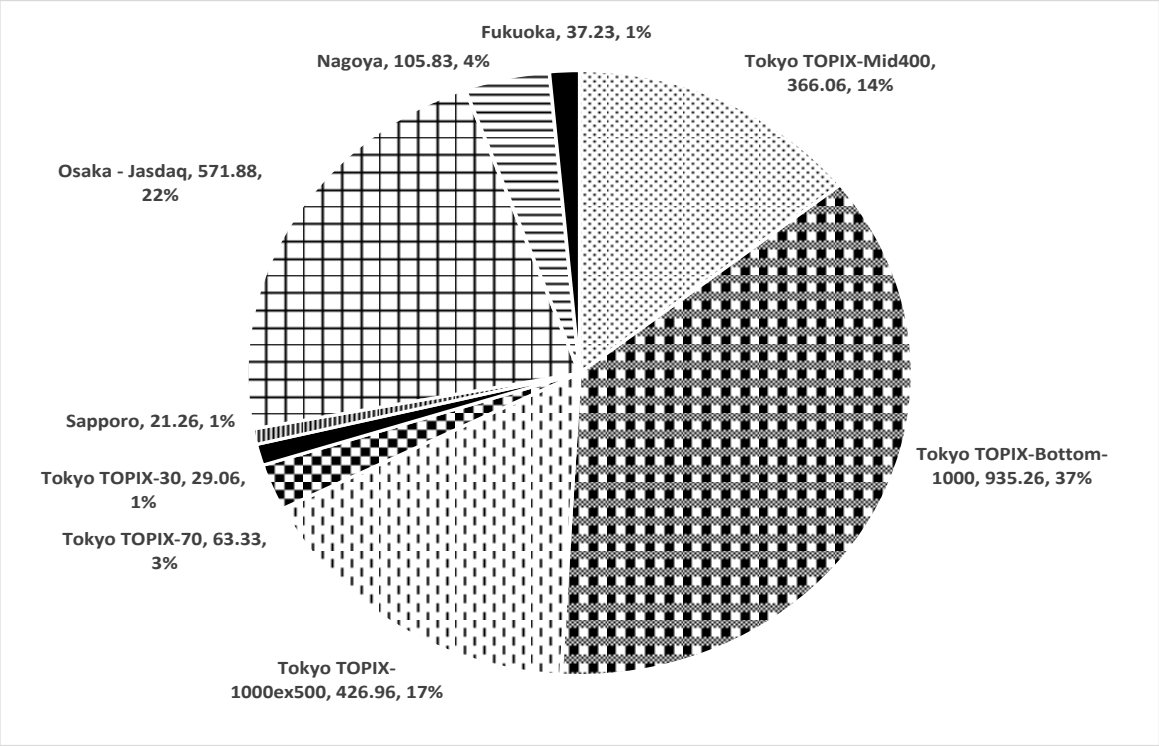
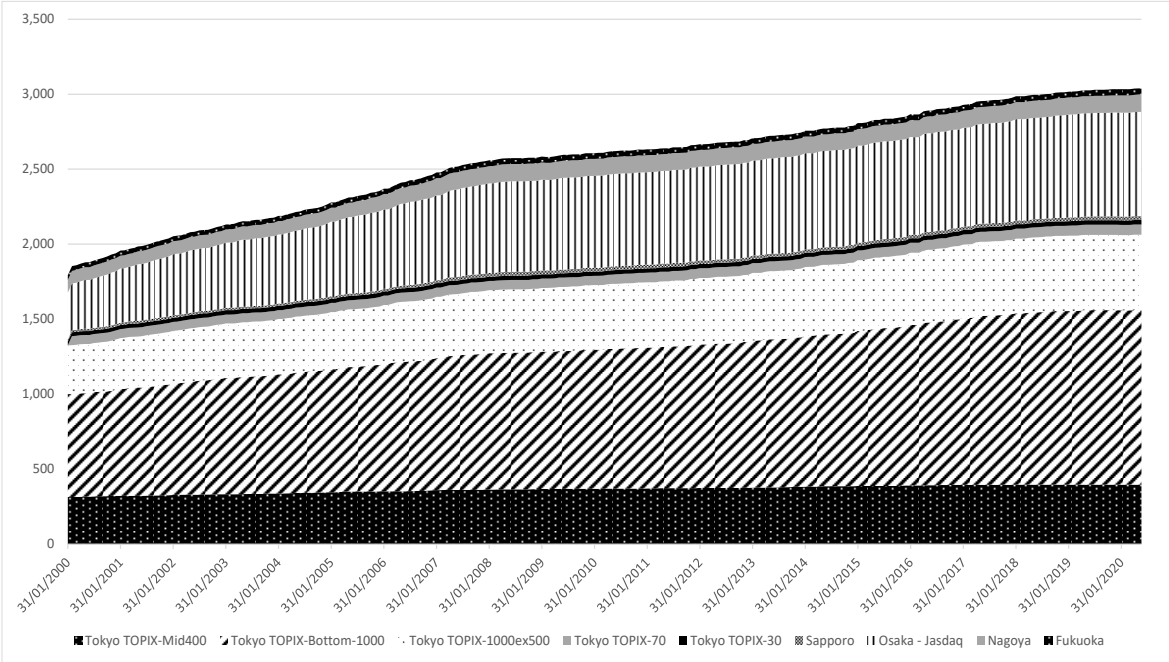


Figure 2
Japan equity market firm sample by month, January 2000 to June 2020

The figure shows the distribution of sample stocks by region and month. The sample selection criteria are described in the data section.



Online Supplementary Appendix

Supplementary Appendix Table 1 Summary of ownership – for Japan and US S&P 1500 universes

This table reports ownership summary statistics for the sample markets. Categories of ownership as defined in Appendix Table 1 citing Thomson Datastream. Cross Holdings: Holdings by one company in another; Employees: Employees, or by those with a substantial position in a company that provides significant voting power at an annual general meeting, (typically family members); Foreign block holders: Holdings by an institution domiciled in a country other than that of the issuer; Government: State (government) or state (government) institution; Investment Co.: Investment banks or institutions seeking a long term return. Note that holdings by Hedge Funds are not included; Pension Fund: Pension funds or Endowment funds; Other holdings: Entities outside one of the above categories

	Cross shareholder networks	**Employee/ Family**	**Foreign**	**State**	**Investment Co.**	**Other**	**Pension Fund**
	%	%	%	%	%	%	%
Panel 1: Japan							
Tokyo TOPIX Core 30	5.04 [0.00]	1.89 [0.00]	1.56 [0.00]	2.83 [0.00]	1.79 [0.00]	0.06 [0.00]	0.00 [0.00]
Tokyo TOPIX Large 70	5.88 [0.00]	0.90 [0.00]	2.25 [0.00]	0.23 [0.00]	1.63 [0.00]	0.05 [0.00]	0.00 [0.00]
Tokyo TOPIX Mid 400	10.72 [0.00]	2.25 [0.00]	1.96 [0.00]	0.01 [0.00]	2.15 [0.00]	0.63 [0.00]	0.00 [0.00]
Tokyo TOPIX 1000 excl. 500	14.60 [9.00]	7.87 [0.00]	1.41 [0.00]	0.07 [0.00]	2.04 [0.00]	0.67 [0.00]	0.01 [0.00]
Tokyo TOPIX bottom 1000	17.52 [13.00]	10.64 [0.00]	0.96 [0.00]	0.01 [0.00]	1.43 [0.00]	0.42 [0.00]	0.01 [0.00]
Osaka - Jasdaq	22.82 [19.00]	16.98 [13.00]	0.96 [0.00]	0.07 [0.00]	0.89 [0.00]	0.58 [0.00]	0.00 [0.00]
Nagoya	26.04 [20.00]	8.37 [0.00]	0.66 [0.00]	0.00 [0.00]	0.28 [0.00]	1.16 [0.00]	0.00 [0.00]
Fukuoka	21.40 [11.50]	12.61 [0.00]	0.11 [0.00]	0.00 [0.00]	0.14 [0.00]	0.80 [0.00]	0.00 [0.00]
Sapporo	31.78 [30.50]	11.14 [0.00]	0.63 [0.00]	0.00 [0.00]	0.04 [0.00]	0.02 [0.00]	0.00 [0.00]
Japan overall	17.55 [12.00]	10.34 [0.00]	1.19 [0.00]	0.07 [0.00]	1.44 [0.00]	0.54 [0.00]	0.00 [0.00]
Panel 2: US							
US S&P 500 New York	4.29 [0.00]	6.81 [0.00]	3.49 [0.00]	0.82 [0.00]	9.00 [6.00]	1.81 [0.00]	0.54 [0.00]
US S&P 500 Nasdaq	5.00 [0.00]	8.35 [0.00]	4.84 [0.00]	0.60 [0.00]	10.02 [6.50]	1.79 [0.00]	0.55 [0.00]
US S&P 500	4.49 [0.00]	7.24 [0.00]	3.86 [0.00]	0.76 [0.00]	9.31 [6.00]	1.85 [0.00]	0.55 [0.00]
US S&P 400 New York	4.77 [0.00]	9.75 [5.00]	2.81 [0.00]	0.21 [0.00]	11.02 [8.00]	1.99 [0.00]	1.03 [0.00]
US S&P 400 Nasdaq	5.99 [0.00]	13.15 [6.00]	3.67 [0.00]	0.14 [0.00]	12.35 [9.00]	2.34 [0.00]	0.67 [0.00]
US S&P 400 [Mid cap]	5.23 [0.00]	11.00 [5.00]	3.13 [0.00]	0.18 [0.00]	11.47 [8.00]	2.07 [0.00]	0.91 [0.00]
US S&P 600 New York	6.86 [0.00]	12.40 [6.00]	4.66 [0.00]	0.33 [0.00]	13.93 [10.00]	2.54 [0.00]	0.81 [0.00]
US S&P 600 Nasdaq	6.60 [0.00]	16.41 [9.00]	4.66 [0.00]	0.12 [0.00]	12.84 [9.00]	1.96 [0.00]	0.49 [0.00]
US S&P 600 [Small cap]	6.75 [0.00]	14.47 [7.00]	4.66 [0.00]	0.22 [0.00]	13.36 [9.00]	2.25 [0.00]	0.65 [0.00]
US S&P 1500	5.58 [0.00]	11.10 [5.00]	3.98 [0.00]	0.39 [0.00]	11.51 [8.00]	2.06 [0.00]	0.68 [0.00]

Supplementary Appendix Table 2 Fama–MacBeth (two-step procedure) regressions of stock returns on beta, size, and valuation ratios

The table reports average slope coefficients from month-by-month Fama–MacBeth regressions for both the Japanese aggregate market and its US S&P 1500 market universe. Individual stock returns are regressed cross-sectionally on stock characteristics as of the previous month. The columns correspond to different regression specifications, with nonempty rows indicating the included regressors. The regressors include pre-ranking CAPM β_t estimated using the past 12 months of daily returns; the log of month-end market cap (log ME); the log of book-to-market (log BM); Mom, namely momentum, with this being the time series average of the percentage cumulative return for each stock over the prior six months, omitting the most recent month, and is monthly, following Jegadeesh and Titman (1993); the Amihud liquidity measure from Amihud (2002) recording the dollar impact in traded volume; the TO or turnover liquidity metric with this being the ratio of daily traded volume over capitalization, the Liu (1 year) metric being the liquidity measure of Liu (2006) estimated over a prior 1 year ranking period; and FF or the free float percentage proportion of listed market capitalization. The last row reports the average adjusted R-squared for each specification. The sample period is January 2001 through June 2020. The t -statistics based on Newey and West (1987) standard errors are reported in brackets.

Panel 1: Japan	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	0.009 [4.64]	0.048 [6.10]	0.045 [5.56]	0.044 [5.78]	0.060 [6.13]	0.048 [5.82]	0.067 [8.12]	0.048 [6.10]	0.015 [5.11]
β_t	0.001 [0.26]	0.002 [0.93]	0.003 [1.07]	0.003 [1.09]	0.001 [0.29]	0.001 [0.29]	0.001 [0.15]	0.002 [0.84]	0.001 [0.47]
Log ME	-- --	-0.002 [-5.27]	-0.002 [-5.11]	-0.002 [-5.42]	-0.003 [-5.17]	-0.002 [-5.48]	-0.003 [-6.24]	-0.002 [-5.88]	-- --
Log BM	-- --	-- --	0.001 [4.46]	0.001 [4.56]	-- --	-- --	-- --	-- --	-- --
Mom	-- --	-- --	-- --	0.001 [-0.03]	-- --	-- --	-- --	-- --	-- --
Amihud Liquidity	-- --	-- --	-- --	-- --	-0.001 [-1.88]	-- --	-- --	-- --	-- --
Turnover Liquidity	-- --	-- --	-- --	-- --	-- --	0.001 [1.46]	-- --	-- --	-- --
Liu Liquidity	-- --	-- --	-- --	-- --	-- --	-- --	-0.003 [-4.45]	-- --	-- --
FF	-- --	-- --	-- --	-- --	-- --	-- --	-- --	0.003 [1.83]	-0.008 [-2.65]
F (prob)	0.07 [0.79]	17.35 [0.00]	26.28 [0.00]	20.60 [0.00]	13.47 [0.00]	13.27 [0.00]	23.48 [0.00]	20.16 [0.00]	4.05 [0.00]
Adj-R^2	0.0336	0.0503	0.0524	0.0575	0.0528	0.0536	0.0513	0.0563	0.0391
Panel 2: US S&P 1500									
Intercept	0.007 [1.29]	0.086 [6.78]	0.079 [6.78]	0.076 [6.59]	0.087 [6.69]	0.086 [6.35]	0.066 [4.07]	0.088 [6.83]	0.020 [3.10]
β_t	0.008 [1.12]	0.006 [0.94]	0.003 [0.58]	0.002 [0.37]	0.002 [0.39]	0.002 [0.38]	0.008 [1.09]	0.007 [0.96]	0.008 [1.11]
Log ME	-- --	-0.004 [-7.87]	-0.003 [-7.47]	-0.003 [-7.36]	-0.003 [-4.31]	-0.004 [-8.51]	-0.003 [-6.97]	-0.004 [-7.76]	-- --
Log BM	-- --	-- --	0.007 [2.57]	0.008 [2.58]	-- --	-- --	-- --	-- --	-- --
Mom	-- --	-- --	-- --	0.001 [0.15]	-- --	-- --	-- --	-- --	-- --
Amihud Liquidity	-- --	-- --	-- --	-- --	0.001 [0.56]	-- --	-- --	-- --	-- --
Turnover Liquidity	-- --	-- --	-- --	-- --	-- --	0.001 [1.15]	-- --	-- --	-- --
Liu Liquidity	-- --	-- --	-- --	-- --	-- --	-- --	0.006 [3.01]	-- --	-- --
FF	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-0.004 [-1.69]	-0.016 [-5.34]
F (prob)	1.26 [0.00]	31.10 [0.00]	24.50 [0.00]	19.52 [0.00]	30.00 [0.00]	29.60 [0.00]	26.83 [0.00]	21.09 [0.00]	14.77 [0.00]
Adj-R^2	0.0505	0.0627	0.0735	0.0873	0.0662	0.0677	0.0687	0.0639	0.0530

Supplementary Appendix Table 3 Factor mimicking portfolio summary statistics – for US S&P 1500 market universe

This table reports the descriptive statistics, autocorrelations (at 1, 6 and 12 lags) for returns-based valuation factors including the Market, the Fama and French (1993) size (SMB) and book to market value (HML), the Jegadeesh and Titman (1993) momentum factor and the Liu (2006) liquidity factor used to explain cross section of stock returns across the market universe. The market universe in this case is the aggregate world and is equal-weighted. All factors are obtained from equal-weighted portfolios while the FF size (SMB) and book-to-market value (HML) factors are value-weighted. Summary statistics are also reported, with t-difference in means, for the highest and lowest liquidity sorted portfolios (used to create the liquidity-based valuation factor). These are based on stock returns, book-to-market value, size (market capitalization US$), stock price, traded volume, monthly bid-ask spread and monthly percentage daily volatility in daily stock returns. Liquidity portfolios D1 and D10 are formed from annual rebalancing. †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively

Panel 1: Descriptive statistics	**Market**	**SMB**	**HML**	**Liquidity (1 year)**	**Liquidity (1 Month)**	**Momentum**	**Free Float (1 year)**	**Free Float (1 Month)**
	Equal weight	Value weight	Value weight	Equal weight	Equal weight	Equal weight	Equal weight	Equal weight
Mean (%)	1.38	1.32	-0.14	0.48	0.42	0.68	1.02	1.04
t-statistic	**4.10****	**5.65****	0.06	**1.72***	**1.54†**	**1.31†**	**5.53****	**5.89****
Standard Deviation (%)	5.54	3.65	3.24	4.28	4.15	6.66	2.81	2.71
Skewness	-0.50	0.21	-0.43	-0.78	-0.81	2.89	0.90	1.06
Kurtosis	5.62	3.70	6.48	20.26	18.38	17.28	5.66	6.17
Jarque-Bera statistic [prob.]	76.97 [0.00]	6.53 [0.04]	125.14 [0.00]	2,929.41 [0.00]	2,331.39 [0.00]	2,312.76 [0.00]	100.53 [0.00]	142.08 [0.00]
Number of months	234	234	234	234	234	234	234	234
Panel 2: Pearson correlations								
Market	1.000							
SMB	0.391**	1.000						
HML (Book to Market value)	0.391**	0.376**	1.000					
Liquidity (1 Year Rebalance)	-0.375**	-0.026	0.055	1.000				
Liquidity (1 Month Rebalance)	-0.366**	-0.009	0.087†	0.978**	1.000			
Momentum	0.452**	-0.067	0.182**	-0.269**	-0.300**	1.000		
Free Float (1 Year Rebalance)	0.587**	0.529**	0.236**	-0.063	-0.066	0.308**	1.000	
Free Float (1 Month Rebalance)	0.576**	0.545**	0.199**	-0.059	-0.061	0.313**	0.981**	1.000
Panel 3: Autocorrelations								
1-Lag	0.067	-0.020	0.171	-0.149	-0.123	0.056	0.054	0.042
6-Lags	-0.167	-0.017	-0.188	-0.006	0.016	-0.053	-0.024	-0.001
12-Lags	0.055	0.048	0.041	0.056	0.070	-0.006	0.084	0.084

Supplementary Appendix Table 4 Descriptive statistics per Free Float sorted decile – for aggregate Japan universe

