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The real value of China's stock market

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The real value of China's stock market

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Abstract

This paper shows that, counter to common perception, stock prices in China are strongly linked to firm fundamentals. Since the reforms of the early 2000s, stock prices are as informative about future profits as they are in the US. Although the market is segmented from international equity markets, Chinese investors price individual stock characteristics like other global investors: they pay up for size, growth, liquidity, and long shots, while they discount for systematic risk. Price informativeness is significantly correlated with corporate investment efficiency. For international investors, China's stock market offers high average returns and low correlation with other equity markets.

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1 Introduction

Despite its rapid growth in listings and market capitalization, China's stock market retains its reputation as a casino, dominated by retail investors and subject to frequent regulatory interventions and significant restrictions on the tradability of shares.[1] Researchers and journalists emphasize the low correlation between China's stock market and its GDP.[2] The market's high volatility erodes buy-and-hold returns and further fuels the perception of dysfunction and poor performance. Repeated market interventions, trading halts, and IPO suspensions reflect low confidence in the market by regulators as well.

This paper analyzes the link between China's stock prices and firm fundamentals and shows that the perception of poor quality stock prices is no longer correct. We find that since the wave of market reforms that started more than a decade ago, stock prices in China have become as informative about future firm profits as they are in the US. In addition, although the market is still largely segmented from the rest of the global financial market, the pricing of these profits is consistent with that in other large economies. Like other global investors, Chinese investors pay up for large stocks, growth stocks, liquid stocks, and long shots, while they discount for systematic risk. Thus, stock prices are linked to firm fundamentals through both cash flows and discount rates.

These results have important implications for the real economy. First, a large literature in economics links informativeness of prices about future profits to managerial decision-making and corporate investment efficiency. We present preliminary evidence on this issue by documenting a positive correlation between stock price informativeness and corporate investment efficiency, suggesting that China's stock market is generating useful signals for managers.

Second, our results suggest that global investors may be overly skeptical of China's stock market. China represents over 10% of the global stock market, but foreign participation has been very low, with foreign investor quotas unfilled. Although fears of repatriation risk, trading suspensions, and administrative costs have been clearly articulated, a quantitative assessment of the opportunity cost of underweighting China in portfolio allocation has been missing from the debate. We provide evidence that China's stock market offers global investors both high average monthly returns and low correlation with other global stock markets, yielding risk-adjusted excess returns of 1% per month. These high returns are plausible given the high market volatility that must be borne almost entirely by domestic Chinese who have little opportunity to diversify internationally. However, they represent an

[1]The "casino theory" of China's stock market was first proposed by a well-known Chinese economist Wu Jinglian in 2001. More recently, The Economist (2015) dubbed China's stock market "a crazy casino."

[2]See, for example, Allen, Qian, Shan, and Zhu (2017) or the Wall Street Journal MoneyBeat (2015).

inflated cost of capital for Chinese firms and a potential drag on economic growth.

Until recently, China's stock market has been a side experiment in a financial system that is dominated by a $30-trillion banking sector that finances centrally planned investment and supplemented by alternative financing channels that leverage China's relationship-based credit enforcement mechanisms (Allen, Qian, and Qian, 2005). Now with over 3400 firms listed and $8.5 trillion in market capitalization in October 2017, and yet still extremely volatile, the stock market has become a focus of attention by international investors and regulators. Our results suggest that despite the underdevelopment of markets for equity mutual funds and derivatives, frequent government interventions, and a highly volatile economic environment, the stock market is successfully aggregating information about future corporate profits, pricing profits consistently, and improving the efficiency of capital allocation.

The implications of our results for the global economy are far-reaching. China is the world's largest investor and most important growth driver, so the efficiency of its investment and its role in sustaining global growth are of broad importance. Even in a political economy where the banking sector must remain dominant, the stock market has a critical complementary role to play, by aggregating diffuse information and generating signals that can be useful to regulators as well as corporate managers and global investors. It is also a natural entry point and allocation channel for foreign capital. Finally, the stock market is an important exit point for private equity investment, and thus a key component of China's innovation strategy.

