Quality investing in Asian stock markets

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Key Words: quality investing, FSCORE, gross profitability, stock return, institutional demand

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Abstract

We examine two quality investing strategies using gross profitability (GP) or FSCORE, respectively, over the period of 2000 to 2016 in Hong Kong, Japan, Korea, Singapore and Taiwan stock markets. We find that the high-quality stocks generally earn positive returns in these markets. Both FSCORE and GP are significantly positively associated with subsequent stock returns in the cross-sectional regressions. We also find that financial institutions as sophisticated investor concern about stock quality. The actively managed institutions buy significantly more high-quality stocks than low-quality stocks in each of five Asian markets. The trading pattern is not significant in passively managed institutions.

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1. Introduction

Quality as an investment style has been studied in recent asset pricing literature (Gallagher, Gardner, Schmidt and Walter, 2014a; Novy-Marx, 2014; Asness, Frazzini and Pedersen, 2017). In a theoretical model, Asness, Frazzini and Pedersen (2017) show that the stock quality, i.e., firm profitability, growth and safety, is positively associated with stock evaluation and price. The empirical studies document that high-quality stocks yield high subsequent stock returns in US and Australian markets. The market practitioners have also been interested in the quality investing strategy for a long time since Graham and Dodd (1934). Frazzini, Kabiller, and Pedersen (2013) show that the abnormal returns earned by Berkshire Hathaway (Warren Buffett's alpha) can be explained by Buffett's preference for high-quality stocks. These studies are conducted mainly in the US market. We are interested in whether the quality investing strategy is also valid to be implemented in markets outside the US.

We have two objectives in this study. First, we examine whether the high-quality stocks outperform low-quality stocks in the markets outside the US. Following previous studies (Gallagher, et al. 2014a; Asness, Frazzini and Pedersen, 2017), we construct portfolios in Hong Kong, Japan, Korea, Singapore and Taiwan based on stock quality over the period of 2000 to 2016 and compare the performance between high-quality stocks and low-quality stocks. We choose these leading Asian markets because these markets are mature and attract international professional investors who consider the stock quality. According to August 2018 MSCI World Index, the free float market capitalization and of the shares of these markets in global stock market are follows: US4,065 billion and 8.02% in Japan, US882 billion and 1.78% in Korea, US742 billion and 1.50% in Taiwan, US619 billion and 1.25% in Hong Kong, and

US218 billion and 0.44% in Singapore. These markets play important role in the investment decisions by the international investors. As we know, this study is among the few papers that investigate the quality investing strategy in the international markets[1].

Our second objective is to investigate the institutional investment decisions on the stock quality. Del Guercio (1996) finds that institutions have incentive to tilt portfolios toward high-quality stocks due to the prudent-man rule. The studies on institutional investors find that institutions like mutual fund and hedge fund are sophisticated in processing and forecasting financial strength of firms (Sias, Starks and Titman, 2006; Bushee and Goodman, 2007; Choi and Sias, 2012). It is also expected that institutional investors can choose high-quality stocks in their portfolios if the quality can predict subsequent stock returns. On the other hand, recent studies show that overall institutional investors hold portfolios similar to market portfolio in the US (Lewellen, 2011), which do not show stock-picking skills. The institutional investors even trade contrary to the well-known return anomalies, i.e., buying overvalued stocks (Edelen, Ince and Kadlec, 2016). Whether institutional investors adopt a quality investing strategy and buy more high-quality stocks than low-quality stocks is not explored in the literature or in the markets outside US. This is the first paper to investigate the institutional demand on stock quality in international markets. Furthermore, we examine the institutional demands on quality in different types of institutions, given that some institutions like mutual fund and hedge fund are more informed than those with a passive investment style (Sias, Turtle and Zykai, 2016).

To achieve these objectives, we have to identify stock characteristics that

[1] Gallagher *et al*. (2014a) investigate the quality investing in Australian market. Asness, Frazzini and Pedersen (2017) explore the abnormal returns to stock quality in 24 developed markets include three Asian markets, Hong Kong, Japan and Singapore. Our paper uses the measures of stock quality different from the studies.

indicate high or low quality. This paper employs two measures of stock quality: FSCORE (Piotroski, 2000) and gross profitability (Novy-Marx, 2013). FSCORE is a composite measure on financial strength of a firm, based on three dimensions: profitability, leverage and liquidity, and operating efficiency. The previous studies document that FSCORE can successfully screen winners from losers in value stocks (Piostroski, 2000; Piotroski and So, 2012; Hyde, 2016; Ng and Shen, 2016); however, there is limited research on whether firms with strong financial strength can outperform the firms with weak financial strength in all stocks. Novy-Marx (2013) finds that the ratio of gross profit to assets (GP) has strong predictive power on stock return. Firms with high GP yield significantly larger returns than firms with low GP in US market. After the investigations in Novy-Marx (2013), there are only a few papers which explore the gross profitability anomaly in international markets[2]. Thus, it is worthwhile to study the impacts of GP on stock performance in Asian markets. The studies on GP and FSCORE portfolio performances also allow us to compare the predictive abilities of a single profitability measure (i.e., GP) and a composite measure (i.e., FSCORE) on the subsequent stock return. Most importantly, as we know, there is no paper that investigates the institutional demands on stocks sorted by FSCORE or GP in the international markets.

The findings in this paper can be summarized as follows. First, we find that the portfolios of high-quality stocks generally earn higher subsequent stock returns than the portfolios of low-quality stocks in Asian stock markets, especially in the equally-weighted portfolios sorted by FSCORE. The returns to the portfolios of long high-quality stocks and short low-quality stocks are larger in FSCORE strategy than those in GP strategy. We calculate the future stock return from July of year *t* to June

[2] Sun, Wei and Xie (2014) examine the gross profitability effect in 41 countries. Their sample is up to 2010 only. This paper extends the period of analysis up to 2016.

of year *t+1*, subsequent to the stock quality measure in year *t* (Fama and French, 1993). In the cross-sectional regressions with controlling firm characteristics, both FSCORE and GP are positively associated with subsequent stock returns at highly significant levels in all five markets, which indicates that stock quality has predictive power on future stock performances. We calculate the stock returns predicted by FSCORE and GP following Edelen, Ince and Kadlec (2016). The FSCORE anomaly returns range from 0.16% per month in Japan to 0.38% per month in Taiwan. The range for GP anomaly returns is from 0.15% (Korea) to 0.86% (Singapore). The anomaly returns by FSCORE and GP are economically significant in the five Asian markets.

Second, we find that financial institutions have strong incentive to tilt the portfolios toward to high-quality stocks in Asian markets. We measure institutional demand as the change in institutional ownership or the number of institutional investors in stocks in a six-quarter window before the realization of stock quality anomaly return (Edelen, Ince and Kadlec, 2016). The institutions significantly buy high-quality stocks, sorted by FSCORE or GP, and generally sell low-quality stocks in each of five Asian markets. The finding confirms that institutional investors in Asian markets have stock-picking skill, which is opposite to the results that the institutions in US trade contrary to the well-known anomaly prescriptions in Edelen, Ince and Kadlec (2016). We find that the quality investing strategy is more likely to be adopted by independent institutions like mutual fund and hedge fund than by grey institutions like bank and insurance company. The magnitude of institutional buying on high-quality stocks and institutional selling on low-quality stocks is much larger in independent institutions than grey institutions. This finding is consistent with the argument that actively managed institutions are more informed than passively

managed institutions (Daniel, Grinblatt, Titman and Wermers, 1997; Coval and Moskowitz, 2001; Sias, Turtle and Zykaj, 2016).

Lastly, our robustness tests show that the institutional trading in the anomaly portfolio formation window is positively associated with the FSCORE or GP anomaly in the five Asian markets. The results provide a direct link between the institutional demand on stock quality and the subsequent relevant return on the quality. We also find that institutional investors significantly buy more glamour stocks than value stocks in these Asian markets. Quality investing, instead of simple value investing based on only the book to market ratio, is more popular in the institutional investment decisions.

Our paper makes contributions to the literature of asset pricing and institutional investment decisions. This study is among a few papers that investigate the profitability of quality investing strategy in international markets. We show that FSCORE alone has predictability of the subsequent stock returns in Asian markets. Our findings are different from previous studies that FSCORE can distinguish winners from losers conditional on the sorts by book-to-market ratio (Piotroski, 2000; Piotroski and So, 2012; Ng and Shen, 2016). Our paper is the first paper to explore the institutional demand on the stock quality in the international markets. We show that at least actively managed institutions are skilled at choosing stocks with good quality, which adds evidence in favor of the sophisticated institutions hypothesis (Edelen, Ince and Kadlec, 2016; Sias, Turtle and Zykaj, 2016).

This paper is structured as follows. The next section gives the hypotheses, data description and methodology. Section 3 presents the empirical results. Section 4 provides some robustness tests. The last section states our conclusions.

2. Hypotheses, Data, and Methodology

2.1 Hypotheses development

The objectives of the research are to examine the relation between the stock quality and the subsequent stock returns and the institutional demand. Recent literature explores the quality investing strategy (Gallagher et al., 2014a; Novy-Marx, 2014; Asness, Fazzini and Pedersen, 2017). Using a dividend discount model, Novy-Marx (2013) and Fama and French (2015) show that expected future earnings are positively associated with the market value of a firm, which implies that profitable firms should outperform unprofitable firms. Similarly, in a dynamic asset pricing model, Asness, Fazzini and Pedersen (2017) indicate that the stock price increases with quality, i.e., profitability, growth and safety. Despite the papers just mentioned, the empirical studies in quality investing in international markets are still limited.