The first panel provides details of block shareholders per decile-sorted Free Float portfolio by category. These are cross-shareholder networks, employee/family, foreign, state, institutional investor, other, and pension funds. Categories of block shareholder are from Datastream. In the first column a t-difference in means statistical significance confidence level is provided for mean values in decile portfolio D1 in relation to the differences between these and D10. The second panel reveals the distributions of stocks across industry categories for Free Float sorted decile portfolios. Some trends are visibly apparent. The first is a clear trend towards the adoption of higher proportions of free float capitalization in the industries of Basic Materials, Consumer Goods, Financials, Utilities and slightly less pronounced but nevertheless apparent in Industrials. Here there is an progressively increasing concentration of stocks drawn from these industries in the D10 (high Free Float) portfolios as opposed to their D1 (low) counterparts. The second observation is that the opposite trend is apparent with a concentration of stocks drawn from almost all other industries in D1 (low Free Float) where this decreases considerably in progression to D10 (high Free Float). †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**
	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal
Panel 1: Stock count (#) – FF deciles (Japan)										
Basic Materials	11.64	13.00	12.74	15.41	17.13	25.74	26.23	26.72	31.79	26.00
Consumer Discretion	48.92	32.06	27.21	25.09	20.62	17.14	10.24	5.91	1.18	2.79
Consumer Goods	12.36	17.15	22.08	26.13	33.18	32.18	40.44	34.58	41.35	38.64
Consumer Services	30.87	29.33	39.64	40.95	32.54	27.15	25.64	19.13	16.05	18.85
Consumer Staples	12.27	10.28	7.31	7.21	5.15	3.33	3.69	5.38	2.03	1.15
Energy	1.26	0.44	0.23	0.56	0.08	0.00	0.00	0.00	0.00	0.00
Financials	13.67	16.54	14.67	13.04	11.15	9.21	9.95	15.77	25.54	32.00
Health Care	4.72	5.13	3.25	4.28	3.03	2.69	2.83	1.85	1.33	0.74
Industrials	53.99	63.28	68.95	68.47	79.47	82.95	87.10	96.62	93.54	90.97
Oil & Gas	0.85	0.64	0.90	1.26	1.85	1.90	1.92	0.82	0.51	0.05
Real Estate	5.49	3.52	1.88	2.32	1.72	1.44	0.92	0.21	0.51	0.75
Technology	46.48	41.07	34.06	30.54	28.63	25.41	21.69	20.92	16.69	11.41
Telecommunications	4.00	3.33	3.15	2.51	2.41	2.03	1.26	0.31	1.03	0.59
Utilities	1.23	0.82	1.38	0.69	1.26	2.28	3.08	3.38	3.31	7.79
Total	248.31	236.96	237.53	238.47	238.20	233.45	235.00	231.59	234.86	231.74
Panel 2: FF (1yr) deciles (Japan)										
Cross-shareholder networks	**40.09****	30.02	24.98	9.93	10.70	17.21	17.38	13.27	20.47	24.06
Employee/ Family	**13.26****	14.33	12.48	0.92	2.53	3.35	5.33	3.74	8.92	10.03
Foreign	**2.35****	3.02	0.41	1.51	1.20	0.70	1.13	1.07	1.36	0.56
State	**0.00****	0.00	0.00	0.00	0.02	0.01	0.03	0.10	0.37	0.00
Investment companies	**2.07****	0.03	2.21	1.95	1.89	1.47	1.08	1.98	0.98	0.47
Other	**0.00****	1.31	1.12	0.73	0.65	0.38	0.36	0.45	0.27	0.83
Pension Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00

Supplementary Appendix Table 5 Descriptive statistics per Free Float sorted decile – for US S&P1500 universe

The first panel provides details of block shareholders per decile-sorted Free Float portfolio by category. These are cross-shareholder networks, employee/family, foreign, state, institutional investor, other, and pension funds. Categories of block shareholder are from Datastream. In the first column a t-difference in means statistical significance confidence level is provided for mean values in decile portfolio D1 in relation to the differences between these and D10. The second panel reveals the distributions of stocks across industry categories for Free Float sorted decile portfolios. Some trends are visibly apparent. †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**
	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal
Panel 1: Stock count (#) – FF deciles (US)										
Basic Materials	5.26	5.64	6.97	6.49	7.46	5.08	5.82	6.74	4.90	2.54
Consumer Discretion	41.49	29.44	25.59	21.03	19.51	17.90	16.31	18.03	15.44	14.87
Consumer Goods	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Staples	11.10	6.23	5.36	4.36	4.33	4.95	5.10	6.85	7.00	8.54
Energy	5.82	4.72	4.15	5.85	5.13	4.18	7.15	5.41	7.36	8.03
Financials	12.03	12.15	15.05	17.59	18.56	21.67	21.72	25.82	19.08	24.90
Health Care	16.54	14.38	14.72	14.33	12.77	13.21	11.85	10.95	11.08	11.95
Industrials	18.59	26.31	27.87	27.21	25.90	25.67	23.92	19.23	22.31	20.15
Oil & Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Real Estate	5.15	6.54	7.51	9.87	11.00	11.18	10.72	10.79	9.97	5.21
Technology	15.31	15.62	13.26	13.26	13.10	13.67	12.46	10.85	12.56	11.10
Telecommunications	2.54	2.92	2.72	2.72	2.92	3.28	3.38	3.64	3.51	4.85
Utilities	0.69	1.21	1.95	2.46	4.46	4.38	6.72	6.85	11.95	12.03
Total	134.51	125.15	125.15	125.15	125.15	125.15	125.15	125.15	125.15	124.15
Panel 2: FF (1yr) deciles (US)										
Cross-shareholder networks	**6.41****	1.78	1.79	1.90	4.31	2.72	1.15	4.94	4.58	3.13
Employee/ Family	**20.53****	13.37	11.73	7.99	9.44	7.63	5.67	12.30	9.36	5.25
Foreign	**3.50****	1.54	1.79	1.72	1.76	1.18	0.37	3.21	3.06	2.77
State	0.71	0.38	0.00	0.00	0.62	0.00	0.06	0.13	0.17	0.62
Investment companies	**11.54****	15.89	16.53	15.18	13.10	11.35	8.48	12.99	11.67	9.31
Other	**3.50****	3.89	1.28	1.08	1.18	3.44	0.85	2.06	2.19	1.57
Pension Funds	**0.36**†	0.00	1.49	0.56	0.31	0.67	0.74	0.68	0.85	0.60

Supplementary Appendix Table 6 Descriptive statistics per Illiquidity sorted decile – for aggregate Japan universe

The first panel is a breakdown of stock counts per portfolio with respect to Liquidity (1yr) decile-sort portfolios. The second panel provides details of block shareholders per decile-sorted liquidity and then investor protection portfolio by category. These are cross-shareholder networks, employee/family, foreign, state, institutional investor, other, and pension funds. Categories of block shareholder are from Datastream. In the first column a t-difference in means statistical significance confidence level is provided for mean values in decile portfolio D1 in relation to the differences between these and D10. The third reports the descriptive statistics for all ten decile sorted Illiquidity (1yr) portfolios (D1 – D10). These show summary statistics for several stock-characteristic variables per decile-sorted portfolio. These are returns (equally and value weighted decile portfolios), momentum, the Liu-liquidity metric, market capitalization (US$ billions), traded volume (US$ millions), the monthly proportion of daily zero returns (%), mean daily stock closing price (US$), Book-to-market value, free float proportion (%) and the investor protection metric. Panels 1 and 2 report the geographic distribution of stocks across respective Japanese regional markets in terms of their countries of primary listing for illiquidity sorted decile portfolios. In the first column a t-difference in means statistical significance confidence level is provided for mean values in decile portfolio D1 in relation to the differences between these and D10. †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively.

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**
	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal
Panel 1: Stock count (#) – Illiquidity deciles (Japan)										
Tokyo TOPIX Core 30	8.10	6.41	5.56	3.18	2.92	1.59	0.79	0.46	0.00	0.10
Tokyo TOPIX Large 70	10.00	17.90	14.26	9.62	5.72	3.18	2.10	0.46	0.15	0.30
Tokyo TOPIX Mid 400	49.44	75.38	74.85	59.15	41.36	33.79	20.92	7.56	1.67	3.03
Tokyo TOPIX 1000 excl. 500	55.21	68.74	70.85	68.97	54.00	44.90	34.44	18.92	5.36	7.44
Tokyo TOPIX bottom 1000	71.94	60.96	69.08	95.15	129.10	146.56	142.49	123.95	63.95	35.36
Osaka - Jasdaq	64.72	21.90	16.77	15.28	18.16	20.73	46.94	87.93	148.33	135.42
Nagoya	1.00	0.46	0.55	0.64	0.61	0.82	3.18	10.96	23.35	37.72
Fukuoka	0.03	0.00	0.00	0.00	0.15	0.26	0.77	1.38	6.81	19.56
Sapporo	0.21	0.23	0.05	0.05	0.00	0.08	0.32	0.27	2.40	12.03
Total	260.63	251.98	251.96	252.05	252.02	251.91	251.95	251.90	252.02	250.95
Panel 2: Block owners (%) Illiquidity (1yr) deciles (Japan)										
Cross-shareholder networks	**11.59****	11.65	15.15	8.02	10.68	17.20	17.46	13.30	20.52	24.14
Employee/ Family	**10.79***	3.45	4.88	0.91	2.17	3.36	5.36	3.79	9.01	10.14
Foreign	**1.05****	0.51	1.26	1.51	1.12	0.70	1.13	1.06	1.36	0.56
State	**0.00****	0.00	0.00	0.00	0.02	0.01	0.03	0.10	0.37	0.00
Investment companies	**2.39****	1.80	2.38	2.15	1.77	1.47	1.07	1.97	0.98	0.47
Other	**0.00****	0.07	0.27	0.72	0.82	0.38	0.36	0.45	0.27	0.83
Pension Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00

Panel 3: Summary statistics – Liquidity deciles (Japan)										
Returns – equal weight, %	**1.2133†**	1.0334	0.9328	0.9006	0.9354	0.8659	1.1270	1.2379	1.1924	0.8609
Returns – value weight, %	0.3757	0.6892	0.4727	0.2906	0.4496	0.3937	0.3679	0.1172	0.3128	0.2183
Investor Protection metric	**5,558.42****	6,261.95	6,319.44	6,264.41	6,168.62	6,046.31	5,586.79	5,267.75	4,882.40	4,350.78
Free Float (%)	**67.91****	76.19	76.84	76.18	74.99	73.51	67.90	64.27	60.09	58.65
Momentum	**0.0687****	0.0522	0.0453	0.0406	0.0407	0.0358	0.0539	0.0548	0.0526	0.0324
Book to Market value ratio	**0.6720****	0.8980	1.0563	1.1593	1.2069	1.2600	1.3185	1.4999	1.7389	1.7793
Liu Liquidity (1 year)	**15.33****	15.39	15.68	15.60	15.44	16.11	19.92	32.59	60.76	119.33
Bid Ask Spread (%)	**0.75****	0.70	0.63	0.70	0.83	0.96	1.38	2.80	4.43	5.87
Market Cap. (US$ billions)	**0.90****	2.73	3.27	4.02	4.29	4.08	2.59	1.05	0.25	0.19
Traded volume (shares millions)	**28.77****	26.05	19.13	9.24	5.25	3.22	3.31	1.22	0.50	2.60
Daily zero returns per month (%)	**11.29****	10.69	11.31	12.09	13.44	14.97	17.82	25.07	36.00	53.25
Price (mean month, US$)	**10.41****	14.66	15.94	15.75	16.83	17.01	15.07	14.50	14.74	20.00

Supplementary Appendix Table 7 Descriptive statistics per Illiquidity sorted decile – for US S&P1500 universe

The first panel is a breakdown of stock counts per portfolio with respect to Liquidity (1yr) decile-sort portfolios. The second panel provides details of block shareholders per decile-sorted liquidity and then investor protection portfolio by category. These are cross-shareholder networks, employee/family, foreign, state, institutional investor, other, and pension funds. Categories of block shareholder are from Datastream. In the first column a t-difference in means statistical significance confidence level is provided for mean values in decile portfolio D1 in relation to the differences between these and D10. The third reports the descriptive statistics for all ten decile sorted Illiquidity (1yr) portfolios (D1 – D10). These show summary statistics for several stock-characteristic variables per decile-sorted portfolio. These are returns (equally and value weighted decile portfolios), momentum, the Liu-liquidity metric, market capitalization (US$ billions), traded volume (US$ millions), the monthly proportion of daily zero returns (%), mean daily stock closing price (US$), Book-to-market value, free float proportion (%) and the investor protection metric. Panels 1 and 2 report the geographic distribution of stocks across respective Japanese regional markets in terms of their countries of primary listing for illiquidity sorted decile portfolios. In the first column a t-difference in means statistical significance confidence level is provided for mean values in decile portfolio D1 in relation to the differences between these and D10. †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively.

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**
	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal
Panel 1: Stock count (#) – Illiquidity deciles (US)										
US S&P 500 New York	27.62	30.36	33.77	37.36	37.56	40.13	41.44	39.72	26.56	13.41
US S&P 500 Nasdaq	27.54	17.90	15.95	13.18	11.10	10.46	8.59	8.08	6.31	4.33
US S&P 400 [Mid cap] New York	21.54	21.85	22.79	22.72	25.36	25.00	24.59	20.13	19.00	14.26
US S&P 400 [Mid cap] Nasdaq	16.56	14.41	13.05	13.15	10.85	10.23	10.67	9.56	10.59	7.54
US S&P 600 [Small cap] New York	19.59	19.62	18.62	19.23	20.54	19.92	19.51	24.90	28.92	29.44
US S&P 600 [Small cap] Nasdaq	22.21	21.18	21.13	19.67	19.90	19.56	20.51	22.92	33.92	55.33
Total	135.05	125.31	125.31	125.31	125.31	125.31	125.31	125.31	125.31	124.31
Panel 2: Block owners (%) Illiquidity (1yr) deciles (US)										
Cross-shareholder networks	**4.94****	6.30	3.69	3.38	5.58	3.39	2.33	4.95	4.58	3.15
Employee/ Family	**16.60****	12.65	10.24	10.59	9.50	12.27	3.86	12.30	9.39	5.31
Foreign	2.51	3.32	3.08	1.79	3.83	1.74	0.76	3.21	3.07	2.81
State	**0.00****	0.54	0.00	0.00	0.00	0.00	0.00	0.13	0.17	0.62
Investment companies	**12.50****	10.32	14.13	13.62	9.80	13.16	10.90	13.02	11.68	9.32
Other	**2.00***	2.11	6.07	4.38	1.82	4.72	1.33	2.06	2.19	1.57
Pension Funds	**0.87***	0.00	1.44	0.31	1.44	0.32	0.21	0.67	0.85	0.60
Panel 3: Summary statistics – Liquidity deciles (US)										
Returns – equal weight, %	**1.74†**	1.38	1.25	1.13	1.10	1.08	1.10	1.36	1.36	2.22
Returns – value weight, %	**1.00****	0.73	0.71	0.59	0.83	0.66	0.71	0.57	0.64	-0.25

Investor Protection metric	**6,835.88****	6,876.88	6,861.84	6,885.73	6,867.17	6,925.24	6,896.74	6,905.93	6,609.99	5,505.27
Free Float (%)	**81.77****	82.09	81.97	82.27	82.20	82.80	82.60	82.65	79.17	72.03
Momentum	**0.0964****	0.0760	0.0697	0.0623	0.0605	0.0566	0.0602	0.0647	0.0777	0.1391
Book to Market value ratio	**0.4588****	0.4750	0.5003	0.5204	0.5172	0.5205	0.5077	0.5423	0.5414	0.5869
Liu Liquidity (1 year)	**9.07****	9.06	9.07	9.08	9.06	9.06	9.08	9.09	9.14	23.61
Bid Ask Spread (%)	**0.75****	0.89	0.67	0.69	1.07	0.61	1.17	0.87	1.04	2.17
Market Cap. (US$ billions)	**4.69****	5.25	6.96	8.17	9.14	10.12	12.76	15.77	24.77	28.41
Traded volume (shares millions)	**116.59****	62.28	51.13	50.85	41.82	35.41	35.46	37.22	32.77	18.62
Daily zero returns per month (%)	**4.57****	4.68	4.80	4.85	4.91	4.94	4.98	5.19	5.53	10.37
Price (mean month, US$)	**31.08****	36.72	38.25	41.86	48.44	44.06	45.95	43.63	48.93	56.37

Supplementary Appendix Table 8 Empirical results for 10 liquidity, size and book to market value sorted decile portfolios – for aggregate Japanese universe

This table reports the beta coefficients for valuation factors with t-statistics, explanatory power (R^2) and standard errors for the Fama and French (1993) three factor model (size and book to market value), the Carhart (1997) four factor model (size, book to market value and momentum) and the Liu (2006) two factor liquidity model of Liu (2006) in modelling returns of 10 liquidity sorted quintile portfolios (single-pass stock sorting following Liu, 2006). 1y indicates annual rebalancing used in factor formation (as opposed to monthly rebalancing). D1 is the lowest illiquidity and D10 the highest. These portfolios are formed from annual rebalancing using the liquidity metric. 10 year US Treasury yield is used as the risk free rate. HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 5.0000). Numbers in square brackets are t-statistics. †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively.

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**	**D1 - D10**	**D1 - D10**
Weighting:	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Value**
Panel 1: Illiquidity deciles												
Panel 1A: CAPM												
Alpha (%)	-0.001	0.000	-0.001	-0.001	-0.001	-0.001	0.001	0.002	0.003	0.001	**-0.004**	**-0.003**
	[-0.36]	[-0.30]	[-1.22]	[-1.12]	[-0.61]	[-1.51]	[1.09]	[2.43]	[2.90]	[0.40]	**[-1.79]***	**[-1.33]** †
Beta: Market (excess return)	1.362	1.084	1.023	0.997	0.991	0.973	1.031	1.001	0.901	0.740	0.624	0.286
	[22.59]	[28.67]	[48.94]	[41.63]	[34.69]	[38.29]	[27.88]	[25.65]	[45.06]	[22.42]	[8.51]	[2.81]
Adjusted R^2	0.8565	0.9075	0.9364	0.9022	0.8904	0.9167	0.9141	0.8818	0.8864	0.7454	0.429	0.0758
Panel 1B: FF3F												
Alpha (%)	0.002	0.002	0.000	-0.001	-0.001	-0.001	0.000	0.001	0.001	0.000	-0.001	0.002
	[0.96]	[1.81]	[0.07]	[-0.93]	[-0.72]	[-1.78]	[-0.08]	[0.89]	[1.61]	[-0.45]	[-0.28]	[0.69]
Beta: Market (excess return)	1.298	1.144	1.086	1.084	1.075	1.019	1.005	0.967	0.832	0.618	0.681	0.412
	[31.50]	[38.83]	[51.71]	[44.09]	[39.52]	[41.07]	[34.29]	[31.81]	[37.36]	[18.29]	[10.77]	[4.44]
Beta: SMB	0.110	-0.192	-0.177	-0.220	-0.207	-0.108	0.088	0.117	0.200	0.322	-0.211	-0.425
	[2.23]	[-5.08]	[-7.09]	[-5.89]	[-5.64]	[-3.18]	[1.94]	[2.50]	[5.77]	[7.26]	[-3.00]	[-4.51]
Beta: HML	-0.385	-0.183	-0.034	0.095	0.129	0.100	0.110	0.156	0.078	-0.043	-0.349	-0.518
	[-5.20]	[-4.28]	[-1.07]	[2.36]	[2.52]	[3.89]	[2.72]	[3.53]	[2.72]	[-1.05]	[-4.12]	[-5.36]
Adjusted R^2	0.8928	0.9275	0.9484	0.9282	0.9181	0.9273	0.9199	0.8938	0.9059	0.8123	0.4964	0.2358
Panel 1C: Carhart 4F												
Alpha (%)	0.001	0.002	0.000	-0.001	-0.001	-0.001	0.000	0.001	0.001	0.000	-0.001	0.001
	[0.69]	[1.85]	[0.15]	[-0.78]	[-0.73]	[-1.59]	[-0.07]	[0.91]	[1.66]	[-0.42]	[-0.51]	[0.52]
Beta: Market (excess return)	1.279	1.148	1.088	1.090	1.075	1.026	1.006	0.970	0.833	0.619	0.661	0.391
	[27.64]	[37.94]	[51.35]	[40.65]	[39.55]	[41.73]	[32.36]	[31.38]	[35.81]	[17.85]	[9.72]	[4.21]
Beta: SMB	0.147	-0.200	-0.181	-0.232	-0.207	-0.123	0.087	0.111	0.196	0.319	-0.171	-0.383
	[2.86]	[-4.95]	[-6.71]	[-6.26]	[-6.24]	[-3.39]	[2.18]	[2.65]	[5.35]	[7.71]	[-2.47]	[-4.06]
Beta: HML	-0.366	-0.187	-0.036	0.089	0.129	0.093	0.110	0.153	0.077	-0.044	-0.328	-0.497