Figure 1 summarizes the history of listings, market capitalization, and ownership structure in the stock market.[3] The Main Boards were opened in Shanghai and Shenzhen in 1991 under the leadership of Deng Xiaoping as a platform for SOE privatization and reform. Privatization was gradual, with two-thirds of shares non-tradable until the Split-Share Structure Reform of 2005 established a market-based negotiation process to facilitate share unlock and compensate tradable shareholders for any adverse price effects. The SME and ChiNext Boards were opened in Shenzhen in 2004 and 2009 with more relaxed listing standards to accommodate small and medium enterprises, and even smaller entrepreneurial firms, with much less state ownership and control. As Figure 1 shows, the tradable fraction of the market grew steadily after these innovations, representing 76% of total market capitalization in 2016. The mutual fund industry started in 1998 but is still small despite regulatory efforts to promote its growth. Equity and hybrid mutual funds still hold less than 10% of the tradable portion of China's stock market. The China Securities Regulatory Commission (CSRC) consistently reports that individual investors account for 80% of total trading volume or more

[3]See Carpenter and Whitelaw (2017) for a more detailed discussion of the development of China's stock market, the potential implications for the real economy, and a survey of the relevant literature.

(see SINA (2013)).

The stock market has a number of other distinctive features as well. The IPO process is tightly controlled by the CSRC, and IPOs were suspended altogether during 2005 and 2013. Delistings are rare. Instead firms go into regulatory "special treatment," but are then often taken over by private firms seeking a public listing. The market is held almost entirely by domestic Chinese investors. The CSRC ratified the Qualified Foreign Institutional Investors program in 2002, approved the Shanghai-Hong Kong Connect program in 2014, and the Shenzhen Hong-Kong Connect program in 2016, but quotas in these programs have never been filled. Total foreign ownership still amounts to less than $200 billion. Stock price movements are capped at 10% per day, after which trading in the affected stock is automatically suspended. Firms can also suspend the trading of their stock indefinitely. Short selling has been legal since 2006, but is often difficult to implement in practice. On the other hand, the market is a centralized, pure-order driven forum, with all orders visible, and no extended trading period for institutional investors, so institutional and retail investors have equal access to information from a microstructure point of view.

The paper begins by analyzing the informativeness of China's stock market about future corporate profits over the period 1995 to 2016, using data on A shares for all firms in the China Stock Market and Accounting Research (CSMAR) database. Following Bai, Philippon, and Savov (2016), we define the price informativeness of the stock market as the cross-sectional variation in future earnings predicted by equity market value. We find that the informativeness of prices has steadily improved since the establishment of market reforms around the time of China's entry into the WTO and is now the same as that in the US. We relate the trends in the price informativeness to China's legal, market, and accounting regimes since 1995. We also study cross-sectional variation in price informativeness and find that firms with H shares dual-listed and priced in Hong Kong have lower stock price informativeness, perhaps because shocks to Hong Kong discount rates leak into the A-share prices of dual-listed stocks and create variation unrelated to earnings. In addition, firms with higher state ownership have lower stock price informativeness, consistent with the idea that the political risk associated with state subsidies makes earnings harder to predict.

Having established a strong link between current prices and future profits, we then study cross-sectional patterns in returns to show how investors account for firm-specific variables in the discounting of those profits. We find that although the stock market is largely segmented from other global financial markets, Chinese investors price stocks remarkably like investors in other large economies. This evidence extends previous studies with shorter sample periods and further establishes a strong link between stock prices and firm fundamentals in China.

Next, we explore the implications of our results for the efficiency of corporate investment

in China. Adapting the approach of Durnev, Morck, and Yeung (2004) to the Chinese setting, we define the efficiency of investment as the unexpected change in equity value associated with a unit of unexpected investment, measured in a cross-sectional regression. We find that the trend of investment efficiency follows that of price informativeness over our sample period, with an economically and statistically high correlation between the series. This strong positive association between China's stock price informativeness and corporate investment efficiency emphasizes the real economic value of China's stock market and merits the attention of financial market reformers.