We need to identify the characteristics of a high-quality stock. There are many ways to measure the quality of a company in the literature. Many studies use a single measure from financial statements, such as net share issuance (Ikenberry, Lakonishok and Vermaelen, 1995), accrual (Sloan, 1996), gross profitability (Novy-Marx, 2013), operating profitability (Fama and French, 2015) and others. Some studies propose an aggregate signal from different dimensions of corporate fundamentals, like profitability, growth, liquidity and leverage (Lev and Thiagarajan, 1993; Abarbanell and Bushee, 1997; Piotroski, 2000; Mohanram, 2005; Gallagher et al., 2014a; Asness, Fazzini and Pedersen, 2017). We choose two popular measures from the literature: FSCORE and gross profitability.

Developed by Piotroski (2000), FSCORE is a summary of nine binary signals from three dimensions of financial strength in a firm: profitability, financial leverage and liquidity, and operating efficiency. FSCORE is a comprehensive indicator of stock quality. Piotroski (2000) argues that FSCORE is a useful indicator to screen winners

from losers in value stocks. The further study by Piotroski and So (2012) shows that FSCORE can systematically predict subsequent stock performance in all categories of firms sorted by book to market, including value stocks, middle stocks, and glamour stocks. International studies also confirm that FSCORE is an effective signal to measure a firm's fundamentals; and, it generates significant returns in Europe (Walkshausl, 2017), Australia (Hyde, 2016) and Asia Pacific countries (Ng and Shen, 2016). These studies indicate that in order to yield abnormal returns, FSCORE should be combined with book to market, which is a joint strategy of quality and value. We are interested in whether FSCORE alone as a stock quality measure can have predictive power on the subsequent stock performances.

Theoretical asset pricing models (Novy-Marx, 2013; Fama and French, 2015) show that the profitability of a firm should be able to predict the subsequent stock return. Novy-Marx (2013) argues that among different proxies of expected future earnings, gross profitability is the cleanest measure of economic profitability as it uses the gross income which is less likely to be polluted. The study shows that gross profitability has better explanatory power on stock returns than other measures like earnings to book equity, cash flow to book equity, or EBITDA to assets. Kalesnik and Kose (2014) also confirm that gross profitability can significantly predict subsequent stock returns in the US market. Sun, Wei and Xie (2014) find that the positive gross profitability effect on stock return also exists in international markets. Given that gross profitability has been proven as an effective measure of future earnings, we choose it as the other measure of stock quality in this paper.

Motivated by the above studies, we would like to test the firms with high quality which either measured by high FSCORE or high GP would provide subsequent abnormal return compared with those firms with low FSCORE or low GP.

So our first hypothesis is:

H1: Firms with high quality (FSCORE or GP) outperform the firms with low quality (FSCORE or GP) in Asian capital market.

In a seminal paper, Del Guercio (1996) shows that due to prudent-man law and fiduciaries, institutions are likely to tilt the investments toward high-quality stocks. In the paper, the stock quality is simply identified as whether a firm is ranked A+ by Standard and Poor's. A large body of following studies (including but not limited to Coval and Moskowitz, 2001; Cohen, Gompers and Vuolteenaho, 2002; Gibson, Safieddine and Sonti, 2004; and others) show that the institutional investors are sophisticated and can use financial statement information to choose good quality stocks. On the other hand, some studies show that institutions may not have superior stock selection skills as they generally hold the portfolios close to market portfolio (Lewellen, 2011). We will examine whether institutions in Asian developed markets trade on the stock quality given that the institutions have ability to identify the stocks with high/low quality and the quality investing strategy may yield abnormal return. If the institutions have preference on the quality, the demand on the stocks with high quality should be larger than those with low quality. The first part of second hypothesis is:

H2a: Institutional demand is stronger in high-quality stock with high GP/FSCORE than in low-quality stock with low GP/FSCORE.

The institutions may have different preferences on the stocks according to their institution types. Actively managed institutions like hedge fund and mutual fund, may be more informed than passively managed institutions or individual investors, and thus earn abnormal returns (Daniel et al., 1997; Coval and Moskowitz, 2001; Sias, Turtle and Zykaj, 2016). The reason could be that these institutions have

superior abilities to understand the fundamental value of a firm and exploit the market mispricing. In contrast, passively managed institutions like bank and insurance company are constrained by the prudent-person rule and may not be able to take advantage of the stock anomalies (Lakonishok, Shleifer and Vishny, 1994; Del Guercio, 1996; Gompers and Metrick, 2001). Some studies (i.e., Gallagher, Gardner, Schmidt and Walter, 2014b) argue that the actively managed institutions are more likely to exploit the abnormal return related to quality and have strong demand on high-quality stocks than passively managed institutions.

On the other hand, many studies provide opposing evidence on superior abilities of active institutions over passive institutions. Ferreira and Matos (2008) show that both active and passive institutions share similar investment preferences in international markets. Lewellen (2011) shows the portfolios held by bank, insurance company and other institutions, like mutual fund, are all highly correlated with market portfolio in the US. Akbas, Armstrong, Sorescu and Subramanyam (2015) document that hedge fund is considered as smart money which attenuates the stock anomalies while mutual fund is considered as dumb money which exaggerates the anomalies. Given the mixed results on the institution types and preferences in the literature, it is interesting to know what type of institutions would have a higher demand on quality stocks in the international markets. If quality investment strategy provides abnormal return, the natural question is whether institutions in Asia exploit the return; and, if it does, what type of institutions in Asia would extract the return. We expect that the active institutions should play a more important role than passive institutions in quality investing as the actively managed institutions could have skills to identify stock quality. Therefore, the second part of the second hypothesis is:

H2b: The institutional demand on stock quality is larger in actively managed

institutions than passively managed institutions.

2.2 Data and variable

We obtain the stock price and financial statement data from Datastream, including both delisted and active firms in five Asian markets (Hong Kong, Japan, Korea, Singapore and Taiwan). Similar to previous studies (Fama and French, 1993), the firms in finance industry are excluded in the sample. The sample period is from 2000 to 2016. Table 1 reports the number of firms in our sample for each market. Among the five markets, the number of firms is largest in Japan (4,690) and least in Singapore (902). The total number of firm in the sample is 11,499. We collect the institutional ownership data from FactSet. In total, there are 8,113 firms in our sample that are covered by institutional investors.

[Insert Table 1 here]

The stock returns with adjustments of dividends and stock split are calculated in the monthly frequency. Datastream provides the stock return data in both local currency and US dollar. To make the results comparable across the markets, we present only the returns in US dollar.[3] The two quality measures, FSCORE and gross profitability, are constructed from annual financial statement variables. FSCORE (Piotroski, 2000) is constructed from three dimensions of financial performances: profitability, financial leverage and liquidity, and operating efficiency. We employ nine indicator variables to measure the financial strength of a firm in one year, including return on asset, cash flow from operation, change of return on asset, net income minus the cash flow from operation, change in long term debt, change in liquid ratio, issuance of equity, change in gross margin, and change in asset turnover ratio. An indicator variable is equal to 1 if there is an improving signal in the measure

[3] The results in the following sections are quantitatively similar using the returns in local currency.

each year. FSCORE is an aggregate measure which is the sum of these binary signals and ranges from 0 to 9. Following Novy-Marx (2013)[4], we define gross profitability (GP) as revenues minus costs of goods sold, scaled by total assets. The ratios of gross profitability are calculated annually. The book to market ratio (BM) is the book value of equity in a firm dividend by its market value at the fiscal year-end. The market value (MV) is the market capitalization of a stock at the end of June in each year. Momentum return is the cumulative return from January to May for a stock in each year (Watanabe, Xu, Yao and Yu, 2013). The variables of GP and BM are winsorized at 1% and 99% levels.

We sort the stocks in each market by FSCORE or GP in year t-1. Following Piotroski and So (2012) and Ng and Shen (2016), we divide the stocks in each market into the groups of "Low FSCORE", "Mid FSCORE" and "High FSCORE" if the FSCORE is below 4, between 4 and 6, and above 6, respectively. We rank stocks based on the sort of gross profitability in each Asian market. Firms are classified as "Low GP", "Mid GP" and "High GP" if the gross profitability ratios are below 30%, between 30% and 70%, and above 70% in the distributions each year, respectively. Similar to Fama and French (1993), the portfolios are constructed and held from July of year t to June of year t+1, based on the quality measures in year t-1. The window is the anomaly realization period.

FactSet provides quarterly data on the number of institutional investors, aggregate institutional holdings and the ownership by institution type on stocks in the five Asian markets from 2000 to 2013. The institutional demand is calculated by the changes in the number of institutional investors or in the institutional ownership (percent shares held by institutional investors). The previous studies in institutional

[4] Novy-Marx (2013) also uses some other variables to measure profitability, such as earnings and free cash flow. It is found that the gross profitability has the most powerful predictions on future stock return among these variables.

investments (e.g., Ferreira and Matos, 2008) find that the market capitalization is the major determinant of institutional ownership. We scale the changes of institutional holdings on each stock by its market capitalization following Choi and Sias (2012) and Edelen, Ince and Kadlec (2016). In each market, the size-adjusted institutional demand of a stock is measured by the change in institutional investors (institutional ownership) minus the average change in institutional investors (institutional ownership) in the same market capitalization decile, divided by the average number of institutional investors (institutional ownership) in the decile. Following Ferreira and Matos (2008), we divide the aggregate institutional demand into the demands by actively managed institutions (or independent institution) and passively managed institutions (or grey institution). The independent institutions include mutual fund, hedge fund and investment advisor, and the grey institutions are bank, insurance company and pension fund.