	[-5.16]	[-4.39]	[-1.29]	[2.27]	[2.50]	[3.59]	[2.87]	[3.7]	[2.65]	[-1.08]	[-4.10]	[-5.31]
Beta: Momentum	-0.1000	0.019	0.012	0.033	0.001	0.039	0.001	0.016	0.010	0.008	-0.108	-0.111
	[-1.52]	[0.61]	[0.50]	[1.24]	[-0.01]	[1.28]	[0.01]	[0.33]	[0.51]	[0.21]	[-1.25]	[-1.34]
Adjusted R^2	0.8953	0.9274	0.9482	0.9285	0.9177	0.928	0.9195	0.8934	0.9056	0.8116	0.5027	0.2403
Panel 1D: Liquidity 2F(1y)												
Alpha (%)	0.000	0.000	-0.001	-0.001	-0.001	-0.001	0.001	0.002	0.002	0.000	-- --	-- --
	[0.09]	[-0.08]	[-1.12]	[-1.06]	[-0.67]	[-1.76]	[1.01]	[2.32]	[3.11]	[0.09]		
Beta: Market (excess return)	0.976	0.938	0.976	0.974	1.015	1.049	1.091	1.057	1.013	0.976	-- --	-- --
	[28.84]	[32.85]	[47.49]	[27.19]	[23.75]	[45.51]	[24.71]	[23.8]	[37.26]	[28.84]		
Beta: Liquidity	-0.621	-0.234	-0.076	-0.037	0.039	0.122	0.096	0.089	0.180	0.379	-- --	-- --
	[-14.16]	[-6.63]	[-2.89]	[-1.04]	[1.01]	[3.87]	[2.40]	[1.99]	[7.02]	[8.65]		
Adjusted R^2	0.9476	0.9289	0.9388	0.9024	0.8907	0.9238	0.9178	0.8850	0.9042	0.8453	-- --	-- --
Panel 1E: Mod-FF 4F												
Alpha (%)	0.001	0.002	0.001	-0.001	-0.001	-0.001	0.001	0.001	0.001	0.001	0.001	**0.004**
	[0.55]	[1.74]	[0.17]	[-0.64]	[-0.65]	[-1.61]	[-0.11]	[0.82]	[1.59]	[-0.31]	[0.58]	**[1.51]†**
Beta: Market (excess return)	1.289	1.124	1.071	1.059	1.063	1.010	1.007	0.974	0.853	0.664	0.625	0.361
	[29.96]	[36.88]	[47.82]	[42.60]	[40.62]	[39.12]	[33.09]	[29.49]	[36.09]	[20.17]	[9.78]	[4.00]
Beta: SMB	0.114	-0.184	-0.171	-0.210	-0.202	-0.105	0.087	0.114	0.192	0.304	-0.190	-0.406
	[2.24]	[-4.9]	[-7.06]	[-5.89]	[-5.60]	[-3.15]	[1.92]	[2.45]	[5.54]	[7.14]	[-2.61]	[-4.35]
Beta: HML	-0.400	-0.220	-0.063	0.051	0.106	0.083	0.110	0.167	0.119	0.043	-0.443	-0.603
	[-5.44]	[-4.84]	[-2.02]	[1.27]	[2.22]	[2.64]	[2.85]	[3.80]	[3.91]	[1.09]	[-5.22]	[-5.91]
Beta: Mod-FF	-0.071	-0.197	-0.158	-0.240	-0.121	-0.091	0.003	0.061	0.219	0.463	-0.533	-0.491
	[-0.57]	[-2.25]	[-2.92]	[-3.61]	[-1.52]	[-1.20]	[0.05]	[0.79]	[2.95]	[4.50]	[-2.70]	[-1.86]
Adjusted R^2	0.8917	0.9292	0.9499	0.9317	0.9186	0.9275	0.9195	0.8934	0.9093	0.8331	0.5156	0.2478
Panel 1F: Free Float 2F(1y)												
Alpha (%)	-0.002	0.001	0.000	0.001	0.001	0.000	0.001	0.001	0.001	-0.002	-0.003	-0.002
	[-1.67]	[0.51]	[0.57]	[1.17]	[1.54]	[0.05]	[0.68]	[1.10]	[1.61]	[-1.58]	[-1.03]	[-0.65]
Beta: Market (excess return)	1.299	1.114	1.067	1.065	1.057	1.016	1.016	0.968	0.855	0.665	0.636	0.327
	[25.61]	[30.86]	[59.03]	[53.94]	[46.21]	[46.34]	[32.83]	[31.79]	[47.73]	[22.56]	[9.29]	[3.08]
Beta: Investor Protect	0.373	-0.179	-0.264	-0.406	-0.398	-0.255	0.091	0.197	0.272	0.446	-0.069	-0.246
	[4.92]	[-3.75]	[-7.92]	[-11.06]	[-8.20]	[-7.02]	[1.36]	[2.80]	[7.05]	[10.37]	[-0.74]	[-2.26]
Adjusted R^2	0.8778	0.9155	0.9573	0.9525	0.9388	0.9378	0.9161	0.893	0.9134	0.8362	0.4283	0.0917
Panel 2: SMB deciles												
Panel 2A: CAPM												
Alpha (%)	0.008	0.004	0.002	0.001	-0.001	-0.001	-0.002	-0.003	-0.003	-0.004	**0.010**	**0.006**

	[3.68]	[5.19]	[2.90]	[1.00]	[-0.83]	[-1.81]	[-2.83]	[-3.45]	[-3.84]	[-3.03]	**[3.23]****	**[1.49]** †
Beta: Market (excess return)	1.418	1.078	0.943	0.947	0.930	0.936	0.982	1.020	0.927	0.766	0.653	0.603
	[19.85]	[45.75]	[42.22]	[55.11]	[52.59]	[50.58]	[50.74]	[47.29]	[46.77]	[21.14]	[7.11]	[6.79]
Adjusted R^2	0.7669	0.9194	0.9271	0.9466	0.9504	0.9502	0.9292	0.9103	0.8928	0.7998	0.2969	0.2359
Panel 2B: FF3F												
Alpha (%)	0.007	0.003	0.001	0.000	-0.001	-0.001	-0.002	-0.003	-0.002	-0.002	**0.006**	0.001
	[3.24]	[4.36]	[1.84]	[0.11]	[-1.24]	[-1.84]	[-2.83]	[-3.31]	[-3.00]	[-2.46]	**[2.55]****	[0.45]
Beta: Market (excess return)	1.229	0.980	0.875	0.906	0.921	0.955	1.042	1.108	1.040	0.931	0.299	0.174
	[17.03]	[41.87]	[42.83]	[57.37]	[47.05]	[42.46]	[41.54]	[46.03]	[55.33]	[47.24]	[3.90]	[2.25]
Beta: SMB	0.496	0.267	0.190	0.113	0.029	-0.045	-0.150	-0.225	-0.312	-0.463	0.960	1.162
	[5.54]	[11.48]	[8.16]	[4.01]	[1.22]	[-1.86]	[-4.86]	[-6.18]	[-11.00]	[-16.79]	[9.92]	[15.36]
Beta: HML	-0.088	0.006	0.025	0.022	0.022	0.037	0.071	0.084	-0.038	-0.101	0.007	0.017
	[-1.03]	[0.25]	[0.93]	[0.78]	[0.91]	[1.78]	[2.29]	[2.88]	[-1.80]	[-4.19]	[0.08]	[0.23]
Adjusted R^2	0.8121	0.9444	0.9433	0.9522	0.9505	0.9518	0.9423	0.9354	0.9371	0.9285	0.5874	0.6353
Panel 2C: Carhart 4F												
Alpha (%)	0.007	0.003	0.001	0.000	-0.001	-0.001	-0.002	-0.003	-0.002	-0.002	**0.006**	0.000
	[2.99]	[4.16]	[2.07]	[0.27]	[-1.08]	[-1.52]	[-2.72]	[-3.19]	[-2.8]	[-2.37]	**[2.30]***	[-0.02]
Beta: Market (excess return)	1.205	0.975	0.880	0.910	0.926	0.963	1.045	1.110	1.044	0.937	0.270	0.132
	[15.78]	[43.96]	[41.35]	[54.21]	[45.61]	[42.26]	[43.25]	[43.94]	[60.24]	[44.38]	[3.26]	[2.05]
Beta: SMB	0.544	0.277	0.180	0.106	0.019	-0.061	-0.157	-0.230	-0.321	-0.474	1.019	1.248
	[6.10]	[10.93]	[8.03]	[3.90]	[0.83]	[-2.39]	[-5.07]	[-6.09]	[-11.78]	[-18.56]	[10.79]	[15.43]
Beta: HML	-0.063	0.011	0.019	0.018	0.016	0.029	0.067	0.081	-0.043	-0.107	0.038	0.062
	[-0.74]	[0.48]	[0.74]	[0.65]	[0.70]	[1.42]	[2.11]	[2.79]	[-1.91]	[-4.43]	[0.44]	[0.78]
Beta: Momentum	-0.128	-0.027	0.027	0.020	0.029	0.042	0.020	0.014	0.023	0.030	-0.159	-0.229
	[-1.38]	[-1.30]	[1.25]	[0.87]	[1.28]	[2.12]	[0.7]	[0.60]	[1.05]	[1.4]	[-1.61]	[-2.44]
Adjusted R^2	0.8154	0.9446	0.9436	0.9522	0.9509	0.9529	0.9423	0.9352	0.9371	0.9290	0.5973	0.6565
Panel 2D: Liquidity 2F (1y)												
Alpha (%)	0.009	0.004	0.002	0.001	-0.001	-0.001	-0.002	-0.003	-0.003	-0.004	**0.010**	**0.006**
	[3.86]	[5.13]	[2.95]	[0.90]	[-1.15]	[-2.12]	[-2.85]	[-3.33]	[-3.83]	[-3.09]	**[3.25]****	**[1.49]** †
Beta: Market (excess return)	1.302	1.116	1.004	1.018	0.997	0.985	0.986	0.989	0.869	0.684	0.618	0.599
	[14.23]	[42.00]	[36.08]	[66.36]	[49.63]	[43.11]	[41.3]	[31.48]	[37.72]	[17.98]	[5.31]	[6.29]
Beta: Liquidity	-0.186	0.062	0.097	0.115	0.108	0.078	0.006	-0.050	-0.093	-0.132	-0.057	-0.005
	[-1.69]	[1.92]	[3.45]	[4.07]	[5.11]	[3.02]	[0.20]	[-1.44]	[-2.92]	[-3.77]	[-0.44]	[-0.04]
Adjusted R^2	0.7727	0.9206	0.9318	0.9536	0.9568	0.9534	0.9289	0.9111	0.8970	0.8111	0.2950	0.2326
Panel 2E: Mod-FF 4F												
Alpha (%)	0.007	0.003	0.001	0.001	-0.001	-0.001	-0.002	-0.003	-0.002	-0.001	**0.008**	**0.003**

	[2.97]	[3.82]	[1.78]	[0.04]	[-1.04]	[-1.84]	[-2.54]	[-3.05]	[-2.90]	[-1.78]	**[3.22]****	**[1.45] †**
Beta: Market (excess return)	1.220	0.994	0.894	0.922	0.926	0.964	1.031	1.090	1.029	0.910	0.309	0.169
	[16.91]	[40.34]	[48.62]	[59.33]	[47.52]	[41.39]	[42.44]	[43.41]	[51.94]	[41.07]	[3.89]	[2.28]
Beta: SMB	0.500	0.262	0.183	0.107	0.027	-0.049	-0.146	-0.218	-0.308	-0.455	0.955	1.163
	[5.50]	[10.98]	[7.86]	[3.70]	[1.11]	[-1.94]	[-4.82]	[-6.06]	[-10.73]	[-16.51]	[9.89]	[15.43]
Beta: HML	-0.104	0.032	0.060	0.050	0.032	0.053	0.051	0.050	-0.057	-0.138	0.034	0.014
	[-1.10]	[1.28]	[2.28]	[1.77]	[1.20]	[2.25]	[1.56]	[1.60]	[-2.38]	[-4.86]	[0.35]	[0.16]
Beta: Mod-FF	-0.081	0.142	0.192	0.151	0.057	0.082	-0.106	-0.181	-0.101	-0.203	0.121	-0.048
	[-0.47]	[2.20]	[3.70]	[2.55]	[1.08]	[1.56]	[-1.96]	[-2.58]	[-1.54]	[-3.45]	[0.64]	[-0.31]
Adjusted R^2	0.8107	0.9452	0.9457	0.9536	0.9504	0.9520	0.9428	0.9372	0.9374	0.9322	0.5858	0.6327
Panel 2E: Free Float 2F (1y)												
Alpha (%)	0.004	0.002	0.001	0.000	0.000	0.000	-0.001	-0.001	-0.001	-0.002	0.004	0.001
	[1.30]	[3.64]	[1.54]	[0.35]	[-0.54]	[-0.59]	[-0.91]	[-1.45]	[-1.26]	[-1.12]	[1.13]	[0.21]
Beta: Market (excess return)	1.258	1.021	0.908	0.932	0.937	0.960	1.036	1.090	0.997	0.838	0.421	0.421
	[24.88]	[47.37]	[44.86]	[55.74]	[51.30]	[48.88]	[58.53]	[70.93]	[71.04]	[26.82]	[7.31]	[5.64]
Beta: Investor Protect	0.949	0.342	0.212	0.089	-0.038	-0.142	-0.321	-0.417	-0.417	-0.429	1.382	1.081
	[11.68]	[12.83]	[7.80]	[2.83]	[-1.50]	[-5.92]	[-11.59]	[-15.82]	[-16.75]	[-11.51]	[16.04]	[8.66]
Adjusted R^2	0.8829	0.9504	0.9426	0.9492	0.9507	0.9574	0.9625	0.9617	0.9538	0.8840	0.7499	0.4940
Panel 3: HML deciles												
Panel 3A: CAPM												
Alpha (%)	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	-0.001	-0.002	0.001	**-0.007**
	[2.10]	[2.27]	[2.05]	[0.95]	[0.49]	[-0.26]	[0.00]	[-0.29]	[-1.61]	[-2.19]	[0.77]	**[-2.10]***
Beta: Market (excess return)	1.109	1.051	1.054	0.992	0.996	0.980	1.001	0.978	1.010	0.909	0.202	0.202
	[40.68]	[53.53]	[60.8]	[74.08]	[73.59]	[68.66]	[62.20]	[61.37]	[52.05]	[43.59]	[4.41]	[2.43]
Adjusted R^2	0.9028	0.946	0.9641	0.9648	0.9716	0.9744	0.9637	0.9525	0.9234	0.9031	0.0951	0.0386
Panel 3B: FF3F												
Alpha (%)	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001	0.000	**-0.006**
	[2.06]	[2.13]	[1.59]	[0.47]	[0.73]	[-0.90]	[-0.41]	[0.34]	[-1.04]	[-2.26]	[0.24]	**[-1.88]***
Beta: Market (excess return)	1.008	0.995	1.001	0.956	0.987	0.963	1.025	1.042	1.102	1.027	-0.018	0.084
	[36.78]	[46.32]	[66.09]	[61.31]	[60.76]	[60.64]	[56.63]	[77.90]	[62.73]	[65.73]	[-0.45]	[0.92]
Beta: SMB	0.255	0.142	0.140	0.095	0.019	0.048	-0.052	-0.167	-0.240	-0.308	0.564	0.281
	[6.52]	[6.35]	[8.00]	[4.74]	[0.90]	[3.01]	[-2.12]	[-9.16]	[-8.77]	[-13.03]	[10.39]	[2.41]
Beta: HML	-0.101	-0.058	-0.033	-0.015	-0.029	0.016	0.065	0.048	0.056	0.069	-0.177	-0.217
	[-3.23]	[-2.43]	[-2.06]	[-0.86]	[-1.58]	[0.86]	[4.84]	[3.08]	[1.82]	[2.53]	[-3.33]	[-0.98]
Adjusted R^2	0.9304	0.956	0.9726	0.9689	0.972	0.9752	0.9671	0.9673	0.95	0.9559	0.5167	0.1017

Panel 3C: Carhart 4F												
Alpha (%)	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001	0.000	**-0.006**
	[1.90]	[1.90]	[1.65]	[0.46]	[0.72]	[-0.85]	[-0.04]	[0.62]	[-0.91]	[-2.20]	[0.14]	**[-1.76]***
Beta: Market (excess return)	1.003	0.986	1.003	0.956	0.987	0.964	1.033	1.048	1.107	1.026	-0.022	0.105
	[33.74]	[53.53]	[59.60]	[59.60]	[57.60]	[62.97]	[57.59]	[71.84]	[64.28]	[67.69]	[-0.53]	[1.18]
Beta: SMB	0.265	0.159	0.135	0.096	0.020	0.046	-0.069	-0.178	-0.249	-0.306	0.573	0.240
	[6.54]	[6.84]	[6.44]	[4.78]	[0.94]	[3.03]	[-2.89]	[-9.88]	[-9.57]	[-13.53]	[10.40]	[2.01]
Beta: HML	-0.096	-0.050	-0.035	-0.015	-0.029	0.015	0.057	0.043	0.052	0.070	-0.172	-0.239
	[-3.05]	[-1.94]	[-2.04]	[-0.84]	[-1.52]	[0.83]	[4.25]	[2.68]	[1.68]	[2.55]	[-3.25]	[-1.09]
Beta: Momentum	-0.027	-0.044	0.013	-0.001	-0.002	0.006	0.044	0.029	0.024	-0.004	-0.023	0.111
	[-0.80]	[-1.94]	[0.69]	[-0.08]	[-0.15]	[0.31]	[3.05]	[1.63]	[1.05]	[-0.23]	[-0.50]	[1.66]
Adjusted R^2	0.9305	0.9569	0.9726	0.9688	0.9718	0.9751	0.9681	0.9677	0.9501	0.9557	0.5154	0.1064
Panel 3D: Liquidity 2F (1y)												
Alpha (%)	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	-0.001	-0.002	0.001	**-0.007**
	[2.06]	[2.31]	[2.06]	[0.96]	[0.42]	[-0.37]	[-0.03]	[-0.27]	[-1.53]	[-2.15]	[0.73]	**[-2.20]***
Beta: Market (excess return)	1.120	1.037	1.050	0.988	1.017	1.005	1.012	0.971	0.970	0.887	0.233	0.324
	[33.42]	[47.58]	[62.5]	[61.85]	[60.06]	[63.18]	[49.31]	[54.19]	[40.73]	[36.07]	[4.36]	[2.66]
Beta: Liquidity	0.018	-0.022	-0.007	-0.006	0.033	0.040	0.018	-0.010	-0.064	-0.035	0.051	0.197
	[0.45]	[-0.91]	[-0.28]	[-0.40]	[2.22]	[2.19]	[0.89]	[-0.4]	[-2.09]	[-1.29]	[0.77]	[1.85]
Adjusted R^2	0.9025	0.9460	0.9639	0.9647	0.9720	0.9751	0.9637	0.9524	0.9250	0.9034	0.0945	0.0555
Panel 3E: Mod-FF 4F												
Alpha (%)	0.001	0.001	0.001	0.001	0.001	-0.001	-0.001	0.001	-0.001	-0.001	0.001	-0.004
	[0.78]	[1.85]	[1.25]	[0.64]	[0.62]	[-0.75]	[-0.08]	[0.60]	[-0.79]	[-0.96]	[1.02]	[-1.14]
Beta: Market (excess return)	1.067	1.004	1.009	0.956	0.992	0.965	1.012	1.030	1.079	0.984	0.083	0.081
	[39.22]	[46.54]	[64.51]	[55.03]	[54.14]	[57.94]	[55.11]	[74.86]	[56.78]	[60.63]	[2.20]	[0.86]
Beta: SMB	0.233	0.139	0.137	0.095	0.017	0.047	-0.047	-0.162	-0.231	-0.291	0.524	0.282
	[6.83]	[6.44]	[7.70]	[4.60]	[0.82]	[2.92]	[-1.92]	[-9.28]	[-9.37]	[-15.37]	[12.64]	[2.48]
Beta: HML	0.002	-0.039	-0.018	-0.014	-0.021	0.020	0.042	0.025	0.013	-0.008	0.009	-0.211
	[0.05]	[-1.52]	[-1.15]	[-0.70]	[-1.10]	[1.02]	[2.63]	[1.40]	[0.43]	[-0.35]	[0.20]	[-0.86]
Beta: Mod-FF	0.571	0.104	0.083	0.005	0.044	0.022	-0.129	-0.127	-0.237	-0.423	0.994	0.002
	[7.66]	[1.97]	[2.13]	[0.09]	[0.92]	[0.58]	[-2.68]	[-2.73]	[-3.98]	[-9.59]	[10.62]	[0.01]
Adjusted R^2	0.9479	0.9563	0.9729	0.9687	0.9719	0.9751	0.9681	0.9683	0.9536	0.9704	0.6957	0.0956
Panel 3E: Free Float 2F (1y)												
Alpha (%)	-0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	**-0.004**	**-0.008**
	[-1.36]	[0.61]	[0.41]	[-0.02]	[0.16]	[-0.20]	[1.87]	[2.58]	[0.67]	[0.58]	**[-7.86]****	**[-2.38]***
Beta: Market (excess return)	1.015	1.006	1.021	0.974	0.990	0.980	1.031	1.022	1.071	0.986	0.030	0.164
	[86.31]	[52.81]	[71.02]	[72.61]	[70.93]	[65.67]	[59.64]	[106.39]	[74.27]	[116.34]	[2.54]	[1.87]

Beta: Investor Protect	0.559	0.267	0.198	0.110	0.036	-0.004	-0.177	-0.264	-0.366	-0.460	1.023	0.222
	[22.04]	[11.96]	[8.85]	[5.21]	[1.76]	[-0.26]	[-6.73]	[-17.24]	[-15.33]	[-26.56]	[56.96]	[1.88]
Adjusted R^2	0.9803	0.9665	0.9754	0.9687	0.9719	0.9743	0.9738	0.9759	0.9643	0.9814	0.9576	0.0521

Supplementary Appendix Table 9 Empirical results for 10 liquidity, size and book to market value sorted decile portfolios – for US S&P 1500 universes

This table reports the beta coefficients for valuation factors with t-statistics, explanatory power (R^2) and standard errors for the Fama and French (1993) three factor model (size and book to market value), the Carhart (1997) four factor model (size, book to market value and momentum) and the Liu (2006) two factor liquidity model of Liu (2006) in modelling returns of 10 liquidity sorted quintile portfolios (single-pass stock sorting following Liu, 2006). 1y indicates annual rebalancing used in factor formation (as opposed to monthly rebalancing). D1 is the lowest illiquidity and D10 the highest. These portfolios are formed from annual rebalancing using the liquidity metric. 10 year US Treasury yield is used as the risk free rate. HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 5.0000). Numbers in square brackets are t-statistics. †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively.