Finally, we look at China's stock market from the viewpoint of international equity investors. Our evidence on the quality of equity pricing in China suggests that international investors may be overly cautious about investing in China. We provide additional evidence in support of this view by summarizing the USD returns of China's stock market in terms of traditional performance measures. We show that China's stock market not only offers high average monthly returns compared with stock markets in other large economies, but also exhibits low correlation with these markets. In particular, this market delivered a four-factor alpha for USD investors of 1% per month during the period 1995-2016. We conclude with a brief discussion of the policy implications of our analysis.

2 Stock prices and firm fundamentals in China

This section analyzes the quality of stock prices in China in two different ways. Section 2.1 examines the informativeness of stock prices about future profits and shows that it is comparable to that in the US. Section 2.2 examines the cross-section of returns and shows that Chinese investors price stock characteristics much like investors in other large economies. Taken together, these results show that stock prices in China are strongly linked to firm fundamentals.

2.1 Stock price informativeness about future earnings

A long literature in economics, finance, and accounting going back to Hayek (1945) and Fama (1970) links good legal and market institutions to stock price informativeness about future profits, and further to the efficiency of capital allocation and corporate investment. Elements of this nexus include the benefits of effective listing, disclosure, and auditing policy (Amihud and Mendelson, 1988; Diamond and Verrecchia, 1991; Healy and Palepu, 2001; Hail and Leuz, 2009), aggregation of diffuse information across individuals, incentives to generate information, and its inference from prices (Grossman and Stiglitz, 1980; Glosten

and Milgrom, 1985; Kyle, 1985), and managerial use of price signals in resource allocation and investment decisions (Wurgler, 2000; Baker, Stein, and Wurgler, 2003; Durnev et al., 2004; Chari and Henry, 2004; Chen, Goldstein, and Jiang, 2007; Bakke and Whited, 2010). Bond, Edmans, and Goldstein (2012) provide a detailed review.

Bai et al. (2016) develop a model in which stock price informativeness promotes efficient allocation of corporate investment and economic growth. They define price informativeness as the extent to which market valuations differentiate firms that will have high profits from those that will not. Empirically, they measure price informativeness in a given year t as the predicted variation, $b_t \times \sigma_t(\log(M/A))$, in the following cross-sectional regression of earnings k years ahead on current market equity value and current earnings, normalized by book asset value,

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + b_t \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + d_t^s 1_{i,t}^s + \varepsilon_{i,t+k} \ , \tag{1}$$

where the $1_{i,t}^s$ are sector indicators to control for industry effects. They use this model to study the trend of stock price informativeness in the US. We take this model to the data on earnings, equity market value, and asset book value from the China Stock Market and Accounting Research (CSMAR) database from 1995 to 2016.

For the earnings variable $E_{i,t}$, we use the net profit reported for firm i earned over calendar year t. For equity market capitalization $M_{i,t}$, we multiply firm i's A-share price at the end of year t by the total number of shares outstanding, including tradable A, B, and H shares and nontradable shares. As in Bai et al. (2016), we deflate all nominal quantities by the GDP deflator. We winsorize all variables at the first and ninety-ninth percentiles. To control for industry effects, we construct a version of the 1-digit SIC classification from CSMAR's industrial code B. We also eliminate financial firms from the sample, although this makes little difference to the results. A few papers in the accounting literature document low quality of auditing and reported earnings in China (DeFond, Wong, and Li, 1999; Chen and Yuan, 2004), Wang, Wong, and Xia (2008)). Such errors should bias our results against finding price informativeness.

2.1.1 Baseline results

Figure 2 plots the coefficients b_t with their 95% confidence bands, the predicted variation $|b_t| \times \sigma_t(\log(M/A))$, and the marginal R^2 of regression (1) for forecasting periods $k = 1, 3,$ and 5, for each year $t = 1995$ to $2016-k$. The confidence bands use White heteroskedasticity-consistent standard errors.[4] Marginal R^2 is the increment in the R^2 of regression (1) created by adding $\log(\frac{M_{i,t}}{A_{i,t}})$ as a regressor. The different price informativeness measures have broadly

[4]We also calculated standard errors clustered by industry, with qualitatively similar results.

similar patterns. The coefficients and their corresponding t-statistics are also reported in Table 1. From approximately 2003 onwards, the coefficients at all horizons are statistically significant, with t-statistics exceeding 4 in every year. Moreover, the patterns across forecasting horizons are similar, with a marked increase in the coefficient, particularly at the longer horizons, from the late 1990s to a relatively sustained level in the later years.