We examine the institutional demand in the periods before the portfolio construction date as of June of year t. To capture the institutional trading, we define the periods from January of year t-1 to June of year t as institutional trading window following Edelen, Ince and Kadlec (2016). The accounting information to measure stock quality is available in this six-quarter period and the institutional investors would trade according to the stock quality signals. Figure 1 gives the timeline of fiscal year end, institutional trading window and stock portfolio holding window.

[Insert Figure 1 here]

Table 1 shows the average values of stock return, institutional demand, and financial variables. We present the descriptive statistics for each market and the full sample. The average monthly stock return in US dollar is 0.75% in the full sample. The average quarterly institutional ownership and the number of institutional

investors are 5.26% and 32.12 in the full sample, respectively. On average, the changes of institutional ownership and the number of institutional investors are 0.12% and 0.79 each quarter in the full sample, respectively. The average value of FSCORE is 5.19, which is comparable to the value of FSCORE in Ng and Shen (2016). The average GP ratio is 26.83%, ranging from 21.03% in Korea to 33.17% in Japan. We also present the average values of book to market ratio, market capitalization in US dollar and momentum returns.

2.3 Methodology

We use two methods to investigate the profitability of the quality investing strategy. The first approach is the portfolio analysis. We calculate the portfolio returns for the stocks sorted by FSCORE or GP in each market, and the returns from the strategy of long, high-quality stocks and short, low-quality stock. Following previous studies (Piostroski and So, 2012; Novy-Marx, 2013; Hyde, 2016), we report both equally-weighted and value-weighted portfolio returns. The weight in value-weighted method is by the market capitalization in prior-month (Asparouhova, Bessembinder, and Kalcheva , 2013). We run regression analysis to control for the impacts of other firm characteristics. The regression model is given as follows (Novy-Marx, 2013; Watanabe et al., 2013):

$$R_{i,t} = \alpha_{i,t} + \beta_1 FSCORE/GP_{i,t-1} + \beta_2 LNBM_{i,t-1} + \beta_3 LNMV_{i,t} + \beta_4 MOM_{i,t} + \varepsilon_{i,t} \quad (1)$$

The dependent variable is the monthly stock return in US dollar from the July of year t to June of year t+1. The key independent variable is the value of FSCORE or gross profitability ratio in year t-1. The control variables include the natural logarithm of book to market ratio (*LNBM*) in year t-1, the natural logarithm of market

capitalization (in US dollar; *LNMV*) at the end of June of year t, and the momentum returns from January to May (*MOM*) in year t. We implement the procedure of Fama and MacBeth (1973) to estimate the equation for each of five Asian markets from 2000 to 2016. We also run cross-country, cross-sectional regressions using the full sample by including country dummies in Equation (1). We expect that the coefficients on *FSCORE* or *GP* should be positive, which indicates that stock quality has predictive power on the subsequent stock returns.

We follow the methodology in Edelen, Ince and Kadlec (2016) to investigate the institutional demand on stock quality. In our paper, the long-leg (short-leg) anomaly stocks in the portfolio are the firms with high (low) quality. We sort the stocks by FSCORE or GP (high, middle, and low) in each of the five Asian markets. We report the average quarterly changes of institutional ownership or the number of institutional investors for each group in each market during the institutional trading window. We also test whether the institutional demand on the high-quality stocks is stronger than on low-quality stocks by comparing the changes of institutional ownership (or the number of institutional investor) between the long-leg and short-leg groups. If the institutional investors follow the quality investing strategy, we should find strong demand for high-quality stock and weak demand for low-quality stock. The differences of institutional trading on the stocks with high and low quality should be significantly positive. We explore the institutional demands on the stock quality by the type of institutions. We expect to find that actively managed institutions have higher demands on the quality than passively managed institutions.

3. Empirical Results

3.1 The profitability of quality investing: portfolio analysis

This section presents the returns of portfolios based on quality investing strategy in Asian markets. The returns are mean cross-sectional monthly returns in the portfolios of stocks with high, middle and low quality, as well as the portfolio to long, high-quality stocks and short, low-quality stocks. We report both equally-weighted and value-weighted returns. The sample period is from July of 2000 to December of 2016 (198 months totally). The *t-statistics* are adjusted by Newey-West standard error (Newey and West, 1987).

Table 2 reports the mean portfolio returns for the stocks sorted by FSCORE in each of the five Asian markets. Panel A shows that the portfolio of high FSCORE stocks earn positive returns in all five markets, which is also significant, except in the Taiwan market. The returns range from 0.61% in Japan to 1.37% in Hong Kong. The returns from the long-short strategy are all positive and significant except in the market in Korea. Panel B reports the results by value-weighted return. The portfolio returns on high FSCORE stocks are positive and significant in Hong Kong, Korea and Singapore. However, the returns from the strategy of buying high FSCORE stocks and selling low FSCORE stocks are only positive and significant in the Singapore market.

[Insert Table 2 here]

Table 3 presents the mean portfolio returns for the stocks sorted by GP. In Panel A, the equally-weighted returns of high GP stocks are positive in all five markets but only significant in Hong Kong and Korea. The returns from long, high GP stocks and short, low GP stocks are significantly positive in Hong Kong and Singapore. It is interesting to find that the gross profitability cannot screen winners from losers in Japan and Korea, in which the portfolio of high GP stocks gives similar return as low GP stocks. Panel B also indicates that the value-weighted returns of high

GP portfolio are not significantly higher than the returns of low GP portfolio in Japan, Korea, Singapore and Taiwan. The results are not consistent with Novy-Marx (2013), which finds that stocks with strong profitability outperform stocks with weak profitability in US market. Our findings are similar to the cross-country evidences in Sun, Wei and Xie (2014), which show substantial variation of the GP effect in international markets.[5]

[Insert Table 3 here]

In sum, we find that the high-quality stocks earn positive returns in the five Asian markets. In the equally-weighted portfolios, high FSCORE stocks significantly outperform low FSCORE in the markets of Hong Kong, Japan, Singapore and Taiwan; yet, the high GP stocks yield significantly higher returns than low GP stocks in only the markets of Hong Kong and Singapore. In the value-weighted portfolios, we find the evidences that the portfolio of high-quality stocks outperforms the portfolio of low-quality stocks only in Singapore (by FSCORE) and Hong Kong (by GP). One of the potential limitations about the portfolio analysis is that it does not control the impacts of other firm characteristics on stock returns such as market capitalization[6]. In the next section, we run cross-sectional regressions of stock returns on the quality measures with control variables of firm characteristics such as market capitalization.

3.2 The profitability of quality investing: regression analysis

This section presents the results of regression analysis. We run the Fama-MacBeth regressions for each of five Asian markets and the full sample. We examine

[5] Sun, Wei and Xie (2014) show that gross profitability effect is stronger in the countries with low investment friction but is not related to country characteristics like limits to arbitrage. The investigation of cross-country variation in GP anomaly is beyond the scope of this paper.

[6] In the unreported results, we find that the stocks with high FSCORE or high GP have significantly larger market capitalizations than the stocks with low FSCORE or low GP. The result is consistent with Gallagher et al. (2014a), who finds that high-quality stocks in Australia have larger firm size than low-quality stocks. .

whether the quality measures are positively associated with the subsequent stock returns after controlling for firm characteristics, including market capitalization, book to market ratio and momentum return. Panel A of Table 4 presents the results from Equation (1). The regressions are run separately for quality measures FSCORE and GP. The *t-statistics* for the coefficient estimates are adjusted by Newey-West standard error (Newey and West, 1987). To save the space, we do not report the coefficients and their *t-statistics* for the control variables.

[Insert Table 4 here]

Columns (1) – (5) present the coefficient estimates of FSCORE and GP for each market, respectively. The coefficients on FSCORE are positive and significant in all five markets. The results indicate that if the value of FSCORE is increased by 1, the monthly stock return is increased by 0.20% (Hong Kong), 0.03% (Japan), 0.06% (Korea), 0.17% (Singapore) and 0.11% (Taiwan), respectively. The coefficients on GP are also all positive and significant in these markets. We report the cross-country results in column (6) by pooling all observations from five markets and employing the Fama-MacBeth procedure with country dummies. The coefficients on FSCORE and GP are both positive and significant at 1% level. Given the standard deviations of FSCORE and GP ratio are 1.79 and 0.211 in our sample, a one-standard-deviation increase of FSCORE and GP leads to an increase of 0.14% (1.79 x 0.0008) and 0.18% (0.211 x 0.0083) of monthly stock return. The magnitudes are economic significance, which are equal to 1.72% and 2.11% per annum[7].

[7] The magnitude of GP effect is similar to the result in Sun, Wei and Xie (2014). They report an increase of 0.17% monthly return associated with one-standard-deviation increase in GP from 41 countries.