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**	**D1 - D10**	**D1 - D10**
Weighting:	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Value**
Panel 1: Illiquidity deciles												
Panel 1A: CAPM												
Alpha (%)	0.001	-0.002	-0.003	-0.003	-0.003	-0.002	-0.002	0.001	0.002	0.009	**-0.011**	**0.009**
	[0.72]	[-2.03]	[-3.03]	[-4.50]	[-3.58]	[-3.27]	[-2.12]	[1.08]	[1.68]	[5.09]	**[-4.29]****	**[1.45]** †
Beta: Market (excess return)	1.228	1.188	1.115	1.056	0.993	0.914	0.882	0.857	0.809	0.936	0.292	0.122
	[15.41]	[39.53]	[44.92]	[46.13]	[42.86]	[52.99]	[37.03]	[24.75]	[30.85]	[17.71]	[2.37]	[0.73]
Adjusted R^2	0.8898	0.9376	0.9616	0.9743	0.9649	0.9609	0.9507	0.7839	0.9031	0.8179	0.1378	0.0061
Panel 1B: FF3F												
Alpha (%)	0.000	-0.002	-0.002	-0.003	-0.002	-0.002	-0.001	0.001	0.001	0.008	**-0.011**	-0.001
	[-0.16]	[-1.67]	[-2.97]	[-3.88]	[-2.98]	[-2.66]	[-1.41]	[0.95]	[1.52]	[4.88]	**[-4.49]****	[-0.14]
Beta: Market (excess return)	1.255	1.228	1.154	1.074	1.005	0.907	0.871	0.842	0.763	0.873	0.384	0.267
	[16.73]	[37.83]	[42.05]	[50.77]	[45.62]	[54.53]	[32.35]	[17.48]	[26.63]	[17.63]	[3.35]	[1.66]
Beta: SMB	0.049	-0.051	-0.068	-0.066	-0.069	-0.023	-0.014	0.018	0.088	0.148	-0.106	0.442
	[1.23]	[-1.19]	[-2.52]	[-3.12]	[-3.46]	[-0.95]	[-0.57]	[0.47]	[2.65]	[2.73]	[-1.34]	[2.02]
Beta: HML	-0.172	-0.118	-0.097	-0.006	0.028	0.057	0.063	0.048	0.102	0.112	-0.288	-1.136
	[-2.54]	[-2.52]	[-3.32]	[-0.30]	[0.87]	[2.11]	[1.91]	[1.10]	[2.72]	[1.70]	[-2.89]	[-5.34]
Adjusted R^2	0.8936	0.9411	0.9656	0.9756	0.9663	0.9616	0.9516	0.783	0.9128	0.8302	0.1868	0.2513
Panel 1C: Carhart 4F												
Alpha (%)	-0.001	-0.002	-0.003	-0.002	-0.002	-0.001	0.000	0.001	0.002	0.008	**-0.011**	-0.002
	[-0.50]	[-2.23]	[-4.01]	[-3.93]	[-2.48]	[-2.41]	[-0.78]	[0.86]	[1.97]	[4.74]	**[-4.59]****	[-0.41]
Beta: Market (excess return)	1.215	1.196	1.112	1.088	1.041	0.927	0.927	0.789	0.798	0.879	0.339	0.175
	[23.26]	[43.89]	[63.30]	[63.37]	[58.58]	[46.07]	[51.11]	[17.61]	[26.05]	[19.66]	[3.91]	[1.06]
Beta: SMB	0.084	-0.023	-0.031	-0.079	-0.101	-0.041	-0.063	0.064	0.058	0.143	-0.067	0.522
	[1.60]	[-0.59]	[-1.23]	[-3.89]	[-5.13]	[-1.36]	[-2.95]	[1.20]	[1.52]	[2.55]	[-0.73]	[2.43]
Beta: HML	-0.184	-0.127	-0.109	-0.002	0.038	0.062	0.079	0.033	0.112	0.114	-0.301	-1.163

	[-3.06]	[-2.98]	[-4.73]	[-0.09]	[1.49]	[2.65]	[3.34]	[0.49]	[3.48]	[1.68]	[-3.21]	[-5.78]
Beta: Momentum	0.062	0.049	0.066	-0.022	-0.056	-0.031	-0.087	0.081	-0.054	-0.009	0.070	0.143
	[1.11]	[1.61]	[2.20]	[-0.90]	[-3.15]	[-1.70]	[-5.74]	[0.66]	[-2.88]	[-0.24]	[0.91]	[1.48]
Adjusted R^2	0.8955	0.9425	0.969	0.9759	0.9694	0.9626	0.9612	0.7895	0.9167	0.8295	0.1919	0.2631
Panel 1D: Liquidity 2F(1y)												
Alpha (%)	0.005	-0.001	-0.002	-0.003	-0.003	-0.002	-0.002	0.001	0.000	0.005	-- --	-- --
	[5.10]	[-0.59]	[-2.32]	[-4.21]	[-3.57]	[-3.71]	[-2.81]	[0.53]	[0.49]	[5.10]		
Beta: Market (excess return)	1.084	1.131	1.083	1.046	0.992	0.928	0.896	0.886	0.859	1.084	-- --	-- --
	[29.16]	[45.75]	[38.55]	[40.8]	[42.8]	[46.8]	[31.99]	[22.49]	[31.04]	[29.16]		
Beta: Liquidity	-0.492	-0.196	-0.109	-0.032	-0.003	0.049	0.051	0.098	0.172	0.508	-- --	-- --
	[-6.92]	[-6.73]	[-3.81]	[-1.45]	[-0.09]	[1.85]	[2.07]	[2.81]	[4.65]	[7.14]		
Adjusted R^2	0.9632	0.9505	0.9662	0.9747	0.9648	0.9621	0.9521	0.7882	0.9239	0.9418	-- --	-- --
Panel 1E: Mod-FF 4F												
Alpha (%)	-0.001	-0.002	-0.002	-0.003	-0.002	-0.002	-0.001	0.001	0.002	0.009	**-0.010**	0.001
	[-0.51]	[-1.71]	[-3.08]	[-3.91]	[-3.26]	[-2.84]	[-1.33]	[0.92]	[1.56]	[5.54]	**[-3.89]****	[0.29]
Beta: Market (excess return)	1.239	1.176	1.126	1.062	1.023	0.932	0.902	0.916	0.814	0.800	0.438	0.283
	[16.46]	[33.87]	[44.06]	[53.14]	[52.42]	[52.27]	[40.22]	[14.75]	[31.07]	[16.11]	[3.76]	[1.64]
Beta: SMB	0.054	-0.030	-0.057	-0.062	-0.077	-0.033	-0.027	-0.012	0.068	0.179	-0.125	0.440
	[1.36]	[-0.82]	[-2.19]	[-2.86]	[-4.20]	[-1.43]	[-1.08]	[-0.28]	[2.11]	[3.35]	[-1.60]	[2.00]
Beta: HML	-0.164	-0.091	-0.082	0.001	0.018	0.043	0.047	0.009	0.076	0.151	-0.315	-1.142
	[-2.51]	[-1.91]	[-3.05]	[0.03]	[0.61]	[1.85]	[1.53]	[0.20]	[2.17]	[2.67]	[-3.25]	[-5.43]
Beta: Mod-FF	0.067	0.211	0.113	0.047	-0.076	-0.102	-0.126	-0.301	-0.206	0.294	-0.227	-0.070
	[0.91]	[2.30]	[2.21]	[1.15]	[-1.32]	[-2.93]	[-2.27]	[-3.60]	[-3.32]	[2.99]	[-1.76]	[-0.30]
Adjusted R^2	0.8935	0.9445	0.9667	0.9756	0.9668	0.9630	0.9539	0.7939	0.9196	0.8395	0.1908	0.2478
Panel 1F: Free Float 2F(1y)												
Alpha (%)	0.000	-0.003	-0.003	-0.003	-0.002	-0.001	-0.001	0.003	0.002	0.006	**-0.008**	**0.009**
	[0.34]	[-2.87]	[-3.06]	[-3.97]	[-2.18]	[-2.19]	[-0.99]	[1.71]	[2.26]	[4.61]	**[-3.83]****	**[1.61]** †
Beta: Market (excess return)	1.206	1.155	1.113	1.072	1.036	0.946	0.917	0.914	0.827	0.806	0.402	0.135
	[15.02]	[31.16]	[43.59]	[45.98]	[47.12]	[48.19]	[41.31]	[18.38]	[30.01]	[15.88]	[3.20]	[0.60]
Beta: Investor Protect	0.075	0.113	0.007	-0.055	-0.145	-0.108	-0.119	-0.190	-0.061	0.439	-0.372	-0.042
	[1.13]	[1.30]	[0.17]	[-1.94]	[-3.81]	[-3.61]	[-2.66]	[-3.02]	[-1.05]	[5.29]	[-2.95]	[-0.13]
Adjusted R^2	0.8899	0.9387	0.9615	0.9746	0.9683	0.9630	0.9534	0.7896	0.9036	0.8480	0.1736	0.0021

Panel 2: SMB deciles												
Panel 2A: CAPM												
Alpha (%)	0.019	0.003	0.001	-0.002	-0.003	-0.003	-0.003	-0.004	-0.004	-0.005	**0.021**	**0.016**
	[7.97]	[2.15]	[0.98]	[-3.64]	[-5.70]	[-5.22]	[-4.10]	[-4.51]	[-3.15]	[-3.26]	**[6.07]****	**[4.40]****
Beta: Market (excess return)	1.216	1.109	1.076	1.027	0.999	0.989	0.934	0.958	0.877	0.788	0.428	0.372
	[24.23]	[32.91]	[49.77]	[61.48]	[61.36]	[68.25]	[50.95]	[38.89]	[30.22]	[22.51]	[5.51]	[5.08]
Adjusted R^2	0.7976	0.934	0.9502	0.9593	0.9689	0.9692	0.9482	0.955	0.9193	0.8384	0.2133	0.2053
Panel 2B: FF3F												
Alpha (%)	0.016	0.000	-0.001	-0.004	-0.004	-0.003	-0.002	-0.002	-0.001	-0.001	**0.015**	**0.006**
	[6.65]	[0.03]	[-1.45]	[-6.35]	[-6.16]	[-3.88]	[-2.54]	[-3.22]	[-1.68]	[-1.82]	**[5.35]****	**[3.16]****
Beta: Market (excess return)	1.110	1.013	1.009	1.010	1.001	0.987	0.966	1.003	0.963	0.915	0.198	0.102
	[20.71]	[36.29]	[42.67]	[57.96]	[65.75]	[53.92]	[40.75]	[59.38]	[37.96]	[27.12]	[2.61]	[1.62]
Beta: SMB	0.304	0.311	0.212	0.152	0.032	-0.022	-0.131	-0.161	-0.294	-0.416	0.713	1.004
	[3.71]	[10.19]	[9.85]	[7.33]	[1.69]	[-0.78]	[-4.46]	[-8.55]	[-10.46]	[-12.53]	[7.09]	[14.44]
Beta: HML	0.122	0.073	0.054	-0.093	-0.042	0.036	0.009	-0.016	-0.051	-0.092	0.210	0.061
	[1.92]	[2.17]	[2.29]	[-2.53]	[-2.08]	[1.67]	[0.20]	[-0.70]	[-1.70]	[-2.87]	[3.41]	[0.84]
Adjusted R^2	0.8205	0.9651	0.9659	0.9669	0.9693	0.9694	0.9545	0.9652	0.9614	0.9371	0.4788	0.7864
Panel 2C: Carhart 4F												
Alpha (%)	0.014	0.000	-0.001	-0.004	-0.004	-0.003	-0.001	-0.002	-0.001	-0.001	**0.012**	**0.005**
	[7.61]	[-0.2]	[-1.80]	[-6.47]	[-5.78]	[-3.77]	[-1.78]	[-2.84]	[-1.17]	[-0.96]	**[6.11]****	**[3.21]****
Beta: Market (excess return)	0.945	0.997	0.980	1.010	1.017	1.014	1.022	1.023	1.007	0.977	-0.029	-0.028
	[18.47]	[46.95]	[46.97]	[62.45]	[63.53]	[64.11]	[51.91]	[89.12]	[59.29]	[36.21]	[-0.44]	[-1.03]
Beta: SMB	0.448	0.325	0.237	0.152	0.018	-0.045	-0.180	-0.179	-0.332	-0.470	0.911	1.118
	[5.17]	[11.65]	[9.32]	[6.42]	[0.75]	[-1.71]	[-5.45]	[-7.00]	[-12.06]	[-15.65]	[9.09]	[21.21]
Beta: HML	0.075	0.068	0.045	-0.093	-0.038	0.044	0.025	-0.010	-0.038	-0.074	0.145	0.023
	[1.33]	[1.94]	[1.65]	[-2.39]	[-1.71]	[2.08]	[0.57]	[-0.45]	[-1.35]	[-1.74]	[2.03]	[0.44]
Beta: Momentum	0.255	0.026	0.045	-0.001	-0.025	-0.042	-0.087	-0.032	-0.068	-0.097	0.351	0.201
	[2.82]	[1.14]	[1.72]	[-0.05]	[-1.00]	[-2.22]	[-4.56]	[-1.09]	[-4.56]	[-5.48]	[3.75]	[4.99]
Adjusted R^2	0.857	0.9655	0.9676	0.9667	0.9698	0.9711	0.9629	0.9662	0.9671	0.9503	0.6313	0.8503
Panel 2D: Liquidity 2F (1y)												
Alpha (%)	0.017	0.003	0.001	-0.002	-0.003	-0.003	-0.003	-0.003	-0.004	-0.005	**0.019**	**0.015**
	[7.86]	[2.16]	[0.63]	[-3.49]	[-5.54]	[-4.44]	[-3.26]	[-4.25]	[-2.81]	[-3.32]	**[5.96]****	**[4.27]****
Beta: Market (excess return)	1.297	1.116	1.089	1.022	0.988	0.975	0.911	0.947	0.858	0.769	0.527	0.420
	[20.23]	[42.24]	[48.41]	61.93]	[54.00]	[58.86]	[47.81]	[36.74]	[27.61]	[25.71]	[6.04]	[5.39]
Beta: Liquidity	0.279	0.022	0.045	-0.018	-0.037	-0.048	-0.081	-0.039	-0.065	-0.065	0.339	0.163
	[2.20]	[0.35]	[1.74]	[-0.86]	[-1.64]	[-2.08]	[-3.85]	[-1.02]	[-1.80]	[-1.03]	[1.86]	[1.66]
Adjusted R^2	0.8184	0.9339	0.9508	0.9592	0.9695	0.9703	0.9516	0.9556	0.9215	0.8407	0.2802	0.2226