Table 1 also reports the time series average of the price informativeness coefficient for the selected forecasting horizons, and Figure 3 plots these averages for all horizons, $k = 1$ to 5. As Bai et al. (2016) find for the US, the coefficient increases with forecasting horizon. This may be because more distant earnings realizations are better proxies for the earnings stream capitalized in market value, particularly in China where growth rates are high.

Figure 4 plots the time series of price informativeness as measured by predicted variation for $k = 3$ in the context of the regulatory reforms and relevant stock market news events taking place in China over the sample period. The early years were a time of market construction and transition from a decentralized and disorganized stock market to a centralized modern market. In 1996, Dow Jones began to publish the China, Shanghai 30, and Shenzhen indices, which attracted a significant following by equity analysts. In addition, the exchanges unified limit-order books and greatly reduced trading commissions, which increased liquidity. Chordia, Roll, and Subrahmanyam (2008) show theoretically that increasing liquidity improves market efficiency and informativeness, which suggests that these developments contributed to the rise of informativeness in China's stock market over this period. The adoption of a price change limit of 10% and a one-day minimum holding period in 1996 may also have deterred stock price manipulation, as suggested by Kim and Park (2010). In 1997, the China Securities Regulatory Commission (CSRC) become the official regulator of China's stock market.

The years from 1998 to 2002 were a low point in price informativeness. By many accounts, this was a period of rampant speculation, accounting fraud, and stock price manipulation. In 1998, prices of firms in "special treatment" for financial distress began to soar and the CSRC reported widespread market manipulation. Pump-and-dump schemes were also common during this period. This may be consistent with theory in Goldstein, Ozdenoren, and Yuan (2013) showing that undesirable coordination across speculators makes the market less informative, decreases real investment, and increases stock market volatility. In early 2000, the first stock traded above 100 RMB, an important cognitive benchmark, and this sparked an investigation by the CSRC, which revealed serious accounting fraud. Later that year several other major accounting scandals came to light. In 2001, a well-known Chinese financial economist Wu Jinglian proposed the "casino theory" of China's stock market, suggesting that China's equity market had failed to fulfill its capital allocation function, and merely

provided a platform for insiders and speculators to profit illegally at the expense of retail investors and minority shareholders whose interests were unprotected.

But the turn of the century ushered in a wave of significant reforms, lead by China's entry into the World Trade Organization (WTO) and marked by improvements in regulatory protection of minority shareholders, increases in accounting transparency and audit quality, privatization of state-owned enterprises, and the increase of foreign investors' direct investment in the A-share market. Gul, Kim, and Qiu (2010) show that stock price synchronicity in China significantly declined with the increase in foreign shareholding, audit quality, and the decrease of ownership concentration. At the end of year 2001, the CSRC enforced new and stricter delisting regulations to protect retail investor interests. In 2002, the CSRC ratified the QFII program, enabling qualified foreign institutional investors to invest in A shares directly. The first two foreign institutional investors were the Nomura and UBS open-end mutual funds. In 2004, the CSRC established the National Nine Rules to protect minority shareholder interests, deter stock price manipulation, and deter accounting and audit fraud.