To mitigate the effect of micro-cap stocks, we remove the firms with market capitalization less than 100 US million[8] in the sample and run the cross-country regressions. The results in column (7) indicate that the coefficients on the quality measures are still positive and significant, although the magnitudes are slightly smaller than those from full sample. Column (8) reports the results from the firms in the five markets that are held by institutional investors. The coefficients on FSCORE and GP are positive and highly significant. Institutional investors have a strong preference for the large firms (Ferreira and Matos, 2008). Thus, the results in both column (7) and (8) suggest that the returns on quality are not driven by the small firms in our sample.

Following Edelen et al. (2016), we calculate the anomaly returns associated with stock quality. Panel B of Table 4 shows the calculations of the anomaly return which is the product of FSCORE/GP value in the regressions and their corresponding coefficients. We report the average FSCORE anomaly return and average GP anomaly return for each market and all markets, respectively. The FSCORE anomaly returns range from 0.16% per month in Japan to 0.38% per month in Taiwan. The range for GP anomaly returns is from 0.15% (Korea) to 0.86% (Singapore). The anomaly returns in the full sample are 0.24% for FSCORE and 0.36% for GP, which are equivalent to 31.62% and 48.63% of total monthly return in the five markets. As we control the well-known anomaly characteristics like book to market ratio, market capitalization, and momentum returns in the regressions, the FSCORE/GP anomaly returns represent the return that is only attributed to the characteristic of quality. Our results show that the anomaly return on the stock quality is economically significant in the markets.

[8] We choose 100 US million as threshold because MSCI defines the small cap stocks as those with free float market capitalization of at least 100 US million. Our results remain similar if different criteria are applied.

Altogether, the results from the cross-sectional regressions confirm the first hypothesis that high-quality stocks outperform low-quality stocks. Both gross profitability and FSCORE can be employed to screen winners from losers in five Asian markets. Our findings are consistent with the Novy-Marx (2013) and Fama and French (2015) in that the profitable firms earn higher subsequent returns than unprofitable firms in the US market. We also find that Piotroski's FSCORE, which examines liquidity, operating efficiency, as well as profitability of a firm, is positively and significantly associated with the subsequent stock returns. It indicates that FSCORE, as a measure of stock quality, can be used to distinguish winners from losers in all stocks rather than just value stocks (Piotroski, 2000; Ng and Shen, 2016).

3.3 Institutional demands for quality stocks

After documenting the profitability of quality investing strategy, we now turn to the other side of quality investing and explore whether sophisticated investors buy quality stocks. Lewellen (2011) finds that institutional investors, as a whole, hold market portfolio in the US market. Edelen et al. (2016) show that in general, institutions trade contrary to the popular anomaly prescriptions such as book to market, net operating assets, investment to assets and undervalued-minus-overvalued[9]. It is interesting to explore whether institutional investors have stronger demand for high-quality stock than for low-quality stock in the markets outside US.

In this section, we restrict our analysis to the firms that are held by institutions in five Asian markets. The sample period is from 2000 to 2013. The firms in the subsample are ranked by FSCORE and GP at the end of June of year t in each market

[9] Edelen et al. (2016) also explore whether institutional investors exploit the GP anomaly return predictability. They find that institutions buy more high GP stocks than low GP stocks, although the differences between them are only marginally significant in the institutional demand measured by the number of institutional investors.

using the financial statement information in year t-1. The institutional demand is measured by the changes in the number of institutional investors or the institutional ownership during the institutional trading window, adjusted by the market capitalization of a firm. Following Edelen et al. (2016), we evaluate the institutional demand for the stocks sorted by FSCORE and GP in each market, respectively. The quarterly average institutional demand on each firm is estimated during the trading window in each year. We calculate the differences of the institutional demand between the stocks with high quality and low quality.

[Insert Table 5 here]

Table 5 documents the average quarterly size-adjusted changes of the number of institutional investors in the institutional trading period in the firms grouped by the two quality measures. In the Panel A, the average changes of the number of institutional investors are all negative in the low FSCORE stocks in each of five Asian markets and significant in Japan, Korea and Taiwan at the 1% level. The institutional demand turns positive in the mid FSCORE stocks in each market. The magnitudes of institutional demand continue to increase in the high FSCORE stocks. The differences of institutional demand between high FSCORE stocks and low FSCORE stocks are highly significant in all the markets. Panel B reports the average quarterly changes of the number of institutional investors in the firms sorted by GP. Similarly, the institutional demands increase with the gross profitability ratio in all the markets. The differences of institutional demand during the trading window between high GP stocks and low GP stocks are positive and significant at 1% level in these markets.

[Insert Table 6 here]

Table 6 reports the average quarterly size-adjusted changes of the institutional ownership during the quality portfolio formation period. Panel A gives the

institutional demand on the FSCORE portfolios. The changes of institutional ownership are negative in low FSCORE portfolios and significantly positive in high FSCORE portfolios in all the markets. The differences are highly significant. Panel B shows that the institutional demands are generally negative or insignificant in the low GP stocks but significantly positive in the high GP stocks. The institutions have much stronger demand on the high GP stocks than low GP stocks in each of the five Asian markets.

The results in this section confirm our second hypothesis H2a - institutional demand is stronger on the high-quality stocks than the low-quality stocks. We find that in aggregate the institutions significantly buy high FSCORE or high GP stocks, and while the demand on the low FSCORE or low GP stocks is relatively weak. The findings support the argument that the institutional investors are sophisticated (Coval and Moskowitz, 2001; Cohen, Gompers and Vuolteenaho, 2002; Gibson, Safieddine and Sonti, 2004) and can use financial statement information to choose good quality stocks. However, the findings are not consistent with the results in Edelen et al. (2016) which show that the institutional investors generally trade contrary to the stock anomaly predictability in the US market. Our study is the first paper to document the institutional demand on the quality stocks in international markets.

3.4 Institutional demands for quality stocks by types

We show that in aggregate the institutional investors would choose stocks with high quality. However, it is still debatable in the literature whether institutions in different types have stock-picking skills. On the one hand, some studies show that actively managed institutions like hedge fund and mutual fund, which are more informed than passively managed institutions or individual investors, can earn abnormal returns (Daniel et al., 1997; Coval and Moskowitz, 2001; Sias, Turtle and

Zykaj, 2016). On the other hand, some literature shows that different institutions have similar investment preferences (Ferreira and Matos, 2008; Lewellen, 2011). This section presents the results on whether the institution types affect the demands on high-quality stock in Asian markets.

[Insert Table 7 here]

Table 7 presents the institutional demands on FSCORE/GP portfolios by institution types. Panel A shows the independent institutions have strong demands on the high FSCORE stocks. The changes of institutional ownership are significantly positive at 1% level in all the markets. The differences in the independent institutional demands between high FSCORE stocks and low FSCORE stocks are also highly significantly in these markets. On the other hand, the grey institutions do not show strong demands on high FSCORE stocks in Hong Kong, Singapore and Taiwan. The differences of the changes of institution ownership between high and low FSCORE stocks are only significantly positive in Japan and Korea. The magnitude of the differences, however, is quite small in these two markets when compared to the magnitude in independent institutions.

Similar patterns are present in the GP portfolios in Panel B. The institutional trading on high GP stocks is positive and highly significant in independent institutions in all five markets. The differences between the high and low GP stocks are also positively significant at 1% level. The changes in the institutional ownership are not significant in low GP or mid GP portfolios. The demands on high GP stocks are only positive and significant in high GP stocks in Korea, Singapore and Taiwan. The differences in the demands between high and low GP by grey institutions are much smaller than the differences by independent institutions.

Our results indicate the quality investing strategy is more likely to be adopted by independent institutions like mutual fund and hedge fund than grey institutions like bank and insurance company. The independent institutions buy significantly more high-quality stocks than low-quality stocks in each of five Asian markets. However, the trades by grey institutions based on stock quality are either insignificant or only a small amount in the markets. These findings are consistent with the argument that actively managed institutions are informed (e.g., Sias, Turtle and Zykaj, 2016). They are skilled investors in using financial statement information and selecting quality stocks. In unreported results, we find that both mutual funds and hedge funds have strong demand on the quality stocks, which is not inconsistent with the results in Akbas et al. (2015) showing that hedge fund is smart money and mutual fund is dumb money.

4. Robustness Tests

4.1 Abnormal returns in quality investing strategy

We investigate whether quality investing strategy yields abnormal returns by looking at alphas for the portfolios sorted by FSCORE and GP. Alphas are derived from Fama and French three-factor model (Fama and French, 1993; 2012) through the time-series regressions of portfolio returns on market premium (MKT), size premium (SMB), and value premium (HML). The factor premiums for Asian markets are downloaded from Kenneth French's website[10]. To save space, we only present the results from the strategy that buys high-quality stocks and sells low-quality stocks. The dependent variable is the hedge return from long-short portfolio in each of five Asian markets. The regression model is given as:

[10] Fama and French (2012) give the factors and returns for the international markets, including the developed markets in North America, Europe, Japan, and Asia Pacific excluding Japan. We use the factors of Asia Pacific (excluding Japan) for portfolios in Hong Kong, Korea, Singapore and Taiwan, and the factors of Japan for Japanese portfolios.

$$r_{i,t} = \alpha_0 + \alpha_1 MKT_t + \alpha_2 SMB_t + \alpha_3 HML_t + \varepsilon_{i,t} \quad (2)$$

[Insert Appendix 1]

Appendix shows the alphas from the long-short portfolios in each market. Panel A gives the alphas from equally-weighted portfolios. The alphas from long, high FSCORE stocks and short, low FSCORE stocks are all positive and highly significant in Hong Kong, Japan, Singapore and Taiwan. The monthly alphas are 1.22%, 0.49%, 0.22%, 0.99% and 0.57% in the markets, respectively. The magnitudes of the abnormal returns are economically significant. In the portfolios by GP, the alphas are also positive and significant in three markets, Hong Kong, Japan and Singapore. The magnitudes of the alphas from GP portfolios are slightly lower than FSCORE portfolios. Panel B shows the value-weighted alphas. The long-short portfolios by FSCORE and GP generally yield positive alphas in the markets, except Korea. The alphas are positive in Singapore and Taiwan (FSCORE portfolios), and Hong Kong (GP portfolio). In sum, these results indicate that the quality investing strategy can yield abnormal returns to investors in Asian markets even after controlling the popular Fama-French factors.