Panel 2E: Mod-FF 4F												
Alpha (%)	0.016	-0.001	-0.001	-0.004	-0.004	-0.003	-0.002	-0.002	-0.001	-0.001	**0.018**	**0.009**
	[6.86]	[-0.06]	[-1.65]	[-6.49]	[-6.28]	[-3.9]	[-2.72]	[-3.18]	[-1.56]	[-1.56]	**[6.29]****	**[4.76]****
Beta: Market (excess return)	1.056	1.018	1.024	1.019	1.002	0.996	0.984	1.004	0.964	0.921	0.134	0.016
	[19.55]	[37.58]	[53.5]	[61.58]	[64.53]	[60.12]	[46.42]	[60.47]	[51.09]	[34.26]	[2.00]	[0.39]
Beta: SMB	0.326	0.309	0.206	0.148	0.032	-0.026	-0.138	-0.161	-0.294	-0.418	0.744	1.045
	[4.39]	[10.55]	[9.97]	[7.29]	[1.63]	[-0.99]	[-4.56]	[-8.64]	[-10.70]	[-13.74]	[8.23]	[17.30]
Beta: HML	0.151	0.070	0.046	-0.098	-0.043	0.031	-0.001	-0.017	-0.052	-0.096	0.246	0.108
	[2.35]	[1.94]	[2.06]	[-2.77]	[-2.08]	[1.37]	[-0.02]	[-0.75]	[-1.84]	[-2.85]	[3.56]	[1.73]
Beta: Mod-FF	0.222	-0.020	-0.059	-0.039	-0.006	-0.039	-0.072	-0.005	-0.006	-0.029	0.251	0.334
	[1.54]	[-0.38]	[-1.09]	[-0.88]	[-0.13]	[-0.86]	[-1.28]	[-0.14]	[-0.11]	[-0.46]	[1.38]	[2.75]
Adjusted R^2	0.8235	0.9651	0.9662	0.9669	0.9692	0.9695	0.9550	0.9651	0.9612	0.9368	0.4879	0.8063
Panel 2F: Free Float 2F (1y)												
Alpha (%)	0.015	0.001	0.000	-0.003	-0.003	-0.003	-0.002	-0.002	-0.002	-0.003	**0.015**	**0.010**
	[7.30]	[1.12]	[0.25]	[-4.17]	[-5.17]	[-4.44]	[-2.30]	[-3.10]	[-1.82]	[-2.03]	**[4.93]****	**[2.88]****
Beta: Market (excess return)	1.038	1.045	1.045	1.009	0.997	1.018	0.994	1.008	0.956	0.881	0.159	0.102
	[20.84]	[27.65]	[42.64]	[73.79]	[56.31]	[76.45]	[45.58]	[42.09]	31.15]	[22.35]	[2.03]	[1.24]
Beta: Investor Protect	0.600	0.216	0.104	0.062	0.007	-0.098	-0.201	-0.167	-0.266	-0.317	0.908	0.909
	[5.89]	[3.52]	[2.28]	[1.34]	[0.21]	[-3.27]	[-4.34]	[-5.77]	[-4.83]	[-5.10]	[7.19]	[5.45]
Adjusted R^2	0.8301	0.9398	0.9515	0.9597	0.9688	0.9707	0.9555	0.9598	0.9334	0.861	0.3773	0.4159
Panel 3: HML deciles												
Panel 3A: CAPM												
Alpha (%)	0.006	0.001	-0.001	0.000	0.000	0.000	-0.002	-0.001	-0.002	-0.002	**0.005**	**-0.005**
	[5.70]	[1.41]	[-1.53]	[0.15]	[-0.77]	[-0.34]	[-3.27]	[-2.42]	[-2.70]	[-2.08]	**[3.14]****	**[-1.84]***
Beta: Market (excess return)	1.069	1.128	1.089	1.017	1.012	1.045	0.985	0.944	0.880	0.822	0.247	0.074
	[57.53]	[92.27]	[56.01]	[26.95]	[95.36]	[34.77]	[69.42]	[76.33]	[61.98]	[56.46]	[9.34]	[1.65]
Adjusted R^2	0.9355	0.9685	0.9702	0.8487	0.9746	0.928	0.9704	0.9688	0.9635	0.9387	0.2679	0.0068
Panel 3B: FF3F												
Alpha (%)	0.004	0.000	-0.002	-0.001	-0.001	0.000	-0.001	-0.001	-0.001	0.000	**0.001**	**-0.006**
	[4.11]	[0.14]	[-2.62]	[-0.52]	[-1.71]	[0.05]	[-1.42]	[-1.49]	[-1.42]	[0.70]	**[1.79]***	**[-2.58]****
Beta: Market (excess return)	1.044	1.119	1.078	1.024	0.997	1.033	0.991	0.932	0.908	0.861	0.185	0.065
	[40.85]	[76.11]	[48.17]	[22.47]	[67.42]	[30.14]	[74.82]	[67.02]	[52.10]	[41.15]	[4.87]	[0.87]
Beta: SMB	0.153	0.078	0.066	0.052	0.052	-0.009	-0.084	-0.023	-0.094	-0.186	0.332	0.054
	[4.87]	[3.76]	[3.91]	[1.63]	[2.11]	[-0.16]	[-4.19]	[-1.06]	[-4.45]	[-7.24]	[7.81]	[0.43]
Beta: HML	-0.061	-0.047	-0.026	-0.088	0.008	0.062	0.067	0.077	-0.020	0.037	-0.103	-0.022

	[-1.23]	[-1.53]	[-1.09]	[-2.75]	[0.31]	[1.51]	[2.97]	[3.19]	[-1.11]	[1.08]	[-1.33]	[-0.21]
Adjusted R^2	0.9416	0.9699	0.9712	0.8494	0.9754	0.9283	0.9731	0.9703	0.9678	0.9551	0.4325	0.0003
Panel 3C: Carhart 4F												
Alpha (%)	0.004	0.000	-0.002	-0.002	-0.001	0.000	-0.001	-0.001	-0.001	0.001	**0.001**	**-0.005**
	[3.67]	[0.07]	[-2.98]	[-2.06]	[-1.35]	[0.08]	[-1.11]	[-1.24]	[-0.88]	[1.47]	**[1.29]** †	**[-2.42]***
Beta: Market (excess return)	1.026	1.115	1.054	0.947	1.014	1.035	1.008	0.947	0.941	0.904	0.125	0.115
	[48.45]	[66.55]	[65.04]	[26.48]	[60.40]	[36.62]	[81.77]	[62.69]	[76.82]	[46.96]	[3.74]	[1.33]
Beta: SMB	0.169	0.082	0.087	0.120	0.037	-0.010	-0.099	-0.036	-0.122	-0.224	0.385	0.010
	[4.75]	[3.56]	[3.73]	[2.39]	[1.43]	[-0.24]	[-4.99]	[-1.26]	[-6.54]	[-7.54]	[7.50]	[0.08]
Beta: HML	-0.066	-0.049	-0.033	-0.111	0.013	0.063	0.071	0.082	-0.011	0.050	-0.120	-0.008
	[-1.32]	[-1.55]	[-1.37]	[-2.03]	[0.52]	[1.52]	[3.19]	[2.98]	[-0.56]	[1.69]	[-1.69]	[-0.07]
Beta: Momentum	0.027	0.007	0.037	0.119	-0.026	-0.003	-0.027	-0.023	-0.050	-0.066	0.093	-0.078
	[0.87]	[0.38]	[1.24]	[0.98]	[-1.48]	[-0.07]	[-1.68]	[-1.02]	[-3.99]	[-4.44]	[2.51]	[-1.69]
Adjusted R^2	0.942	0.9698	0.9722	0.8612	0.976	0.928	0.9737	0.9708	0.971	0.9613	0.4708	0.0091
Panel 3D: Liquidity 2F (1y)												
Alpha (%)	0.005	0.001	-0.001	0.001	0.000	-0.001	-0.002	-0.001	-0.001	-0.001	**0.004**	**-0.006**
	[5.43]	[1.40]	[-1.50]	[0.46]	[-0.48]	[-1.63]	[-3.05]	[-2.18]	[-2.01]	[-1.54]	**[2.66]****	**[-2.15]***
Beta: Market (excess return)	1.086	1.128	1.088	1.006	1.007	1.080	0.982	0.945	0.865	0.807	0.277	0.092
	[47.1]	[79.34]	[50.09]	[23.35]	[81.53]	[25.15]	[55.18]	[55.33]	[59.01]	[46.88]	[8.24]	[2.11]
Beta: Liquidity	0.057	-0.002	-0.004	-0.039	-0.017	0.117	-0.010	0.005	-0.052	-0.050	0.103	0.062
	[1.16]	[-0.14]	[-0.20]	[-1.56]	[-0.77]	[1.46]	[-0.40]	[0.18]	[-3.29]	[-2.56]	[1.72]	[0.86]
Adjusted R^2	0.9366	0.9683	0.9700	0.8487	0.9746	0.9338	0.9703	0.9687	0.9651	0.9402	0.2892	0.0066
Panel 3E: Mod-FF 4F												
Alpha (%)	0.005	0.001	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	0.001	**0.005**	-0.002
	[6.35]	[0.05]	[-2.94]	[-0.84]	[-1.81]	[-0.06]	[-1.49]	[-1.66]	[-1.55]	[0.19]	**[5.47]****	[-0.83]
Beta: Market (excess return)	0.914	1.093	1.083	1.043	1.009	1.038	0.998	0.955	0.939	0.938	-0.024	-0.104
	[45.01]	[54.02]	[52.21]	[17.61]	[49.91]	[38.29]	[59.98]	[66.26]	[58.38]	[59.45]	[-1.14]	[-1.32]
Beta: SMB	0.207	0.088	0.063	0.044	0.047	-0.011	-0.087	-0.032	-0.106	-0.217	0.424	0.130
	[7.56]	[4.00]	[3.57]	[1.24]	[1.80]	[-0.21]	[-4.22]	[-1.38]	[-5.13]	[-10.16]	[13.48]	[1.06]
Beta: HML	0.008	-0.034	-0.029	-0.099	0.002	0.060	0.063	0.066	-0.036	-0.003	0.011	0.070
	[0.25]	[-1.09]	[-1.16]	[-2.42]	[0.08]	[1.40]	[2.81]	[2.69]	[-1.85]	[-0.13]	[0.26]	[0.75]
Beta: Mod-FF	0.519	0.105	-0.019	-0.077	-0.046	-0.016	-0.028	-0.090	-0.122	-0.308	0.827	0.658
	[6.98]	[2.54]	[-0.43]	[-0.93]	[-1.14]	[-0.19]	[-0.94]	[-2.24]	[-3.65]	[-9.25]	[10.67]	[3.97]
Adjusted R^2	0.9680	0.9709	0.9711	0.8495	0.9756	0.9281	0.9731	0.9713	0.9700	0.9708	0.7940	0.1036

Panel 3F: Free Float 2F (1y)												
Alpha (%)	0.002	0.000	-0.001	0.000	0.000	0.000	-0.001	-0.001	-0.001	0.001	-0.001	**-0.008**
	[3.86]	[0.21]	[-1.64]	[0.18]	[-0.35]	[-0.58]	[-2.30]	[-1.57]	[-0.88]	[1.36]	[-1.26]	**[-3.06]****
Beta: Market (excess return)	0.917	1.087	1.084	1.021	1.021	1.040	1.011	0.966	0.933	0.927	-0.007	-0.040
	[50.27]	[66.86]	[50.20]	[20.56]	[57.81]	[46.37]	[57.67]	[67.3]	[59.8]	[58.15]	[-0.33]	[-0.56]
Beta: Investor Protect	0.513	0.139	0.018	-0.012	-0.029	0.018	-0.090	-0.075	-0.181	-0.354	0.858	0.382
	[9.34]	[3.60]	[0.53]	[-0.20]	[-0.68]	[0.23]	[-3.34]	[-1.88]	[-7.79]	[-10.35]	[14.20]	[2.16]
Adjusted R^2	0.9720	0.9709	0.9701	0.8481	0.9746	0.9278	0.9717	0.9697	0.9703	0.9683	0.8250	0.0538

Supplementary Appendix Table 10 Pooled Regressions of Q ratio on proportion of free float and ownership categories for Japan and US S&P1500 universes

The table reports pooled coefficients from panel regressions for both the Japan and US S&P1500 market universes. Individual stock q ratios are regressed on proportion of free float, different categories of ownership and firm controls as of the previous month. The columns correspond to different regression specifications, with nonempty rows indicating the included regressors. In terms of regressors and following Shin & Stulz (2000) we include natural logarithm of firm age and book value of assets, alongside the ratio of total liabilities to total book asset value, as a measure of leverage alongside FF or the free float percentage proportion of listed market capitalization. Categories of block ownership are sequentially included alongside an aggregate term accounting for the total ownership attributed to all other ownership categories, where this is necessary to mitigate omitted variable bias as well as a potential source of endogeneity. These are defined by Thomson Datastream. Industry controls are included in all models but omitted for brevity. The last row reports the average adjusted R -squared for each specification. The sample period is January 2000 through June 2020. The standard errors are reported in parentheses. †p<0.10; *p<0.05; **p<0.01; ***p<0.005; Robust Heteroskedasticity-Consistent (HC3) standard errors & covariance

Panel 1: Japan	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Intercept	0.786 [0.08]***	0.902 [0.10]***	0.808 [0.08]***	0.707 [0.06]***	0.906 [0.11]***	0.901 [0.11]***	0.902 [0.11]***	0.902 [0.10]***
Firm age	-0.103 [0.00]***	-0.105 [0.00]***	-0.094 [0.00]***	-0.092 [0.00]***	-0.104 [0.00]***	-0.105 [0.00]***	-0.105 [0.00]***	-0.105 [0.00]***
Total Assets	-0.027 [0.01]***	-0.029 [0.01]***	-0.027 [0.01]***	-0.022 [0.00]***	-0.030 [0.01]***	-0.029 [0.01]***	-0.029 [0.01]***	-0.029 [0.01]***
Ratio Liabilities to Assets	0.003 [0.00]***	0.003 [0.00]***	0.003 [0.00]***	0.003 [0.00]***	0.003 [0.00]***	0.003 [0.00]***	0.003 [0.00]***	0.003 [0.00]***
Free Float	+0.029 [0.02]*							
Ownership:								
All Block own		-0.027 [0.01]**						
Cross Holdings			-0.154 [0.04]***					
All other own			+0.191 [0.04]***					
Employee/Family				+0.275 [0.06]***				
All other own				-0.103 [0.03]***				
Government					+0.696 [0.05]***			
All other own					-0.030 [0.01]***			
Foreign						-0.032 [0.01]***		
All other own						-0.026 [0.01]**		
Investment Co.							-0.027 [0.01]**	
All other own							-0.027 [0.01]**	
Pension Fund								-0.131 [0.13]
All other own								-0.027 [0.01]*
N	566,489	526,467	526,467	526,467	526,467	526,467	526,467	526,467
F (prob)	697.90 [0.00]	661.69 [0.00]	623.69 [0.00]	625.39 [0.00]	645.52 [0.00]	621.19 [0.00]	620.65 [0.00]	623.53 [0.00]
Adj-R^2	0.0009	0.0009	0.0010	0.0010	0.0009	0.0009	0.0009	0.0009

Panel 2: US S&P1500	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Intercept	0.003 [0.01]	0.009 [0.01] †	0.010 [0.01]*	0.009 [0.01]*	0.009 [0.01]*	0.009 [0.01]*	0.010 [0.00]***	0.009 [0.01]*
Firm age	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***
Total Assets	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***
Ratio Liabilities to Assets	0.009 [0.01] †	0.009 [0.01] †	0.009 [0.01] †	0.009 [0.01] †	0.009 [0.01] †	0.009 [0.01] †	0.009 [0.01] †	0.009 [0.01] †
Free Float	+0.007 [0.00]***							
Ownership:								
All Block own		-0.003 [0.00]***						
Cross Holdings			-0.002 [0.00]**					
All other own			-0.005 [0.00]***					
Employee/Family				-0.003 [0.00]**				
All other own				-0.005 [0.00]***				
Government					-0.007 [0.00]***			
All other own					-0.004 [0.00]***			
Foreign						-0.003 [0.00]		
All other own						-0.004 [0.00]		
Investment Co.							-0.009 [0.00]***	
All other own							-0.003 [0.00]***	
Pension Fund								+0.002 [0.00]
All other own								-0.004 [0.00]***
N	259,304	261,744	261,744	261,744	261,744	261,744	261,744	261,744
F (prob)	31.74 [0.00]	27.46 [0.00]	25.83 [0.00]	30.07 [0.00]	32.02 [0.00]	30.57 [0.00]	25.68 [0.00]	32.51 [0.00]
Adj-R^2	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004

Supplementary Appendix Table 11 Endogeneity Robustness test - Pooled Regressions of Q ratio on proportion of free float and ownership categories for Japan and US S&P1500 universes

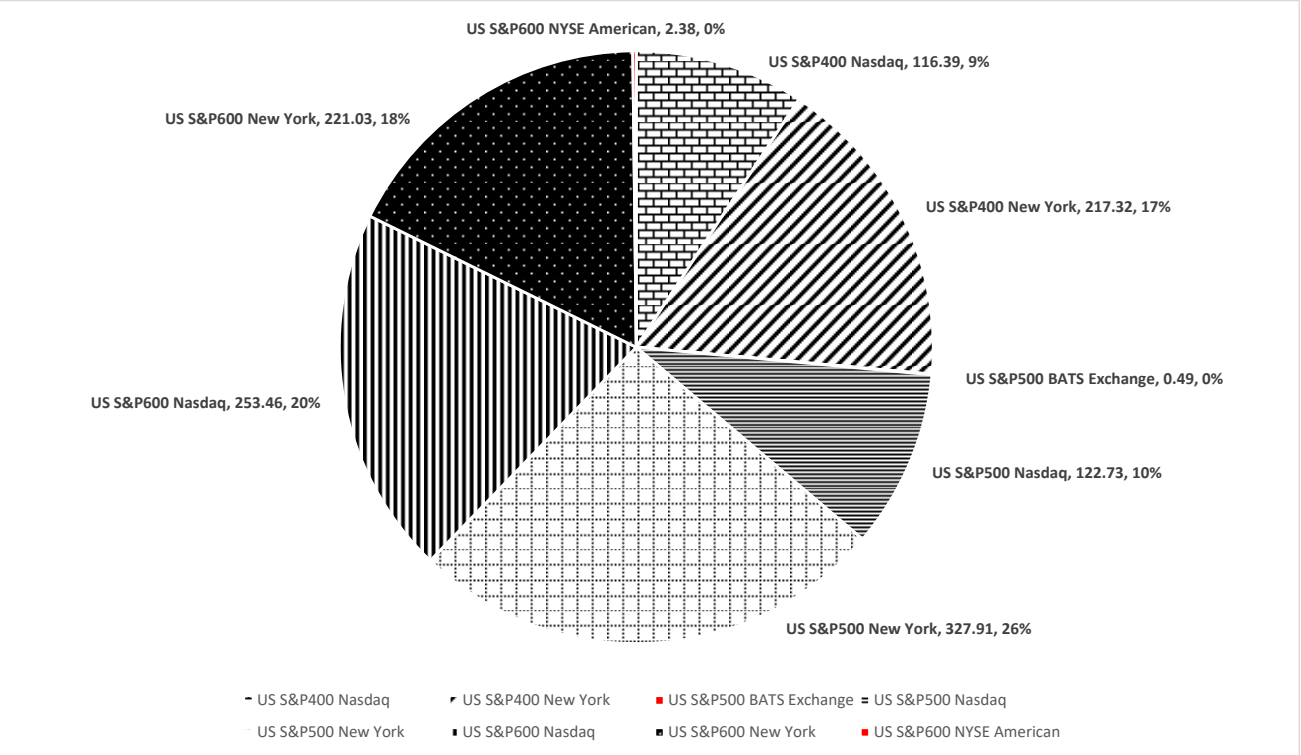
The table reports pooled coefficients from the second stage panel regressions for both the Japan and US S&P1500 market universes. The corresponding first stage regressions regressed all exogenous variables plus the endogenous dependent variable in second stage against the free float, aggregate block ownership level, and then each ownership category (as well as the other ownership for each of the categories) with the residuals from these first stage regressions being entered into the second stage – as below. This method is introduced in Heflin & Shaw (2000). If the coefficients against each first stage residuals are zero and statistically not different to zero then endogeneity can be effectively ruled out. Individual stock bid ask spreads are regressed on proportion of free float, different categories of ownership and market microstructural controls as of the previous month. The columns correspond to different regression specifications, with nonempty rows indicating the included regressors. In terms of regressors and following Shin & Stulz (2000) we include natural logarithm of firm age and book value of assets, alongside the ratio of total liabilities to total book asset value, as a measure of leverage alongside FF or the free float percentage proportion of listed market capitalization. The natural logarithms of firm variables are used in order to mitigate heteroskedasticity. Categories of block ownership are sequentially included alongside an aggregate term accounting for the total ownership attributed to all other ownership categories, where this is necessary to mitigate omitted variable bias as well as a potential source of endogeneity. These are defined by Thomson Datastream. Industry controls are included in all models but omitted for brevity. The sample period is January 2000 through June 2020. The standard errors are reported in parentheses. †p<0.10; *p<0.05; **p<0.01; ***p<0.005; Robust Heteroskedasticity-Consistent (HC3) standard errors & covariance