In 2005, the CSRC introduced the split share structure reform to unlock nontradable shares gradually and privatize them through a firm-by-firm negotiation process that compensated the holders of tradable shares. The results in Figure 4 suggest that this expansion and diversification of the base of market participants further boosted the informativeness of stock prices. Liao, Liu, and Wang (2011) and Li, Wang, Cheung, and Jiang (2011) study this reform in depth and document the improvements in information discovery and risk sharing it enabled. In 2006, the Shanghai and Shenzhen Stock Exchanges introduced margin trading and short selling pilot programs, which expanded gradually in the subsequent years. In a study of 46 countries, Bris, Goetzmann, and Zhu (2007) find evidence that allowing short sales permits prices to incorporate negative information more quickly. More recently, Ljungqvist and Qian (2014) document a direct mechanism through which the possibility of short sales gives arbitrageurs an incentive to incorporate negative information into prices. The combination of regulatory reforms, capital market development, an expanding investor base, improving accounting and auditing quality, and foreign investors' direct participation in the market may all have helped to boost price informativeness in China's stock market during this period. The final years, from 2007, are those of the financial crisis and subsequent reconstruction, during which price informativeness declined somewhat. The crisis could have depressed realized price informativeness for at least two reasons, one, because it precipitated extreme realizations from the distribution of earnings, and two, because it lead to some dislocation and mistrust of capital markets, which did in fact undermine the informativeness of prices.

2.1.2 Comparison of stock price informativeness in China and in the US

Table 2 and Figure 5 compare stock price informativeness coefficients in China with those in the US over the same period for forecasting horizons $k = 3$ and 5 years.[5] We test formally for differences in the coefficients using the estimates of their standard errors from the cross-sectional regressions in each country and assuming independence of the coefficients across the two countries. The columns labeled "p-value" report the probability level in percent at which the null hypothesis that the coefficients in the US and China are equal can be rejected in favor of the alternative hypothesis that the US coefficient is greater. In other words, a p-value of 50% corresponds to a year in which the US and China price informativeness coefficients are equal, and p-values greater than 50% are in years in which the China coefficient is greater than the US coefficient. Counter to conventional wisdom, stock prices in China have become as informative about future profits as they are in the US. From 2004 onwards, all 14 of the p-values exceed the conservative threshold level of 10%, and there are 6 times in which the p-value exceeds 90%, i.e., observations for which the null hypothesis of equality can be rejected in favor of the alternative that price informativeness in China is greater than in the US at the 10% level.

Figure 5 provides visual confirmation of this result. The dotted line shows the highest China price informativeness level for which the hypothesis that price informativeness in China is as high as in the US can be rejected at the 10% level in a one-sided test. Stock price informativeness in China easily clears this conservatively high hurdle, i.e., we cannot reject the hypothesis that China's informativeness is as high as that in the US, in all years since 2003 for horizons $k = 3$ and $k = 5$. In many years China's stock price informativeness coefficient even exceeds that of the US.

2.1.3 Cross-sectional variation in stock price informativeness

To study cross-sectional variation in stock price informativeness in China, we estimate interaction effects with the stock price regressor $\log(\frac{M_{i,t}}{A_{i,t}})$ in a panel version of regression (1), with year dummies to allow the coefficients in the basic regression to continue to vary across years. For example, about 90 firms with A shares listed in Shanghai or Shenzhen also have H shares with identical cash flow and voting rights dual-listed in Hong Kong and traded in HKD. This raises the question of the impact of this broader investor base and trading activity on the firm's A-share price informativeness. To estimate this H-share effect, we introduce the dummy variable $X_{i,t}$, which indicates whether firm i has H shares listed in

[5] Many thanks to Alexi Savov for providing us with the US results. The US results shown here are slightly different from those reported in Bai et al. (2016) because of small methodological differences, such as the use of net income instead of EBIT, which is more comparable across the two countries.

year t, in panel regressions of the form

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + a^* X_{i,t} + (b_t + b^* X_{i,t}) \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + d_t^s 1_{i,t}^s + \varepsilon_{i,t+k} \ , \tag{2}$$

for $k = 1$ to 5, where the subscripts on the basic coefficients a_t, b_t, and c_t are a shorthand to indicate that year dummies are incorporated to allow these coefficients to vary across time. We estimate only a constant average H-share effect across time to increase power. The coefficients b^* and their t-statistics for forecasting horizons $k = 1$ to 5 are reported in the first panel of Table 3. As the table shows, the presence of dual-listed H shares are associated with lower levels of A-share price informativeness. Although this runs counter to the theory in Foucault and Gehrig (2008), it is consistent with the evidence in Fernandes and Ferreira (2008) that cross-listing on US exchanges improves price informativeness for firms from developed markets, but reduces it for firms from emerging markets. It may be that because the A- and H-share markets are partially segmented, with well-documented differences in pricing, discount rate shocks in Hong Kong leak into A-share prices and create variation unrelated to expectations about future earnings.