4.2 Institutional ownership change and stock return

In the section 3, we find that high-quality stocks outperform low-quality stocks in the subsequent periods, and institutional investors trade according to the stock quality. In this section, we explore whether changes in institutional ownership predict future stock returns. Gompers and Metrick (2001) find that the level of institutional ownership is positively associated with stock returns but the change of institutional ownership does not have predictive power on subsequent stock returns. Sias, Starks and Titman (2006) document a positive and significant relation between

the change in institutional ownership and the stock return in the contemporaneous periods. However, Edelen et al. (2016) find that the institutional trading in the long horizon (from January of year t-1 to June of year t) is negatively associated with the subsequent stock returns (from July of year t to June of year t+1) and the anomaly predicted returns. Following Edelen et al. (2016), we run cross-sectional regressions of the institutional demand and subsequent stock returns or quality anomaly return and. The regression equation is given as:

$$R_{i,t}/ANOMALY_{i,t} = \alpha_{i,t} + \beta_1 \Delta IO/\Delta NBR_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

The dependent variable is the stock return or anomaly return related to FSCORE or GP from July of year t to June of year t+1. The anomaly return is the product of FSCORE/GP and their corresponding coefficients estimated in Equation (1) for each stock (Edelen et al., 2016). The independent variable is the institutional demand measured by the average changes of institutional ownership or the number of institutional investors in the institutional trading window. We run the Fama-MacBeth regressions for each of five Asian markets and the full sample with country dummies.

[Insert Appendix 2]

We report the regression results in Appendix 2. Panel A shows the results using future stock returns. The coefficients on the change of the number of institutional investors are positive and significant only in the markets of Singapore and Taiwan and are insignificant in other markets or the pooled sample of five markets. The coefficients on the change of the institutional ownership are significantly negative in Japan and the overall sample. In sum, we do not find a positive relation between institutional trading and subsequent stock returns, similar to the findings in Gompers and Metrick (2001). Panels B and C show the relation between the

institutional demand and the FSCORE and GP anomaly returns. The institutional demand is positively associated with the subsequent FSCORE anomaly return. The relation is significant in each market and the overall five markets except the regression using the change of institutional ownership in Japan. Panel C indicates that the institutional trading remains positive in relation with subsequent GP anomaly return; and the relation is highly significant in Hong Kong, Taiwan and the full sample.

Putting together, we find that the changes of institutional ownership in the long horizon have predictive power on the subsequent anomaly returns associated with FSCORE and GP in the Asian markets. It again supports our second hypothesis that institutional investors trade on the stock quality and earn the related returns. Our findings are not consistent with the results in Edelen et al. (2016) that institutional trading has negative predictive power on the stock anomaly returns in US market.

4.3 Value investing or quality investing

The literature (Fama and French, 1992; Lakonishok, Shleifer and Vishny, 1994) shows that the value stocks outperform glamour stocks, which is coined as value investing. However, the value investing only considers the cheapness dimension of a stock, which may not provide superior investment performance (Kok, Ribando and Sloan, 2017). We explore whether value stocks earn higher returns than glamour stocks, and whether institutional investors buy more value stocks than glamour stocks in Asian markets. Appendix 3 reports the results of stock returns and institutional demand on the portfolios by book to market ratio in each of the five Asian markets.

[Insert Appendix 3]

Panels A and B report the equally-weighted and value-weighted returns on the portfolios sorted by BM. We find that value stocks outperform glamour returns in all five markets in both equally-weighted returns and value-weighted returns. The equally-weighted returns from long value stocks and short glamour stocks are positive and highly significant in all these markets except Taiwan. The value-weighted returns from the long-short strategy are also significantly positive in Japan, Korea and Singapore. The results confirm the book to market effect in the international markets (Fama and French, 1998; Hou, Karolyi and Kho, 2011; Asness, Moskowitz and Pedersen, 2013).

Surprisingly, we find that institutional demands are much stronger on glamour stocks than value stocks in all the five markets, documented in Panels C and D. The changes of institutional ownership or the number of institutional investors are significantly positive in glamour stocks in each market. In most of the markets, the demands on value stocks are negative or insignificant. The differences of institutional demands between value stocks and glamour stocks are highly significant in these Asian markets. The results indicate that institutional investors prefer to buy glamour stocks over value stocks, which are consistent with the findings in Edelen et al. (2016) about the institutional trading on BM anomaly in US market. Combined with the findings of institutional demands on quality stocks above, our results suggest that institutions are more likely to adopt quality investing strategy than value investing strategy in Asian markets.

5. Conclusion

We examine the quality investing strategies in five developed Asian markets: Hong Kong, Japan, Korea, Singapore and Taiwan. We measure the stock quality by

gross profitability (Novy-Marx, 2013) or FSCORE (Piotroski, 2000). We first explore whether stock quality measures in year t-1 have predictive power on future stock returns in the periods between July of year t and June of year t+1. We find that the stocks with high quality generally outperform the stocks with low quality in these markets, especially in the equally-weighted portfolios. FSCORE has stronger predictive power than GP on subsequent stock returns. In the cross-sectional regressions, the stock quality is positively and significantly associated with subsequent stock returns in all these markets, after controlling for other firm characteristics. We document that quality investing strategy is profitable in the developed Asian markets from 2000 to 2016.

We find that institutional investors in the markets have strong demand on the stocks with high quality. The institutional demand (or institutional trading) is measured by the changes of institutional ownership or the number of institutional investors in the period from January of year t-1 and June of year t, following Edelen et al. (2016). In the stocks with high FSCORE or high GP, the institutional demand is significantly positive in the five markets, while the demand is negative or insignificant in the stocks with low quality. The differences in the institutional demands between high- and low-quality stocks are highly significant in all these markets. We find that independent institutions like mutual fund and hedge fund are more likely to trade on the stock quality than grey institutions like bank and insurance company. This is the first paper to investigate the relation between institutional demand and stock anomaly in international markets. Our findings are not consistent with the results in Edelen et al. (2016) which show that the institutional investors generally trade against the popular stock return anomalies in US market. The results in our paper support the argument that the institutional investors such as hedge fund

and mutual fund are sophisticated, and they trade on some stock return anomalies (Caglayan, Celiker and Sonaer, 2018; Calluzzo, Moneta and Topaloglu, 2018).

This paper shed lights on whether/how quality investing strategy could be implemented in the Asian stock market with practical value. We show that professional investors, like institutions, do consider the stock quality and follow the quality investing strategy, i.e., buying more high-quality stock than low-quality stock. On the contrary, the sophisticated investors do not trade according to the value investing strategy, i.e., buying more value stock than glamour stock. The quality (high FSCORE or GP) may be more important characteristic to select stock than the cheapness (high BM) in the capital markets.

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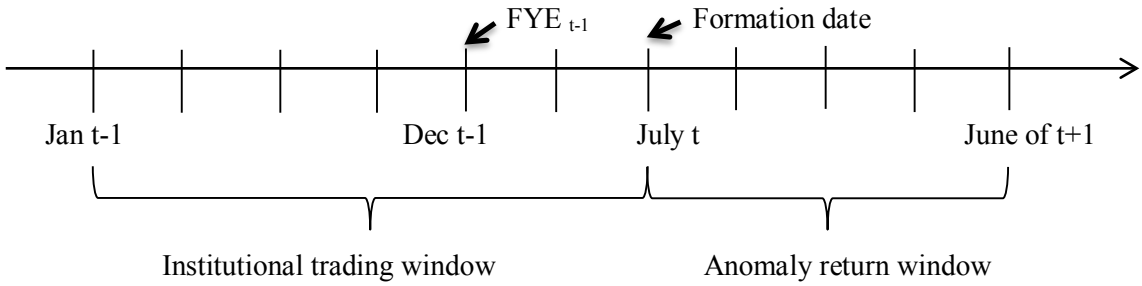
Figure 1: Time line for the portfolio construction, anomaly return window and institutional trading window



Note: this figure depicts the time line for portfolio construction date, anomaly return window and institutional trading window. The portfolios are formed at the end of June of year t based on the financial statement information in the fiscal year t-1. The portfolios are held from July of year t to June of year t+1, which is anomaly return window. The institutional trading window is from Jan of year t-1 to June of year t, totally six quarters. During the institutional trading window, the institutions receive the financial statement information of fiscal year t-1 about a firm and may trade on the stock quality accordingly. FYE t-1 is the fiscal year-end in calendar year t-1. Our time line is similar to time line of accounting and operating anomalies in Edelen et al. (2016).