Panel 1: Japan	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Intercept	0.838 [0.08]***	0.865 [0.09]***	0.865 [0.09]***	0.866 [0.09]***	0.865 [0.09]	0.865 [0.09]	0.865 [0.09]	0.865 [0.09]
Firm age	-0.101 [0.00]***	-0.103 [0.00]***	-0.103 [0.00]***	-0.103 [0.00]***	-0.102 [0.00]	-0.103 [0.00]	-0.103 [0.00]	-0.103 [0.00]
Total Assets	-0.026 [0.01]***	-0.028 [0.01]***	-0.028 [0.01]***	-0.028 [0.01]***	-0.028 [0.01]	-0.028 [0.01]	-0.028 [0.01]	-0.028 [0.01]
Ratio Liabilities to Assets	0.003 [0.00]***	0.003 [0.00]***	0.003 [0.00]***	0.003 [0.00]***	0.003 [0.00]	0.003 [0.00]	0.003 [0.00]	0.003 [0.00]
Residuals Free Float	0.000 [0.00]							
Residuals Ownership:								
All Block own		0.000 [0.00]						
Cross Holdings			0.008 [0.01]					
All other own			0.002 [0.02]					
Employee/Family				0.029 [0.01]*				
All other own				0.005 [0.00]*				
Government					0.060 [0.15]			
All other own					0.000 [0.00]			
Foreign						0.009 [0.01]		
All other own						0.000 [0.01]		
Investment Co.							0.009 [0.01]	
All other own							0.000 [0.00]	
Pension Fund								0.000 [0.11]
All other own								0.000 [0.00]
N	566,489	526,467	526,467	526,467	526,467	526,467	526,467	526,467
F (prob)	692.27 [0.00]	656.65 [0.00]	648.23 [0.00]	630.39 [0.00]	626.52 [0.00]	616.35 [0.00]	615.73 [0.00]	618.75 [0.00]
Adj-R^2	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009

Panel 2: US S&P1500	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Intercept	0.006 [0.01]	0.006 [0.01]	0.006 [0.01]	0.006 [0.01]	0.006 [0.01]	0.006 [0.01]	0.006 [0.01]	0.006 [0.01]
Firm age	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***	0.001 [0.00]***
Total Assets	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***	-0.001 [0.00]***
Ratio Liabilities to Assets	0.008 [0.01]	0.007 [0.01]	0.007 [0.01]	0.007 [0.01]	0.007 [0.01]	0.007 [0.01]	0.007 [0.01]	0.007 [0.01]
Residuals Free Float	0.000 [0.00]							
Residuals Ownership:								
All Block own		0.000 [0.00]						
Cross Holdings			0.000 [0.00]					
All other own			0.000 [0.00]					
Employee/Family				0.000 [0.00]				
All other own				0.000 [0.00]				
Government					0.000 [0.00]			
All other own					0.000 [0.00]			
Foreign						0.000 [0.00]		
All other own						0.000 [0.00]		
Investment Co.							0.000 [0.00]	
All other own							0.000 [0.00]	
Pension Fund								0.000 [0.00]
All other own								0.000 [0.00]
N	259,304	261,744	261,744	261,744	261,744	261,744	261,744	261,744
F (prob)	27.48 [0.00]	24.42 [0.00]	22.96 [0.00]	29.83 [0.00]	31.14 [0.00]	29.06 [0.00]	23.08 [0.00]	29.13 [0.00]
Adj-R^2	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003

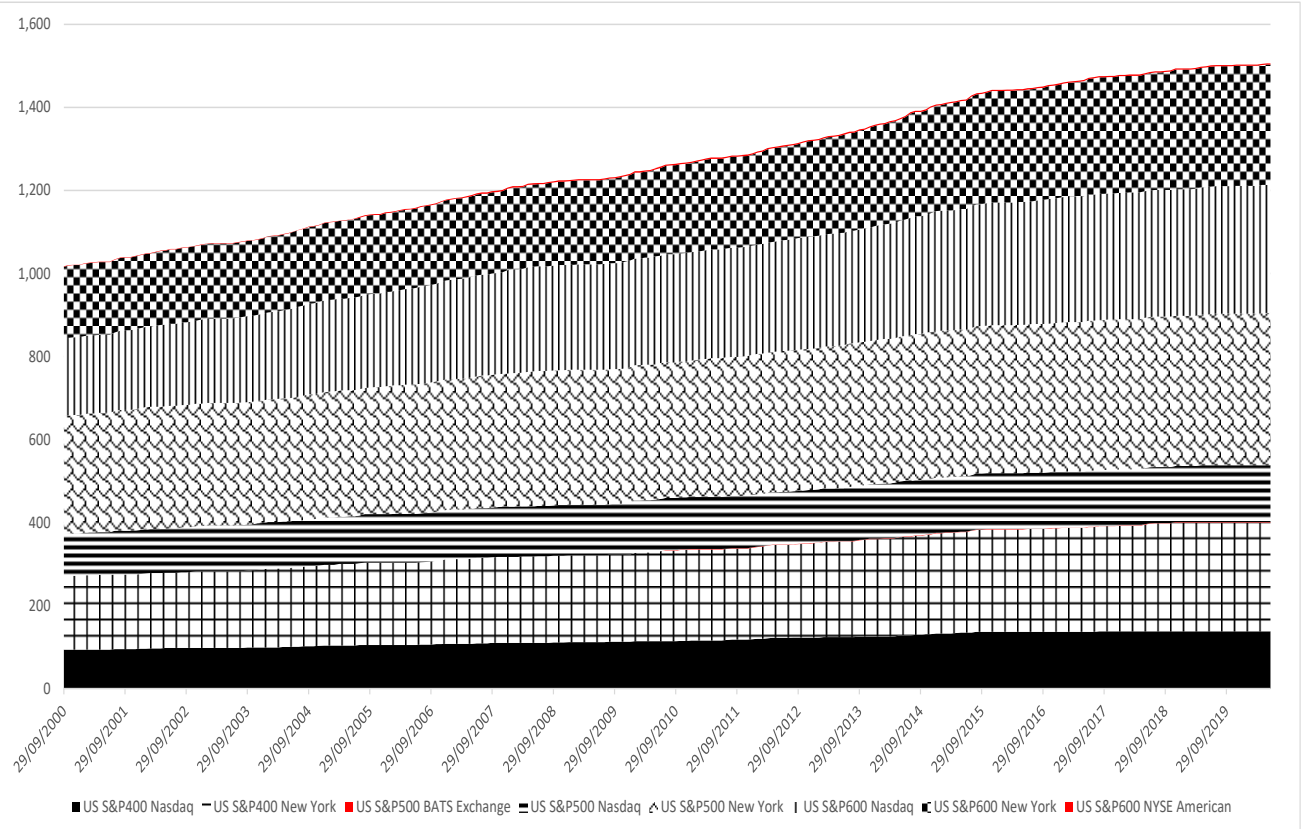
Supplementary Appendix Figure 1
US S&P 1500 equity market firm sample by market, January 2000 to June 2020

The figure shows the distribution of sample stocks by country, with the sample size and percentage of the total for each. The sample selection criteria are described in the data section.



Supplementary Appendix Figure 2
US S&P 1500 equity market firm sample by month, January 2000 to June 2020

The figure shows the distribution of sample stocks by region and month. The sample selection criteria are described in the data section



Supplementary Appendix Figures – for Japan universe

Figure 3 Tokyo TOPIX30 (Alpha)

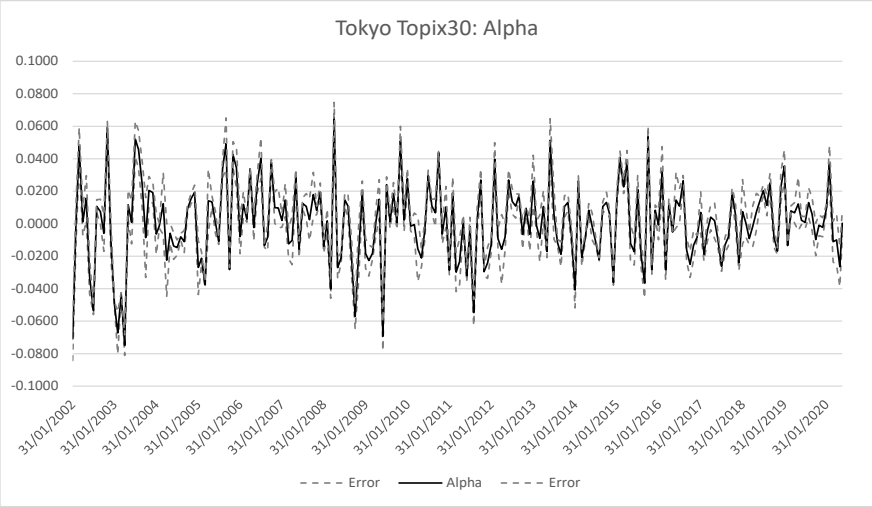


Figure 4 Tokyo TOPIX30 (Beta Market)

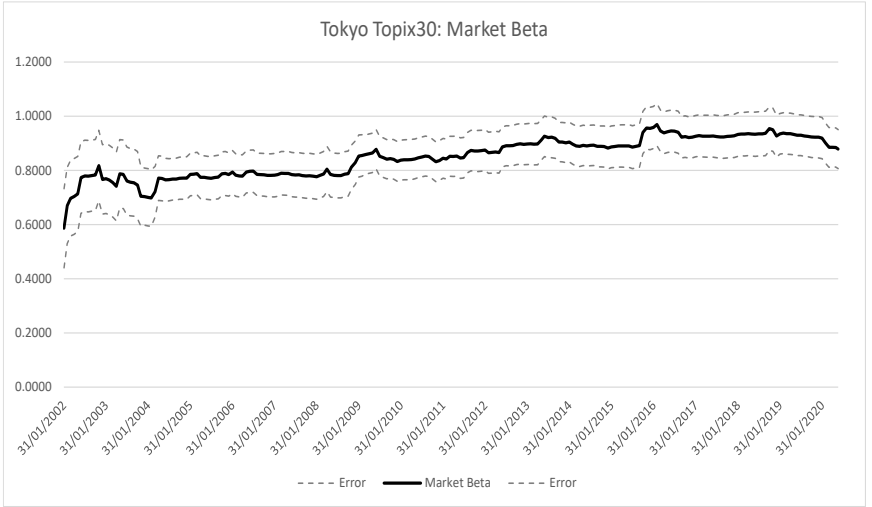


Figure 5 Tokyo TOPIX30 (Beta Free Float)

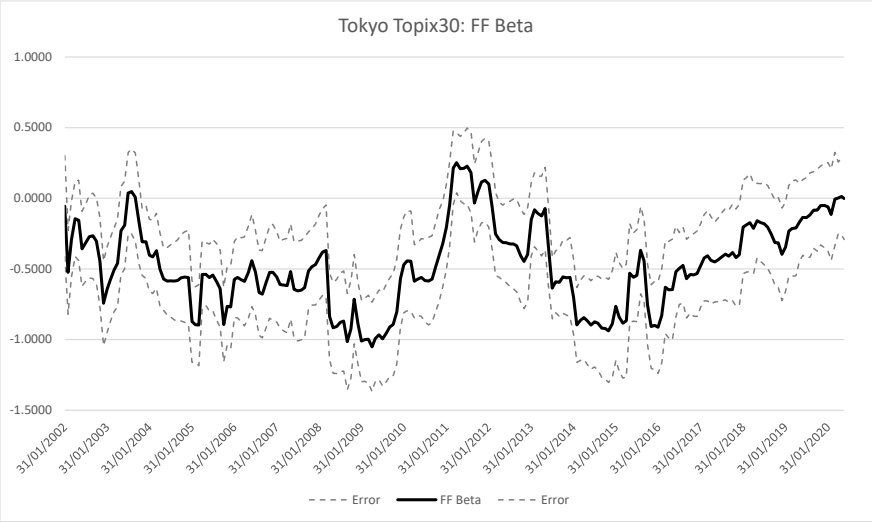


Figure 6 Tokyo TOPIX70 (Alpha)

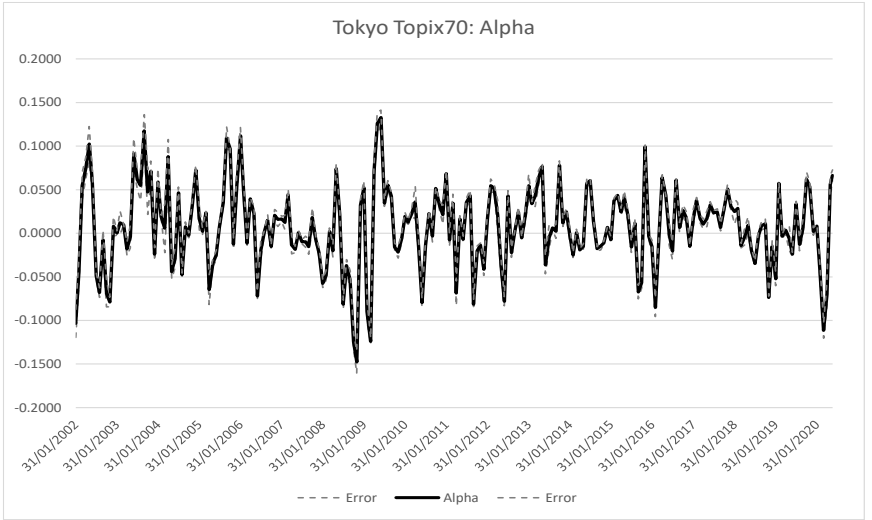


Figure 7 Tokyo TOPIX70 (Beta Market)

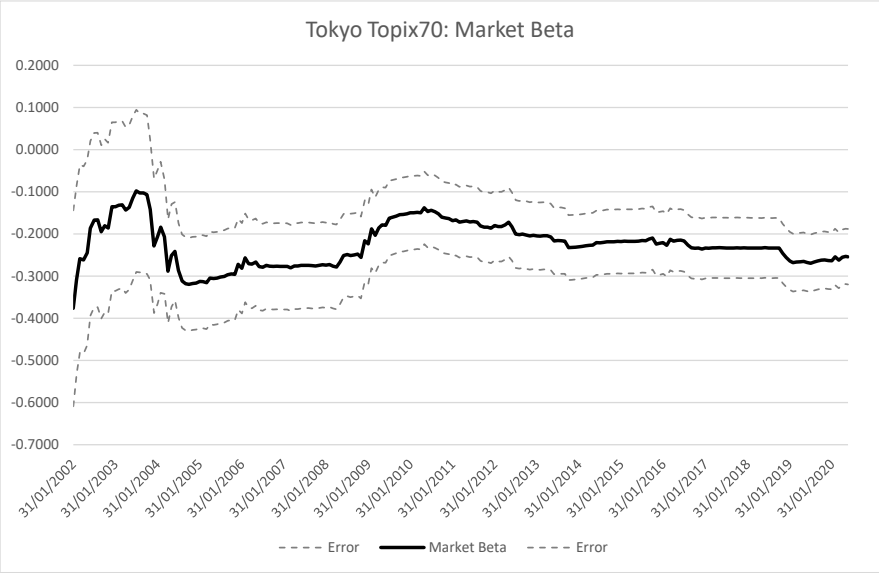


Figure 8 Tokyo TOPIX70 (Beta Free Float)

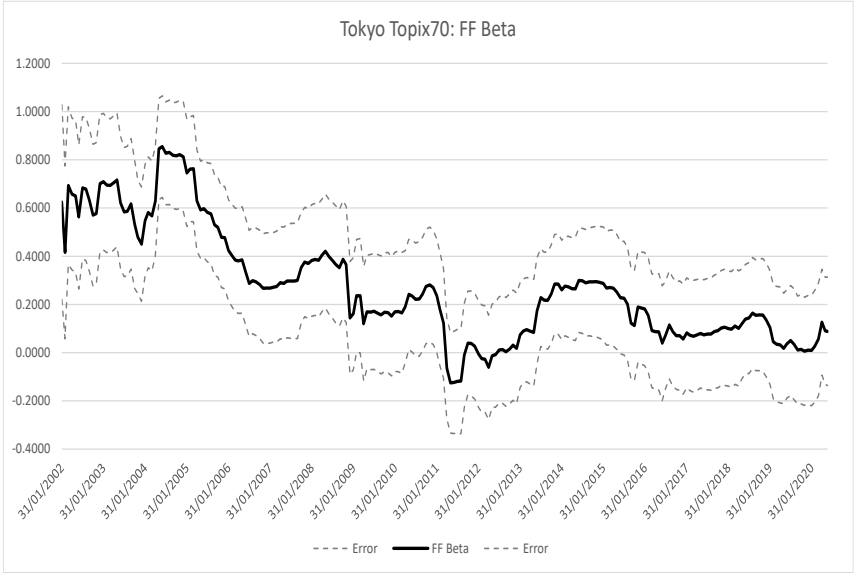


Figure 9 Tokyo Mid400 (Alpha)

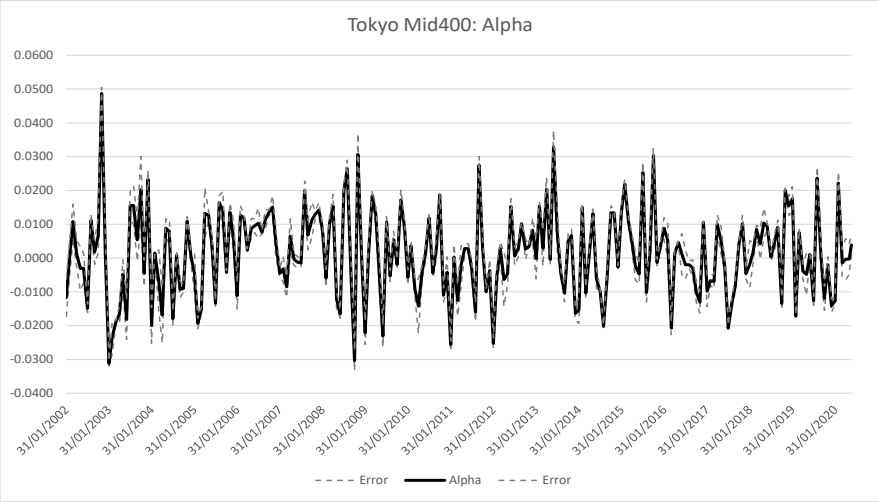


Figure 10 Tokyo Mid400 (Beta Market)

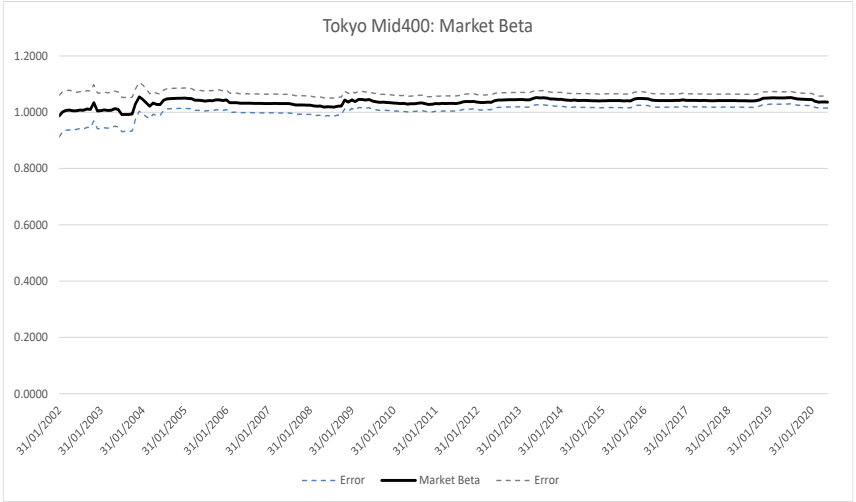


Figure 11 Tokyo Mid400 (Beta Free Float)