To illustrate the effect of state ownership on stock price informativeness, the second panel of Table 3 presents results on the interaction of the stock price regressor $\log(\frac{M_{i,t}}{A_{i,t}})$ with the fraction of firm i's shares that are nontradable and state owned. The table shows that higher levels of state ownership are generally associated with lower levels of price informativeness, which is consistent with the idea that the political risk in state subsidies makes earnings harder to predict. The third panel of Table 3 shows that these results hold up when both interaction terms are included in the panel regressions at the same time, confirming that the effects of dual-listing and state-ownership on price informativeness are distinct.

2.2 The cross-section of expected returns

Section 2.1 documents an increasingly strong link between stock prices and expected future earnings. This section presents new evidence on how Chinese investors discount those expected earnings and which stock characteristics they pay up for. The results suggest that Chinese investors price stocks much like other global investors: they pay up for size, liquidity, and long shots, and they discount for systematic risk. These findings provide further evidence that stock prices in China are strongly linked to firm fundamentals.

Our analysis updates and extends earlier studies of the cross-section of A-share stock returns in China. Chen, Kim, Yao, and Yu (2010) examine cross-sectional stock return predictability in China over the period July 1995 to June 2007 using data from the PACAP-CCER China database. They consider 18 firm-specific variables found to predict returns in

the US and find all 18 have signs consistent with US evidence, and five are significant in their sample, compared with eight variables that are significant in the US data over the same period. Cakici, Chan, and Topyan (2011) analyze stock return predictability in China from January 1994 to March 2011 using data from Datastream and find strong predictive power for size, book-to-market, cash-flow-to-price, and earnings-to-price, but not momentum. Our results are based on data from the CSMAR over the period January 1995 to December 2016.

Using the methodology of Fama and MacBeth (1973), we average the coefficients from firm-level cross-sectional regressions of returns on nine predictor variables: BETA, SIZE, BM, MOM, ILLIQ, MAX, and REV. Following Scholes and Williams (1977) and Dimson (1979) to account for nonsychronous trading, BETA is obtained from regressing daily firm returns on daily current, lead, and lagged market returns over the previous month and summing the three coefficients. Following a long literature going back to Banz (1981), SIZE is the natural logarithm of the total market value of firm equity at the end of the previous month. For ease of comparison to the later results for the US over the same time period, size is calculated in US dollars by converting the Chinese yuan values at the prevailing exchange rate at that point in time. This conversion has absolutely no effect on the cross-sectional coefficient estimate because the exchange rate is the same for every firm in the cross-section in a particular month, and the log transformation converts this multiplicative scaling into an additive constant. All that matters for the cross-sectional coefficient is the ratio of the size of firms at a given point in time, which is the same measured in dollars as it is in yuan. However, the descriptive statistics that we report are abviously dependent on this scaling. As in Fama and French (1992), BM is the ratio of book value of equity to market value of equity at the end of the previous calendar year. This ratio is used from the end of June for 12 months to ensure that the relevant accounting data is available to investors when we include it in the regressions. Following Jegadeesh and Titman (1993), momentum, MOM, is defined as the cumulative stock return over the previous eleven-month period, lagged one month. We measure illiquidity, ILLIQ, as the average over the previous month of the daily ratio of the absolute value of the stock return to the total value of shares traded, as in Amihud (2002). Again for comparability with the US results, we measure trading volume in US dollars, again converting at the applicable exchange rate. In contrast to SIZE discussed above, this conversion does change the cross-sectional coefficient estimate in each month. Effectively, this coefficient is scaled by the same exchange rate used to convert the trading volume numbers. Due to China's management of the exchange rate over the period, which results in a stable series, this conversion has no qualitative effect on the results. Following Bali, Cakici, and Whitelaw (2011), MAX is the maximum daily stock return over the previous month and, following Jegadeesh (1990) and Lehmann (1990), short-term reversal, REV, is

the return on the stock over the previous month.