Table 1: Summary statistics

Country	Hong Kong	Japan	Korea	Singapore	Taiwan	Total
N of firms	1,680	4,690	2,157	902	2,070	11,499
N of firms with IO	1,059	4,078	1,237	502	1,237	8,113
N of firm-quarter observations	29,873	137,416	28,568	12,196	29,579	237,632
N of firm-month observations	189,211	653,203	223,883	107,094	239,645	1,413,036
Mean monthly return	0.82%	0.45%	1.80%	0.60%	0.57%	0.75%
Mean quarterly IO	6.64%	5.20%	4.80%	5.19%	4.67%	5.26%
Mean quarterly NBR	35.54	36.40	20.70	27.14	21.82	32.12
Mean quarterly change of IO	0.13%	0.13%	0.07%	0.07%	0.14%	0.12%
Mean quarterly change of NBR	1.02	0.83	0.55	0.57	0.68	0.79
Mean FSCORE	4.78	5.40	5.00	5.00	5.25	5.19
Mean GP	22.37%	33.17%	21.03%	23.12%	21.37%	26.83%
Mean BM	1.21	1.28	1.41	1.16	0.93	1.22
Mean MV (million USD)	993.31	962.80	472.07	473.84	430.07	757.71
Mean MOM	2.32%	4.06%	5.00%	0.48%	2.19%	3.48%

Note: This table reports summary statistics for each Asian market in the sample. The sample period is from 2000 to 2016. The number of firms and observations in each market are provided. Most of firms in these markets are held by institutional investors. The average monthly stock return, calculated in US dollar, for each market is presented. The institutional demand is measured by the quarterly changes of institutional ownership (IO) and the number of institutional investors (NBR). The table also gives average values of FSCORE, gross profitability (GP), book to market ratio (BM), market value (MV), and momentum return (MOM) in each market. Market value is market capitalization of a firm at the end of June each year in million US dollar. Momentum return is the cumulative returns from January to May in each year.

Table 2: FSCORE and stock returns in each country

Panel A: Equally-weighted portfolio returns

	Hong Kong	Japan	Korea	Singapore	Taiwan
Low FSCORE	0.0008	0.0019	0.0168	-0.0000	0.0008
	(0.13)	(0.51)	(2.61)***	(-0.01)	(0.12)
Mid FSCORE	0.0093	0.0050	0.0184	0.0050	0.0042
	(1.61)	(1.42)	(2.90)***	(0.96)	(0.65)
High FSCORE	0.0137	0.0061	0.0195	0.0097	0.0067
	(2.49)**	(1.74)*	(3.03)***	(1.83)*	(1.06)
High - Low	0.0129	0.0041	0.0027	0.0097	0.0059
	(6.11)***	(3.35)***	(1.31)	(6.53)***	(3.75)***

Panel B: Value-weighted portfolio returns

	Hong Kong	Japan	Korea	Singapore	Taiwan
Low FSCORE	0.0063	0.0024	0.0127	0.0026	0.0009
	(1.06)	(0.60)	(1.84)*	(0.42)	(0.16)
Mid FSCORE	0.0066	0.0029	0.0087	0.0069	0.0048
	(1.31)	(0.85)	(1.49)	(1.47)	(0.84)
High FSCORE	0.0108	0.0013	0.0108	0.0100	0.0049
	(2.11)**	(0.38)	(1.71)*	(2.02)**	(0.90)
High - Low	0.0045	-0.0011	-0.0019	0.0074	0.0040
	(1.13)	(-0.45)	(-0.56)	(2.12)**	(1.60)

Note: This table presents the raw returns for the portfolios sorted by FSCORE for each market. The return is measured in US dollar. The portfolios of Low FSCORE, Mid FSCORE and High FSCORE contains stocks with the values of FSCORE less or equal to 3, between 4 and 6, and above 7. The portfolios are constructed annually from July of year t to June of year t+1 based on the FSCORE of firms in year t-1. The row High – Low reports the return in the long-short portfolio that buys high-quality stocks and sells low-quality stocks. Panel A reports the equally-weighted portfolio returns. Panel B gives the portfolio returns weighted by market value. The sample period is from 2000 to 2016. The *t*-statistics are adjusted by Newey-West standard error. ***, ** and * represent significance at 1%, 5% and 10% level, respectively.

Table 3: Gross profitability and stock returns in each country

Panel A: Equally-weighted portfolio returns

	Hong Kong	Japan	Korea	Singapore	Taiwan
Low GP	0.0046	0.0045	0.0171	0.0028	0.0028
	(0.77)	(1.19)	(2.65)***	(0.48)	(0.40)
Mid GP	0.0085	0.0052	0.0188	0.0042	0.0043
	(1.43)	(1.45)	(2.86)***	(0.79)	(0.64)
High GP	0.0098	0.0044	0.0171	0.0071	0.0053
	(1.82)*	(1.30)	(2.62)***	(1.36)	(0.87)
High - Low	0.0052	-0.0001	-0.0001	0.0043	0.0025
	(2.46)**	(-0.07)	(-0.03)	(2.33)**	(0.85)

Panel B: Value-weighted portfolio returns

	Hong Kong	Japan	Korea	Singapore	Taiwan
Low GP	0.0035	0.0037	0.0090	0.0072	0.0039
	(0.63)	(1.10)	(1.25)	(1.24)	(0.64)
Mid GP	0.0062	0.0022	0.0096	0.0079	0.0035
	(1.29)	(0.59)	(1.55)	(1.76)*	(0.58)
High GP	0.0090	0.0029	0.0083	0.0083	0.0058
	(1.73)*	(0.93)	(1.39)	(1.79)*	(1.09)
High - Low	0.0055	-0.0009	-0.0007	0.0011	0.0019
	(1.78)*	(-0.43)	(-0.18)	(0.37)	(0.67)

Note: This table presents the raw returns for the portfolios sorted by gross profitability (GP) for each market. The return is measured in US dollar. The portfolios of Low GP, Mid GP and High GP contains stocks in bottom 30%, between 30% and 70%, and top 30% of gross profitability. The portfolios are constructed annually from July of year t to June of year t+1 based on the gross profitability of firms in year t-1. The row High – Low reports the return in the long-short portfolio that buys high-quality stocks and sells low-quality stocks. Panel A reports the equally-weighted portfolio returns. Panel B gives the portfolio returns weighted by market value. The sample period is from 2000 to 2016. The *t*-statistics are adjusted by Newey-West standard error. ***, ** and * represent significance at 1%, 5% and 10% level, respectively.

Table 4: Cross-sectional regressions of stock returns on FSCORE and gross profitability

	Hong Kong	Japan	Korea	Singapore	Taiwan	All	MV>=100m	With IO
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Coefficients on FSCORE and GP from Fama-MacBeth regressions								
Coeff. on FSCORE	0.0020	0.0003	0.0006	0.0017	0.0011	0.0008	0.0005	0.0006
t-stat	(5.75)***	(2.32)**	(1.92)*	(6.54)***	(3.86)***	(6.79)***	(3.67)***	(4.75)***
Coeff. on GP	0.0206	0.0046	0.0131	0.0149	0.0213	0.0083	0.0073	0.0085
t-stat	(3.84)***	(1.75)*	(2.58)**	(3.08)***	(3.67)***	(3.95)***	(2.54)**	(2.78)***
Control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummy	No	No	No	No	No	Yes	Yes	Yes
N of months	198	198	198	198	198	198	198	198
Panel B: Anomaly returns associated with FSCORE and GP								
FSCORE anomaly	0.31%	0.16%	0.24%	0.25%	0.38%	0.24%		
GP anomaly	0.74%	0.18%	0.15%	0.86%	0.55%	0.36%		

Note: This table reports the average coefficient estimates on FSCORE and GP from monthly Fama-MacBeth regressions and the anomaly returns associated with FSCORE and GP. The regression model for each market is given as follows:

$$R_{i,t} = \alpha_{i,t} + \beta_1 FSCORE/GP_{i,t-1} + \beta_2 LNBM_{i,t-1} + \beta_3 LNMV_{i,t} + \beta_4 MOM_{i,t} + \varepsilon_{i,t}$$

In the model, the dependent variable is monthly stock return in US dollar from July of year t to June of year t+1. The key independent variables are FSCORE or GP from year t-1. The regressions are run separately for FSCORE and GP. The control variables include the natural logarithm of book to market ratio (LNBM), the natural logarithm of market value in US dollar (LNMV) and momentum return. Panel A presents the coefficients on FSCORE and GP estimated from the regression model, respectively. To conserve space, the intercepts and the coefficients on the control variables are not reported. Column (1) – (5) gives the coefficient estimates for each Asian market. Column (6) provides the coefficient estimates for all the stocks in the five markets by including country dummies in the regression. Column (7) and (8) reports the coefficient estimates in the stocks with market value larger than 100 million USD or with institutional ownership at the end of June of year t. Panel B reports the anomaly returns associated with FSCORE and GP. The returns are calculated by the product of FSCORE/GP and their corresponding coefficients in Panel A. The sample period is from 2000 to 2016. The *t*-statistics are adjusted by Newey-West standard error. ***, ** and * represent significance at 1%, 5% and 10% level, respectively.