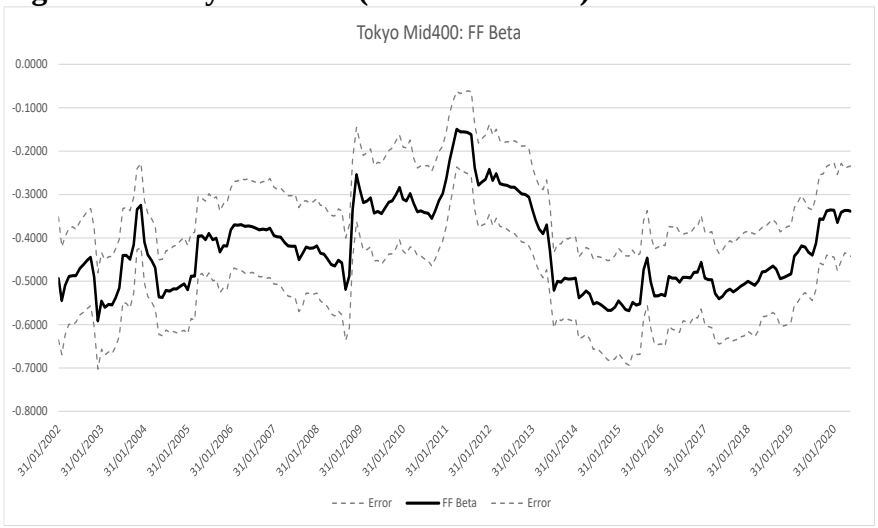


Figure 12 Nagoya (Alpha)

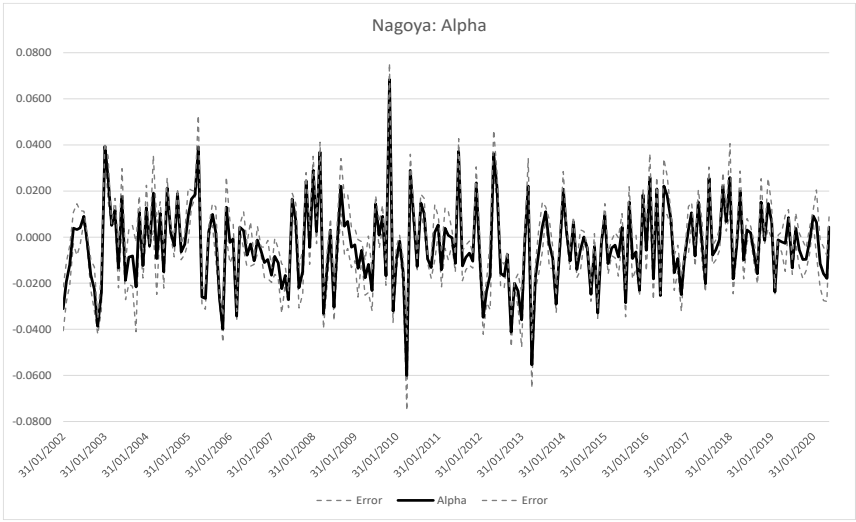


Figure 13 Nagoya (Beta Market)

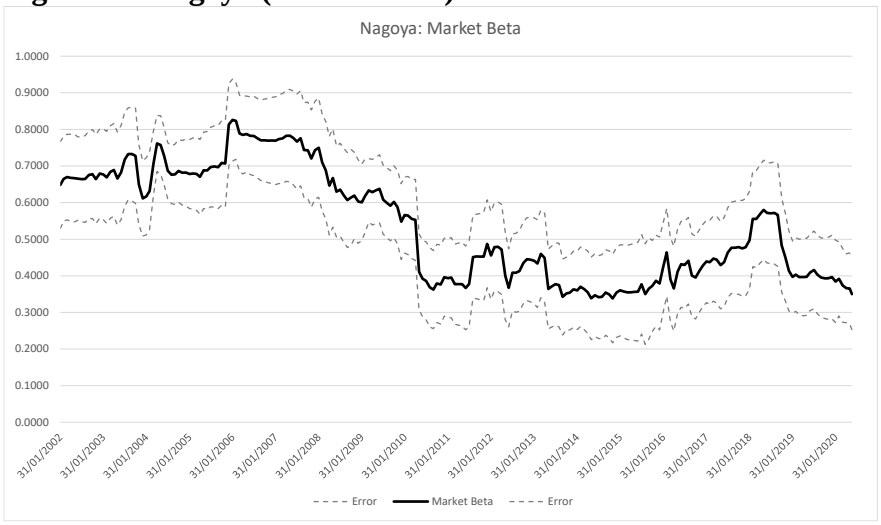


Figure 14 Nagoya (Beta Free Float)

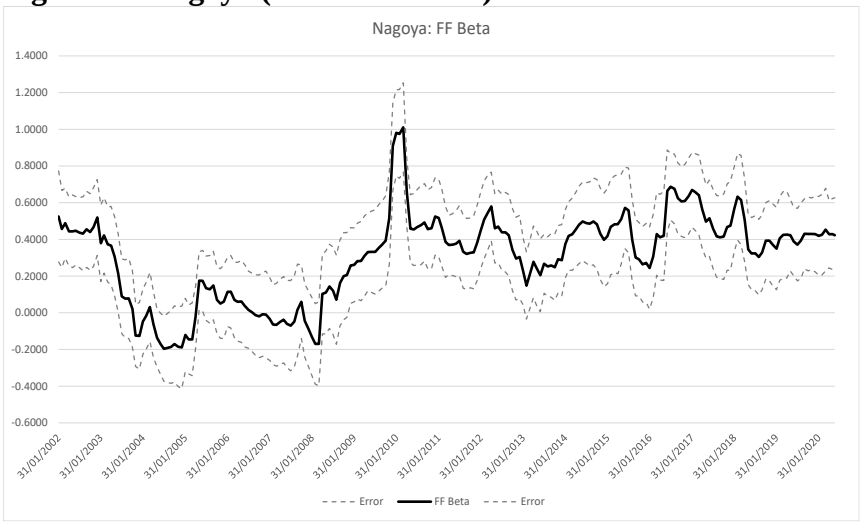


Figure 15 Fukuoka (Alpha)

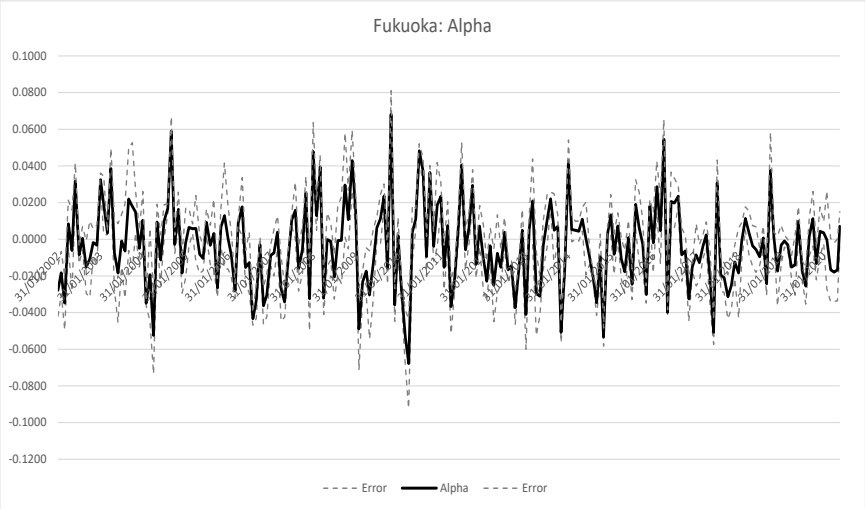


Figure 16 Fukuoka (Beta Market)

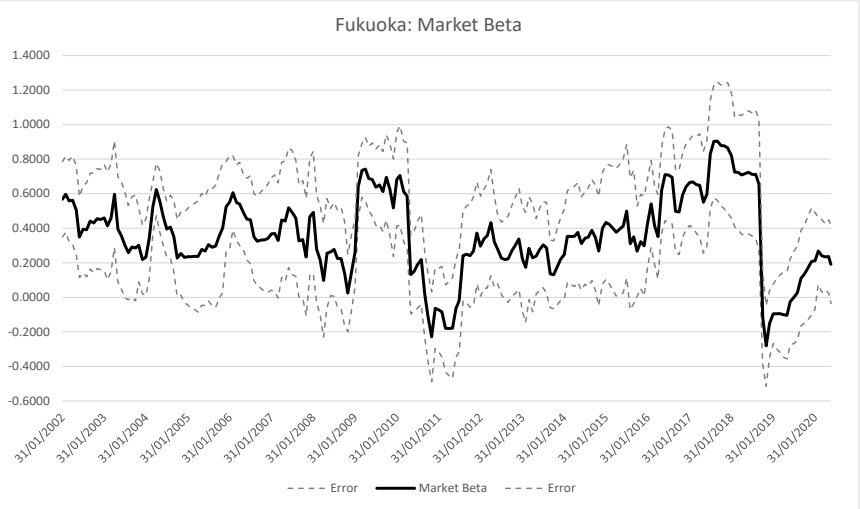


Figure 17 Fukuoka (Beta Free Float)

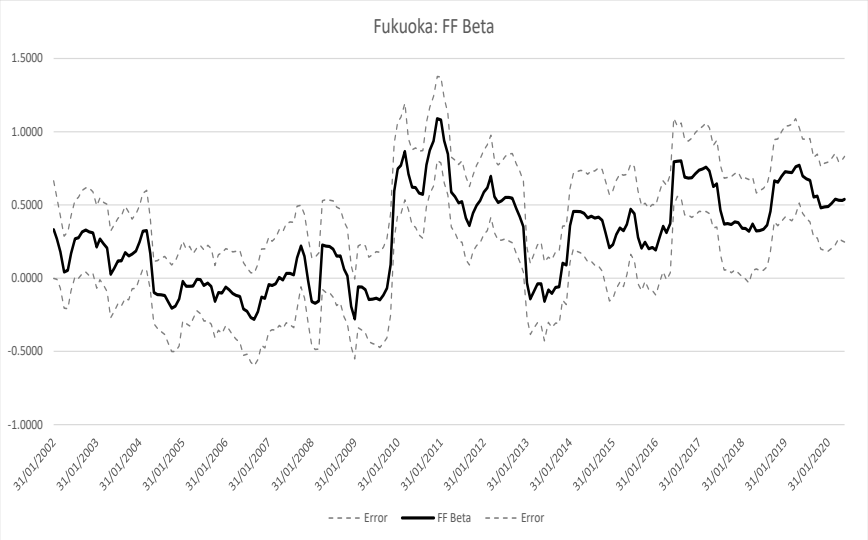


Figure 18 Sapporo (Alpha)

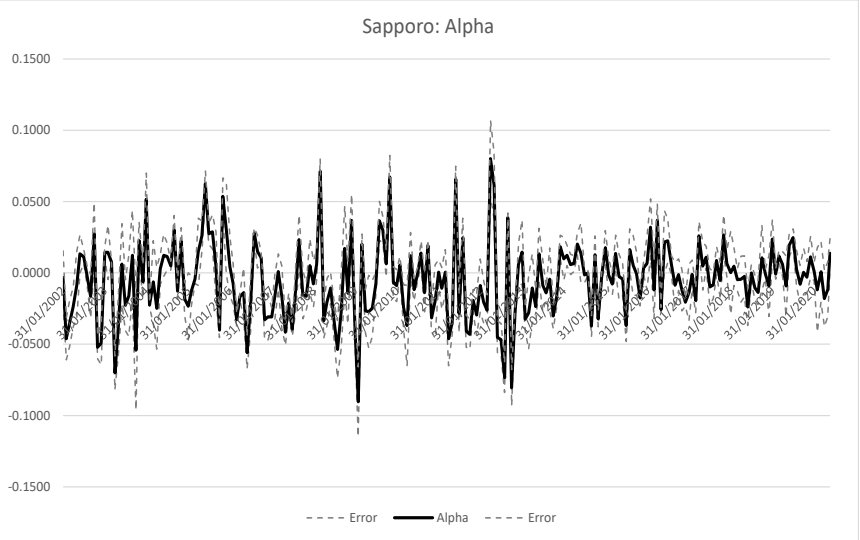


Figure 19 Sapporo (Beta Market)

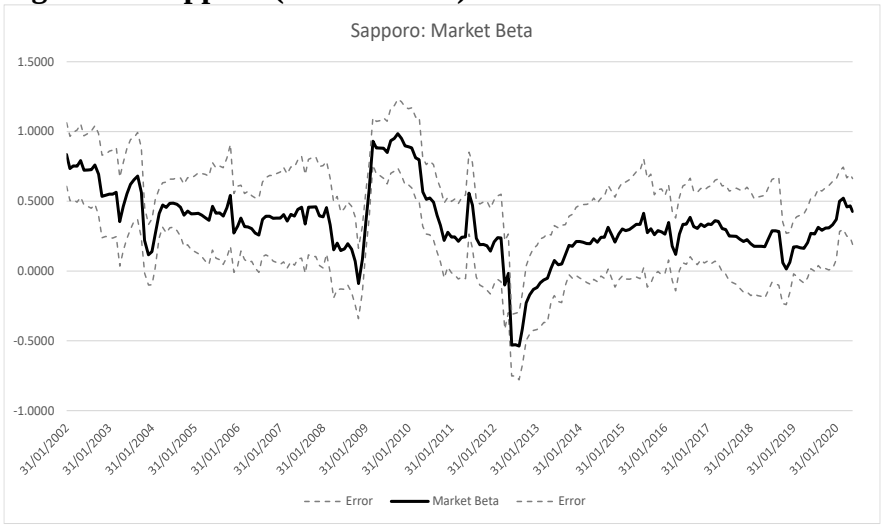
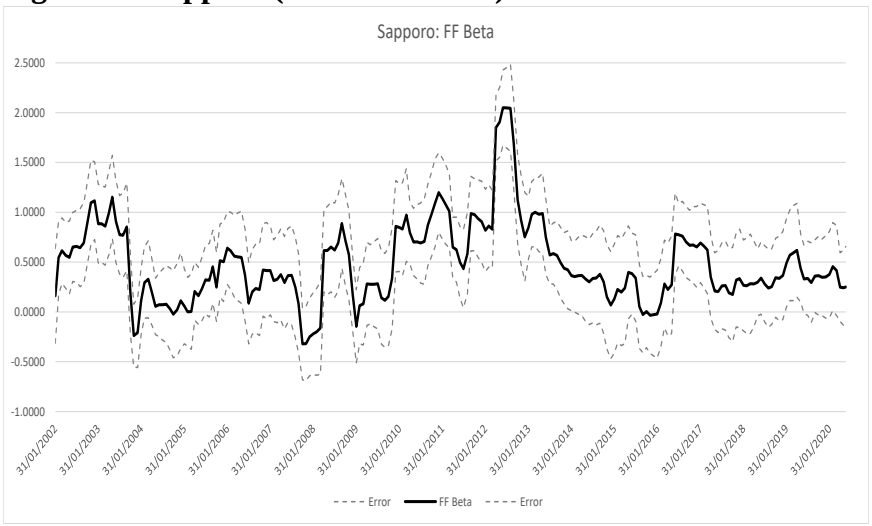


Figure 20 Sapporo (Beta Free Float)



Supplementary Appendix Figures – for US S&P 1500 universe

Figure 21 S&P 500 Nasdaq (Alpha)

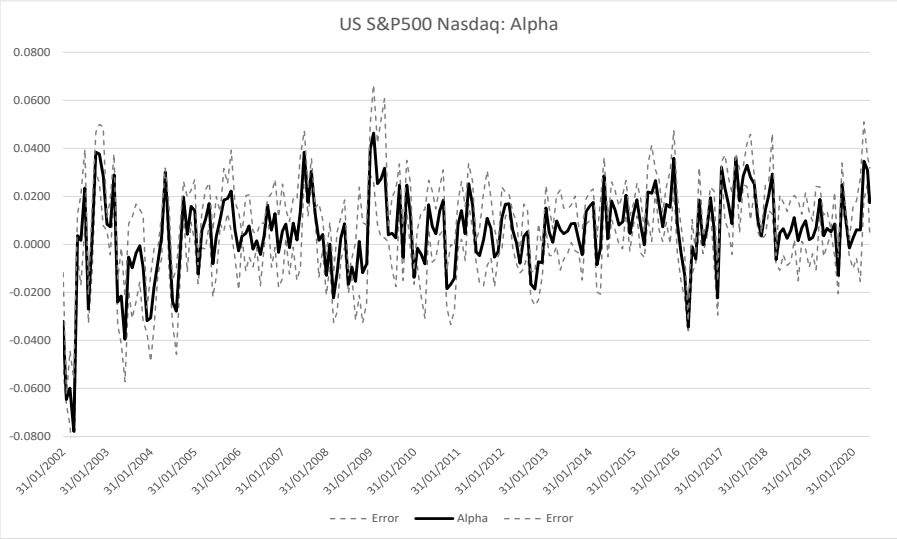


Figure 22 S&P 500 Nasdaq (Beta Market)

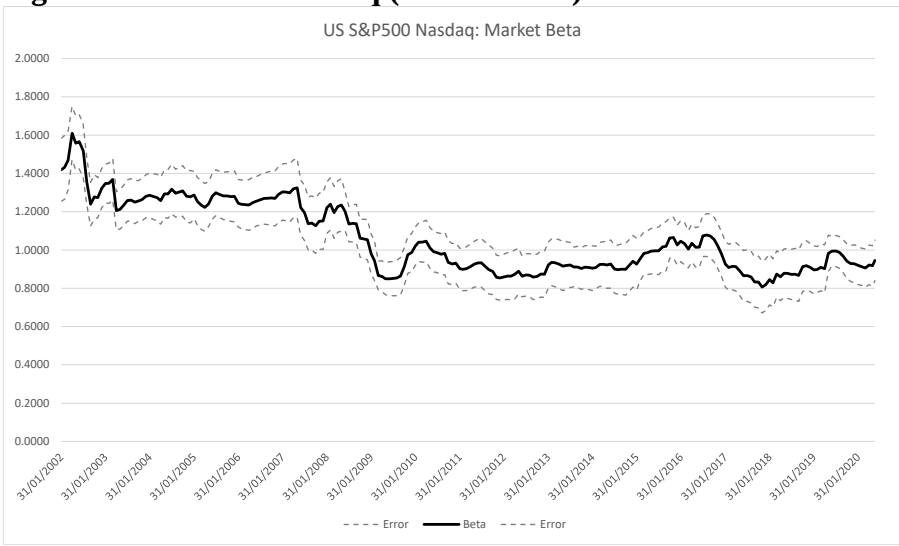


Figure 23 S&P 500 Nasdaq (Beta Free Float)

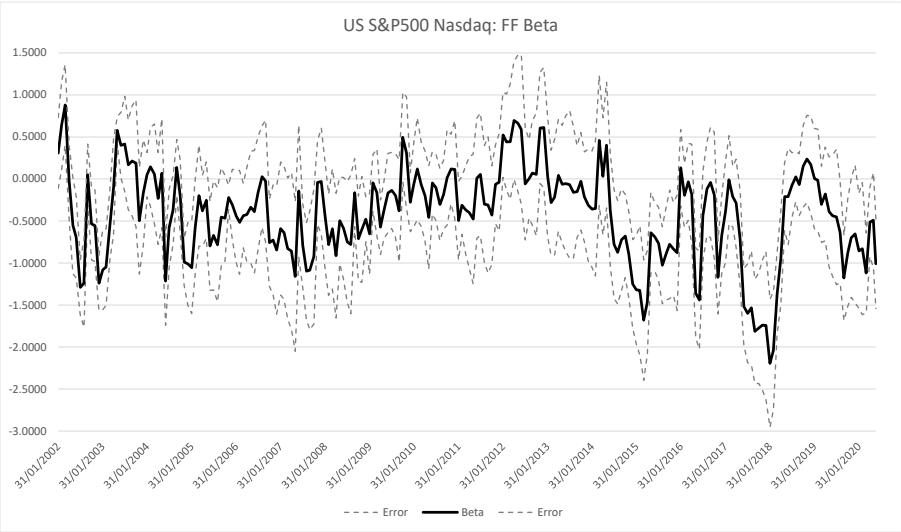


Figure 24 S&P 400 New York (Alpha)