Table 5: Changes in the number of institutional investors for FSCORE and GP portfolios

Panel A: Institutional demand in FSCORE portfolios

	Hong Kong	Japan	Korea	Singapore	Taiwan
Low FSCORE	-0.0061	-0.0235	-0.0290	-0.0144	-0.0270
	(-1.00)	(-5.48)***	(-4.60)***	(-1.41)	(-4.24)***
Mid FSCORE	0.0093	0.0068	0.0125	0.0149	0.0129
	(3.46)***	(6.39)***	(4.28)***	(3.20)***	(4.04)***
High FSCORE	0.0292	0.0169	0.0377	0.0307	0.0297
	(5.42)***	(17.52)***	(8.69)***	(4.49)***	(7.21)***
High - Low	0.0353	0.0404	0.0667	0.0452	0.0567
	(4.35)***	(9.20)***	(8.71)***	(3.68)***	(7.47)***

Panel B: Institutional demand in GP portfolios

	Hong Kong	Japan	Korea	Singapore	Taiwan
Low GP	0.0009	0.0020	-0.0095	-0.0041	-0.0152
	(0.30)	(1.42)	(-2.51)**	(-0.87)	(-4.76)***
Mid GP	0.0037	0.0062	0.0153	0.0087	0.0111
	(0.95)	(5.15)***	(4.40)***	(1.65)*	(3.13)***
High GP	0.0336	0.0118	0.0270	0.0393	0.0449
	(5.30)***	(6.24)***	(5.80)***	(4.37)***	(8.09)***
High - Low	0.0327	0.0098	0.0365	0.0433	0.0600
	(4.62)***	(4.14)***	(6.10)***	(4.27)***	(9.39)***

Note: This table presents the average quarterly changes in the number of institutional investors for FSCORE/GP portfolios during portfolio formation period in five Asian markets. The changes in the number of institutional investors are adjusted by market capitalization. The portfolio formation period is a six-quarter period before the portfolio construction, from January of year t-1 to June of year t. The portfolios of Low FSCORE, Mid FSCORE and High FSCORE contains stocks with the values of FSCORE less or equal to 3, between 4 and 6, and above 7. The portfolios of Low GP, Mid GP and High GP contains stocks in bottom 30%, between 30% and 80%, and top 30% of gross profitability. The portfolios are based on the gross profitability of firms in year t-1. The row High – Low reports the differences of institutional demand between high-quality stocks and low-quality stocks. Panel A reports the institutional demands for FSCORE portfolios. Panel B gives the institutional demand for GP portfolios. The sample period is from 2000 to 2013. The *t*-statistics adjusted by robust standard error are reported in parentheses. ***, ** and * represent significance at 1%, 5% and 10% level, respectively.

Table 6: Changes in institutional ownership for FSCORE and GP portfolios

Panel A: Institutional demand in FSCORE portfolios

	Hong Kong	Japan	Korea	Singapore	Taiwan
Low FSCORE	-0.0181	-0.0142	-0.0138	-0.0035	-0.0041
	(-2.04)**	(-2.33)**	(-1.28)	(-0.25)	(-0.30)
Mid FSCORE	0.0131	0.0106	0.0177	0.0258	0.0247
	(2.95)***	(5.86)***	(3.51)***	(4.39)***	(3.75)***
High FSCORE	0.0232	0.0159	0.0275	0.0526	0.0296
	(3.94)***	(9.03)***	(3.84)***	(4.57)***	(3.85)***
High - Low	0.0414	0.0301	0.0414	0.0561	0.0337
	(3.88)***	(4.75)***	(3.19)***	(3.14)***	(2.13)**

Panel B: Institutional demand in GP portfolios

	Hong Kong	Japan	Korea	Singapore	Taiwan
Low GP	-0.0054	-0.0036	-0.0066	0.0084	-0.0117
	(-1.08)	(-1.77)*	(-1.16)	(1.18)	(-2.21)**
Mid GP	0.0099	0.0067	0.0134	0.0205	0.015
	(1.90)*	(3.38)***	(2.20)**	(3.03)***	(2.09)**
High GP	0.0322	0.0264	0.0342	0.0562	0.0694
	(2.91)***	(8.56)***	(4.51)***	(4.67)***	(5.80)***
High - Low	0.0376	0.0299	0.0409	0.0478	0.0811
	(3.09)***	(8.14)***	(4.30)***	(3.42)***	(6.19)***

Note: This table presents the average quarterly changes in institutional ownership for FSCORE/GP portfolios during portfolio formation period in five Asian markets. The changes in the institutional ownership are adjusted by market capitalization. The portfolio formation period is a six-quarter period before the portfolio construction, from January of year t-1 to June of year t. The portfolios of Low FSCORE, Mid FSCORE and High FSCORE contains stocks with the values of FSCORE less or equal to 3, between 4 and 6, and above 7. The portfolios of Low GP, Mid GP and High GP contains stocks in bottom 30%, between 30% and 80%, and top 30% of gross profitability. The portfolios are based on the gross profitability of firms in year t-1. The row High – Low reports the differences of institutional demand between high-quality stocks and low-quality stocks. Panel A reports the institutional demands for FSCORE portfolios. Panel B gives the institutional demand for GP portfolios. The sample period is from 2000 to 2013. The *t*-statistics adjusted by robust standard error are reported in parentheses. ***, ** and * represent significance at 1%, 5% and 10% level, respectively.

Table 7: Changes in institutional ownership for FSCORE and GP portfolios by types

Panel A: Institutional demand in FSCORE portfolios by institution types

	Hong Kong	Japan	Korea	Singapore	Taiwan
Independent institutions:					
Low FSCORE	-0.0177	-0.0134	-0.0109	-0.0032	-0.0044
	(-2.02)**	(-2.20)**	(-1.03)	(-0.24)	(-0.32)
Mid FSCORE	0.0129	0.0103	0.0167	0.0257	0.0241
	(2.92)***	(5.79)***	(3.34)***	(4.39)***	(3.67)***
High FSCORE	0.0231	0.0156	0.0266	0.0527	0.0320
	(3.94)***	(8.88)***	(3.74)***	(4.59)***	(4.32)***
High - Low	0.0408	0.0289	0.0375	0.0559	0.0364
	(3.86)***	(4.57)***	(2.94)***	(3.14)***	(2.34)**
Grey institutions:					
Low FSCORE	-0.0004	-0.0009	-0.0030	-0.0002	0.0003
	(-0.34)	(-1.84)*	(-1.55)	(-0.49)	(0.36)
Mid FSCORE	0.0001	0.0003	0.0009	0.0001	0.0005
	(0.26)	(1.07)	(2.17)**	(0.29)	(2.36)**
High FSCORE	0.0001	0.0003	0.0009	-0.0001	-0.0024
	(0.29)	(2.87)***	(1.66)*	(-0.16)	(-1.02)
High - Low	0.0005	0.0012	0.0039	0.0002	-0.0027
	(0.41)	(2.47)**	(1.93)*	(0.20)	(-1.08)

Panel B: Institutional demand in GP portfolios by institution types

	Hong Kong	Japan	Korea	Singapore	Taiwan
Independent institutions:					
Low GP	-0.0046	-0.0035	-0.0057	0.0088	-0.0117
	(-0.94)	(-1.78)*	(-1.03)	(1.24)	(-2.21)**
Mid GP	0.0094	0.0065	0.0134	0.021	0.0165
	(1.79)*	(3.32)***	(2.21)**	(3.10)***	(2.36)**
High GP	0.0319	0.0261	0.0328	0.0551	0.0682
	(2.89)***	(8.52)***	(4.33)***	(4.58)***	(5.72)***
High - Low	0.0366	0.0297	0.0385	0.0463	0.0800
	(3.02)***	(8.11)***	(4.10)***	(3.32)***	(6.12)***
Grey institutions:					
Low GP	-0.0008	-0.0000	-0.0009	-0.0004	-0.0000
	(-0.95)	(-0.09)	(-0.79)	(-0.77)	(-0.03)
Mid GP	0.0005	0.0002	0.0000	-0.0005	-0.0016
	(0.88)	(0.67)	(0.03)	(-0.98)	(-0.95)
High GP	0.0002	0.0003	0.0014	0.0011	0.0011
	(0.48)	(1.56)	(2.67)***	(2.55)**	(2.40)**
High - Low	0.0010	0.0003	0.0023	0.0015	0.0011
	(1.06)	(1.14)	(1.86)*	(2.31)**	(2.05)**

Note: This table presents the average quarterly changes in institutional ownership for FSCORE/GP portfolios by institution types during portfolio formation period in five Asian markets. Independent institutions include hedge fund, mutual fund and investment companies. Grey institutions are bank,

insurance company, pension fund and endowment. The aggregate institutional trading is divided into the institutional demand by independent institutions and by grey institutions. The changes in the institutional ownership are adjusted by market capitalization. The portfolio formation period is a six-quarter period before the portfolio construction, from January of year t-1 to June of year t. The portfolios of Low FSCORE, Mid FSCORE and High FSCORE contains stocks with the values of FSCORE less or equal to 3, between 4 and 6, and above 7. The portfolios of Low GP, Mid GP and High GP contains stocks in bottom 30%, between 30% and 80%, and top 30% of gross profitability. The portfolios are based on the gross profitability of firms in year t-1. The row High – Low reports the differences of institutional demand between high-quality stocks and low-quality stocks. Panel A reports the institutional demands for FSCORE portfolios. Panel B gives the institutional demand for GP portfolios. The sample period is from 2000 to 2013. The *t*-statistics adjusted by robust standard error are reported in parentheses. ***, ** and * represent significance at 1%, 5% and 10% level, respectively.

Appendix 1: Alphas for the long-short portfolios by FSCORE and GP

	Hong Kong	**Japan**	**Korea**	**Singapore**	**Taiwan**
Panel A: Equally-weighted alpha					
High FSCORE - Low FSCORE	0.0122	0.0049	0.0022	0.0099	0.0057
	(6.13)***	(4.37)***	(1.10)	(7.14)***	(3.39)***
High GP - Low GP	0.0064	0.0022	0.0001	0.0044	0.0024
	(3.36)***	(2.08)**	(0.08)	(2.58)**	(0.88)
Panel B: Value-weighted alpha					
High FSCORE - Low FSCORE	0.0055	0.0019	-0.0037	0.0079	0.0049
	(1.42)	(0.86)	(-1.06)	(2.52)**	(2.00)**
High GP - Low GP	0.0105	0.0028	-0.0008	0.0036	0.0026
	(3.06)***	(1.57)	(-0.21)	(1.46)	(0.86)

Note: This table presents the alphas for the long-short portfolios by FSCORE and GP in each market. The portfolio return is measured in US dollar by long, high-quality stocks (high FSCORE or GP) and short, low quality (low FSCORE or GP) stocks. The portfolios are constructed annually from July of year t to June of year t+1 based on the FSCORE/GP of firms in year t-1. The regression model is given as:

$$r_{i,t} = \alpha_0 + \alpha_1 MKT_t + \alpha_2 SMB_t + \alpha_3 HML_t + \varepsilon_{i,t}$$

The dependent variable is the hedge return from long-short portfolio in each of five Asian markets. MKT is the market risk premium. SMB is small minus big risk factor. HML is high minus low risk factor. These factors are obtained from Kenneth French's website. The Fama-French three factors for Asia Pacific (excluding Japan) are used in the regressions for portfolios in Hong Kong, Korea, Singapore and Taiwan. The Fama-French three factors for Japan are used in the regressions for portfolios from Japan market. To conserve the space, the coefficients on risk factors are not reported. Panel A reports the equally-weighted portfolio alphas. Panel B gives the portfolio alphas weighted by market value. The sample period is from 2000 to 2016. The *t*-statistics are adjusted by Newey-West standard error. ***, ** and * represent significance at 1%, 5% and 10% level, respectively.

Appendix 2: Cross-sectional regressions of anomaly returns on institutional demand

	Hong Kong	**Japan**	**Korea**	**Singapore**	**Taiwan**	**All**
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: total monthly stock return						
Coeff. on ΔNBR	0.0002	-0.0015	0.0042	0.0084	0.0071	0.0015
t-stat	(0.05)	(-0.52)	(1.06)	(1.77)*	(2.83)***	(0.93)
Coeff. on ΔIO	-0.0000	-0.0033	0.0004	0.0026	0.0009	-0.0015
t-stat	(-0.01)	(-2.61)***	(0.18)	(0.90)	(0.63)	(-2.30)**
Country dummy	No	No	No	No	No	Yes
N of months	168	168	168	168	168	168
Panel B: FSCORE anomaly return						
Coeff. on ΔNBR	0.0008	0.0008	0.0014	0.0022	0.0011	0.0009
t-stat	(3.23)***	(1.94)*	(2.91)***	(3.26)***	(2.93)***	(5.27)***
Coeff. on ΔIO	0.0005	0.0001	0.0005	0.0009	0.0002	0.0002
t-stat	(4.43)***	(1.56)	(2.44)**	(3.42)***	(1.96)*	(4.97)***
Country dummy	No	No	No	No	No	Yes
N of months	168	168	168	168	168	168
Panel C: GP anomaly return						
Coeff. on ΔNBR	0.0019	0.0004	0.0018	0.0005	0.0018	0.0013
t-stat	(4.51)***	(1.04)	(1.78)*	(0.85)	(3.57)***	(4.21)***
Coeff. on ΔIO	0.0010	0.0002	0.0006	0.0001	0.0008	0.0005
t-stat	(4.13)***	(1.05)	(1.54)	(0.14)	(2.87)***	(3.50)***
Country dummy	No	No	No	No	No	Yes
N of months	168	168	168	168	168	168

Note: This table reports the average coefficient estimates on institutional demand from monthly Fama-MacBeth regressions. The regression model is given as:

$$R_{i,t}/ANOMALY_{i,t} = \alpha_{i,t} + \beta_1 \Delta NBR/\Delta IO_{i,t-1} + \varepsilon_{i,t}$$

The dependent variable in Panel A is monthly stock return in US dollar from July of year t to June of year t+1. The dependent variables are FSCORE anomaly return in Panel A and GP anomaly return in Panel B from July of year t to June of year t+1. The anomaly return is the product of FSCORE/GP and the corresponding coefficients from the models in Panel A of Table 4. The independent variables are the average quarterly change of the number of institutional investors (ΔNBR) and the average quarterly change of institutional ownership (ΔIO) during the institutional trading period. Column (1) – (5) gives the coefficient estimates for each Asian market. Column (6) provides the coefficient estimates for all the stocks in the five markets by including country dummies in the regression. The *t*-statistics are adjusted by Newey-West standard error. ***, ** and * represent significance at 1%, 5% and 10% level, respectively.

Appendix 3: Stock return and institutional demand for BM portfolios

Panel A: Equally-weighted returns for BM portfolios

	Hong Kong	**Japan**	**Korea**	**Singapore**	**Taiwan**
Glamour stock	0.0020	0.0013	0.0106	0.0013	0.0017
	(0.36)	(0.34)	(1.76)*	(0.23)	(0.27)
Middle stock	0.0082	0.0060	0.0190	0.0052	0.0044
	(1.44)	(1.78)*	(2.99)***	(0.97)	(0.70)
Value stock	0.0135	0.0071	0.0257	0.0085	0.0076
	(2.14)**	(2.00)**	(3.92)***	(1.55)	(1.04)
Value - Glamour	0.0115	0.0058	0.0151	0.0072	0.0059
	(5.27)***	(4.12)***	(6.28)***	(3.95)***	(1.65)

Panel B: Value-weighted returns for BM portfolios

	Hong Kong	**Japan**	**Korea**	**Singapore**	**Taiwan**
Glamour stock	0.0058	0.0011	0.0063	0.0053	0.0042
	(1.14)	(0.31)	(1.05)	(1.11)	(0.73)
Middle stock	0.0074	0.0057	0.0134	0.0093	0.0055
	(1.58)	(1.73)*	(2.23)**	(1.91)*	(0.99)
Value stock	0.0098	0.0075	0.0173	0.0106	0.0053
	(1.60)	(2.09)**	(2.64)***	(1.89)*	(0.76)
Value - Glamour	0.0040	0.0064	0.0110	0.0053	0.0011
	(1.00)	(3.02)***	(3.18)***	(2.11)**	(0.30)

Panel C: Changes in the number of institutional investors for BM portfolios

	Hong Kong	**Japan**	**Korea**	**Singapore**	**Taiwan**
Glamour stock	0.0274	0.0099	0.0225	0.0327	0.0479
	(6.03)***	(5.40)***	(4.75)***	(3.90)***	(8.93)***
Middle stock	0.0062	0.0034	0.0063	0.0128	0.0008
	(1.92)*	(2.60)***	(2.06)**	(2.42)**	(0.23)
Value stock	-0.0097	0.0044	0.0049	-0.0061	-0.0056
	(-2.74)***	(3.17)***	(1.14)	(-1.17)	(-1.68)*
Value - Glamour	-0.0370	-0.0055	-0.0176	-0.0388	-0.0535
	(-6.44)***	(-2.41)**	(-2.76)***	(-3.94)***	(-8.48)***

Panel D: Changes in the institutional ownership for BM portfolios

	Hong Kong	**Japan**	**Korea**	**Singapore**	**Taiwan**
Glamour stock	0.0246	0.0259	0.0331	0.0397	0.0721
	(4.29)***	(9.16)***	(3.62)***	(3.70)***	(6.27)***
Middle stock	0.0067	0.0007	0.0073	0.0276	-0.0008
	(1.47)	(0.32)	(1.40)	(3.82)***	(-0.12)
Value stock	-0.0062	-0.0022	0.0033	0.0107	0.0048
	(-1.17)	(-1.06)	(0.56)	(1.37)	(0.89)
Value - Glamour	-0.0308	-0.0281	-0.0298	-0.0290	-0.0674
	(-3.95)***	(-7.99)***	(-2.74)***	(-2.19)**	(-5.31)***

Note: This table presents the stock return and average quarterly institutional demand for BM portfolios in five Asian markets. The portfolios of Glamour stock, Middle stock and Value stock contains stocks in bottom 30%, between 30% and 80%, and top 30% of book to market ratios in year t-1. Panel A reports equally-weighted portfolio returns for the BM portfolios. Panel B shows the value-weighted returns for the BM portfolios. The portfolios are constructed annually from July of year t to June of year t+1. The row High – Low reports the return in the long-short portfolio that buys value stocks and sells glamour stocks. The sample period is from 2000 to 2016. The t-statistics are adjusted by Newey-West standard error. Panel C reports the changes in the number of institutional investors. Panel D presents the changes in the institutional ownership. The changes in the number of institutional investors and the institutional ownership are adjusted by market capitalization. The institutional trading period is a six-quarter period before the portfolio construction, from January of year t-1 to June of year t. The row High – Low reports the differences of institutional demand between value stocks and glamour stocks. The sample period is from 2000 to 2013. The *t*-statistics adjusted by robust standard error are reported in parentheses. ***, ** and * represent significance at 1%, 5% and 10% level, respectively.