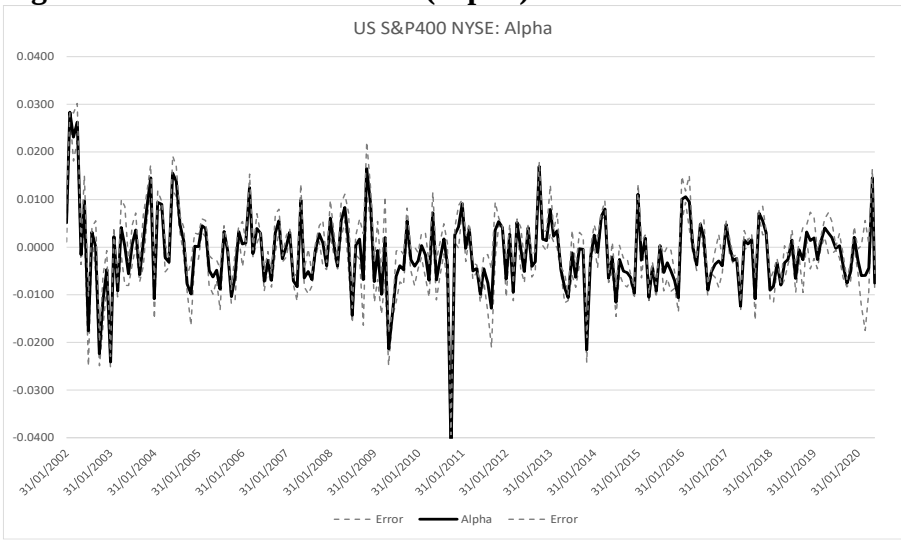


Figure 25 S&P 400 New York (Beta Market)

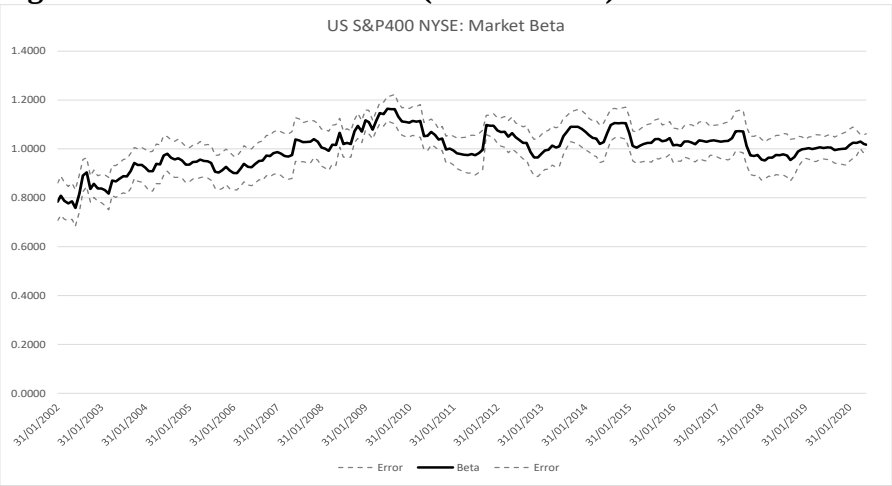


Figure 26 S&P 400 New York (Beta Free Float)

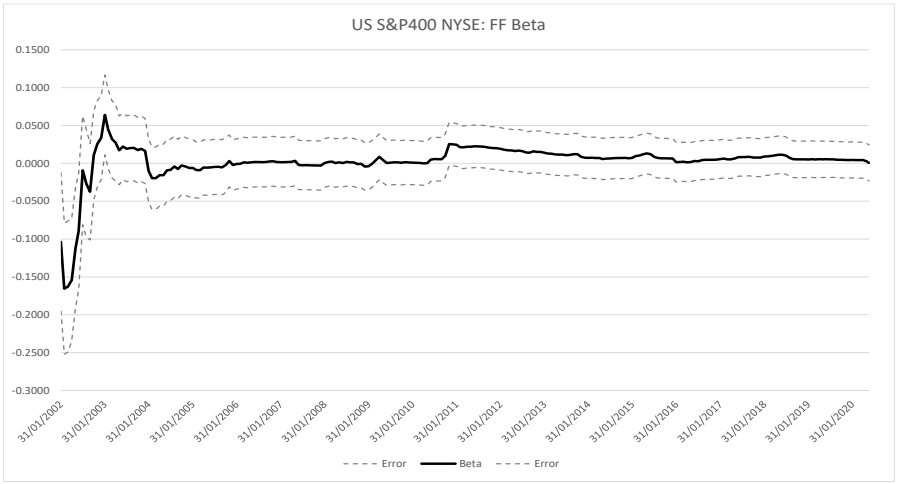


Figure 27 S&P 400 Nasdaq (Alpha)

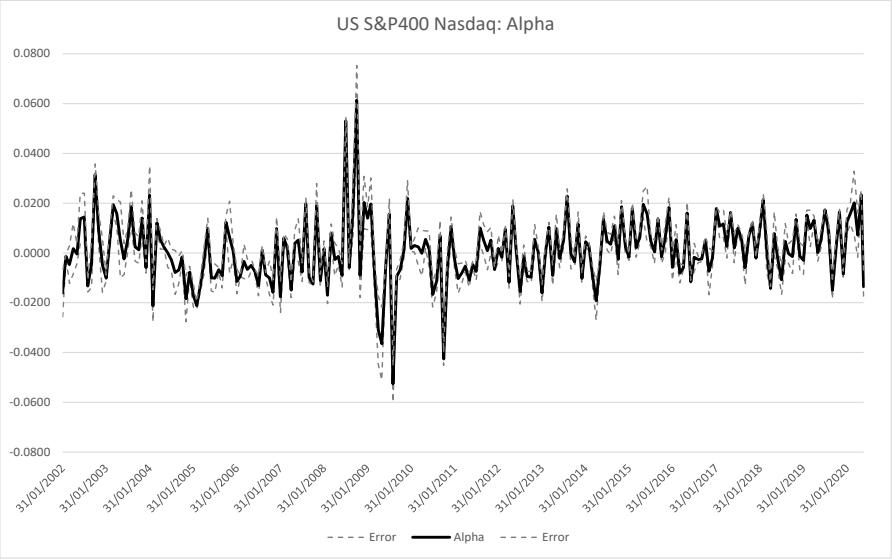


Figure 28 S&P 400 Nasdaq (Beta Market)

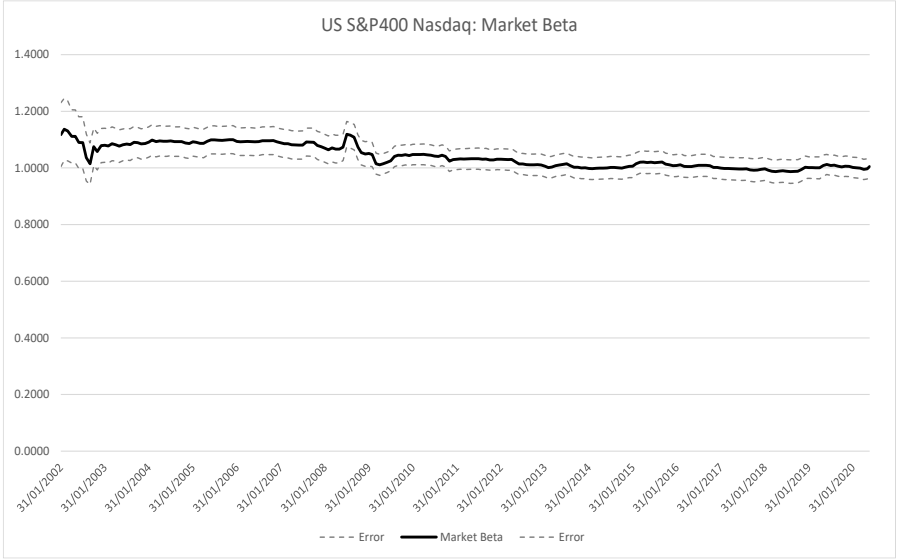


Figure 29 S&P 400 Nasdaq (Beta Free Float)

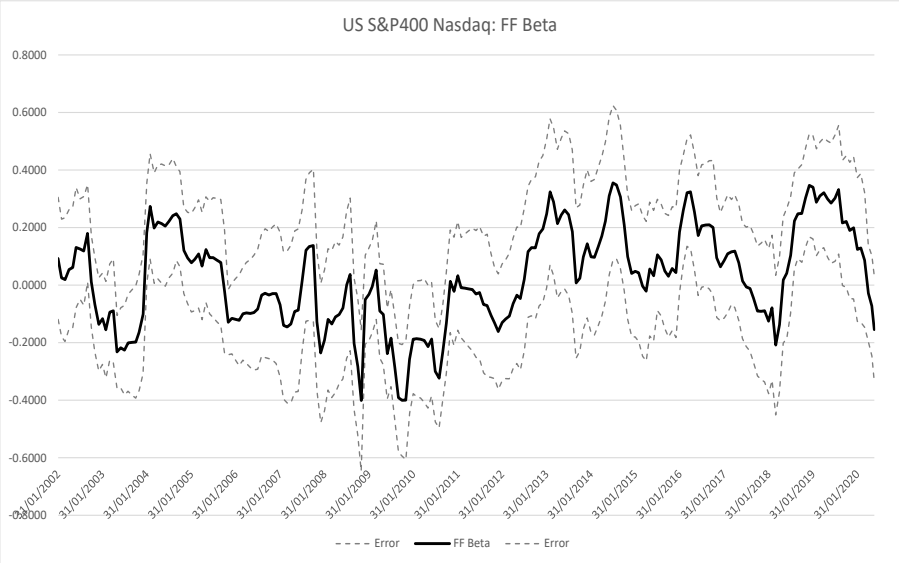


Figure 30 S&P 600 New York (Alpha)

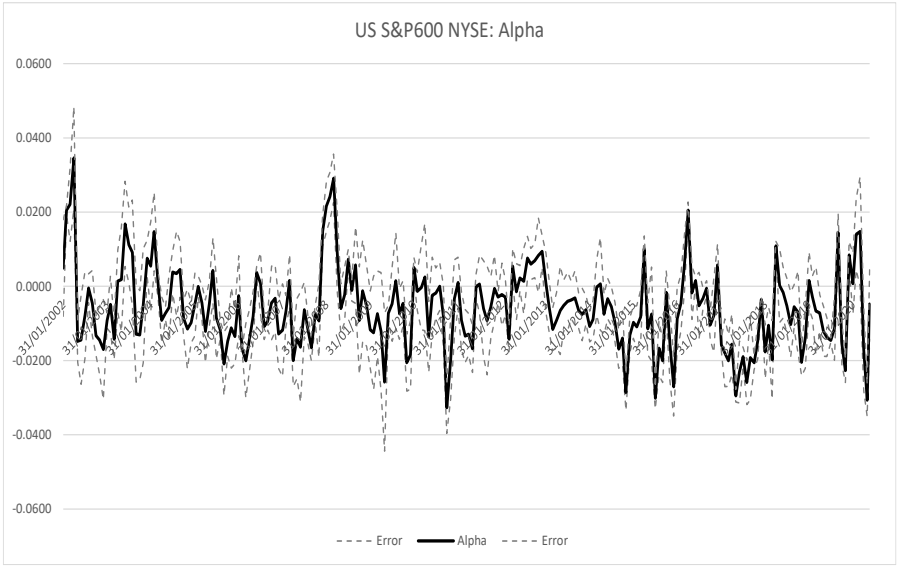


Figure 31 S&P 400 Nasdaq (Beta Market)

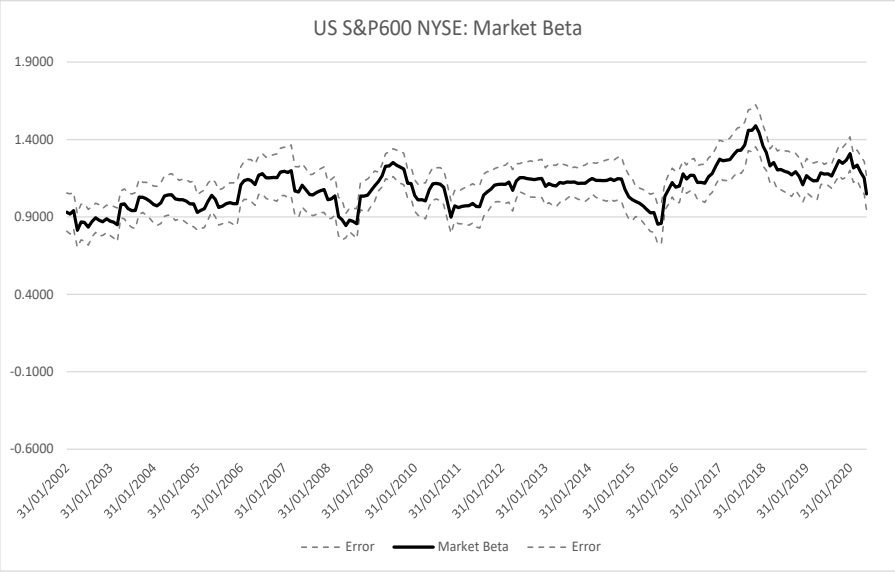


Figure 32 S&P 600 New York (Beta Free Float)

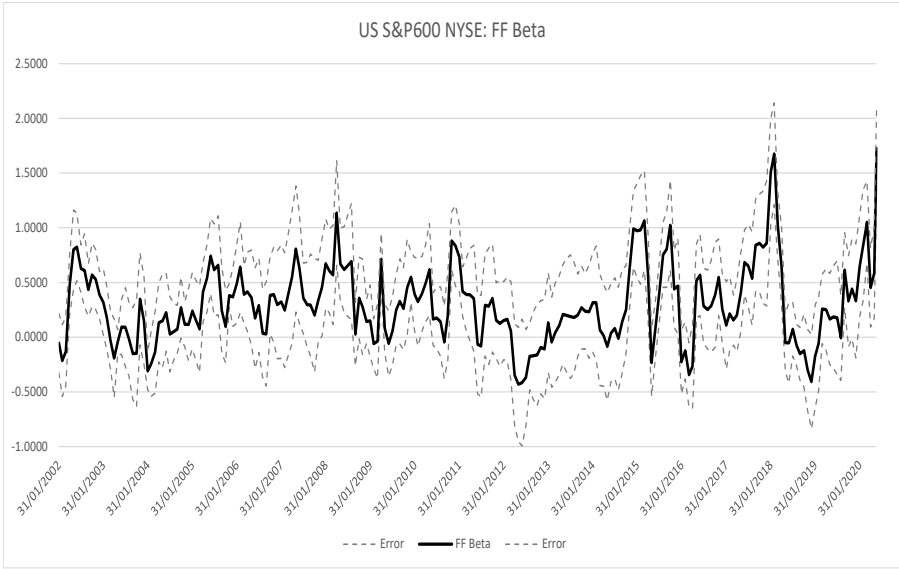


Figure 33 S&P 600 Nasdaq (Alpha)

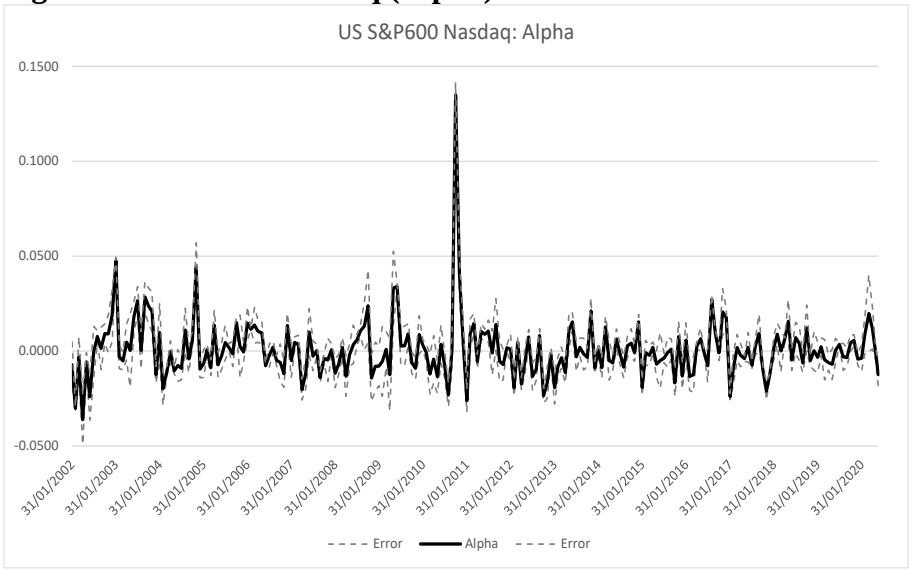


Figure 34 S&P 600 Nasdaq (Beta Market)

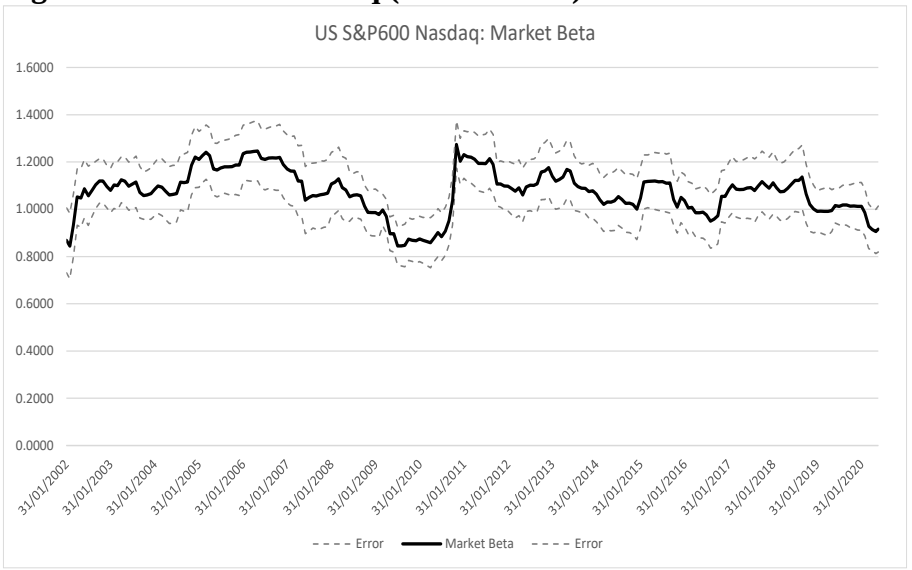
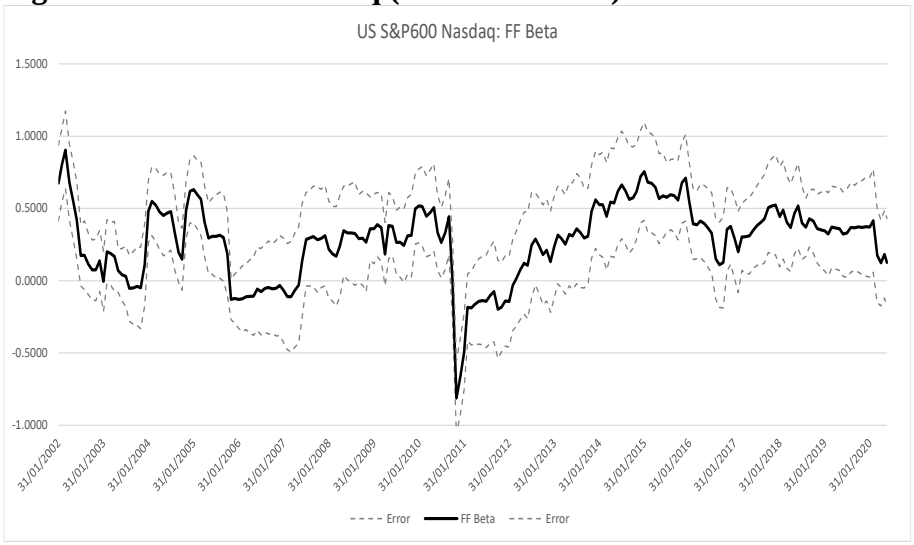


Figure 35 S&P 600 Nasdaq (Beta Free Float)



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