Table 4 presents descriptive statistics for each predictor variable, and the results of univariate regressions for each of these predictors, multiple regressions with BETA, SIZE, BM, and MOM, multiple regressions with these four variables together with each additional predictor variable included in turn, and multiple regressions with all variables included simultaneously. The first panel of Table 1 gives the descriptive statistics. The second panel contains equal-weighted time-series averages of the monthly regression coefficient estimates. The bottom panel contains time-series averages of the monthly coefficient estimates weighted by the square root of the number of firms in the monthly cross-section, which Figure 1 shows has been steadily increasing over time. In parentheses below each coefficient estimate is its associated Newey-West adjusted t-statistic.

Table 5 reports the same descriptive statistics and cross-sectional regression coefficient estimates for stocks in the US over the same 1995-2016 sample period. Again, the bottom panel presents average coefficients weighted by the square root of the numbers of firms in the cross-sectional regressions, but for the US this number has been declining for much of the sample period. Before turning to the regression results, it is worth taking a brief look at the summary statistics, which are time series averages across months of the cross-sectional statistics within each month. The most notable feature of the data is that the cross-sectional standard deviations of all the US variables exceed those of their counterparts in China. This result is especially surprising for the return measures MOM and REV because it is well known that volatility at the market level in China greatly exceeds that in China. One explanation is that while market level variability is larger, the higher synchronicity of firms in China in the form, for example, of higher R-squareds in market model regressions, reduces the ratio of total risk to systematic risk in China. It is total risk that is reflected in the cross-sectional standard deviation of MOM and REV.

With regard to SIZE, the range of the 5th to 95th in China is very similar to the interquartile range in the US. Mean and median firm market capitalizations are similar in the two countries, but US has both significantly larger and significantly smaller firms. The truncation of the left tail of the size distribution in China is partly a function of the tightly regulated IPO process. For many years only larger, more profitable firms were allowed to go public. This same selection mechanism may account for the fact that the US has both more high growth and deep value stocks as measured by BM. Finally, the most striking contrast is between the distributions of ILLIQ in the two markets. Median ILLIQ is almost 7 times higher in the US than in China. Again, the existence of many very small capitalization firms in the US may, in part, explain this phenomenon, but it is also due to the notoriously high trading volume in China. The main point is that the magnitudes of the coefficients discussed

below must be interpreted in the context of the distribution of the predictor variables.

Overall, the cross-sectional return patterns associated with the Fama-French-Carhart factors in China are surprisingly similar to those for US stocks. In China, the coefficient on SIZE is generally strongly significantly negative, though it loses some magnitude and significance in the presence of ILLIQ. The same is true for the US, although the coefficient is much smaller in magnitude, which is partly compensated for by the fact that the predictor is more than twice as volatile. In other words, while the effect on expected returns of a doubling in size is 4 to 5 times larger in China, a one standard deviation increase is associated with approximately a 2 times larger effect in China. The coefficients on BM are positive, albeit generally statistically insignificant, in both China and the US. The decline in the estimated magnitude of the value premium in the US in recent times is well known, but, of course, it is impossible to know if the premium would have been larger in earlier years in China since the stock market did not exist then. The momentum effect is positive but statistically weak in both markets. In the US this is due, in part, to the momentum crash in 2009. Whether or not the premiums attributable to size, book-to-market, and momentum should be interpreted as evidence of market inefficiency, the predictive power of these variables for stock returns in China is in line with the cross-sectional return patterns in the US over the same period and also consistent in direction with those documented for developed economies in earlier samples, such as in Fama and French (1998) and Fama and French (2012).

Turning to our additional predictors, the coefficient on ILLIQ is consistently significantly positive in both countires, with greater statistical significance evident in China. As in the US, Chinese investors charge a premium for bearing illiquidity, whether to compensate for direct trading costs or the probability of trading against more informed market participants. Information asymmetry between corporate insiders and outsiders, government insiders and outsiders, and domestic and foreign investors is regarded as a major concern in China. These China specific factors could partially explain why the magnitude of the coefficient is so much larger in China. This result suggests that legal, accounting, and market reforms that increase transparency and level the playing field might not only attract more market participants, but also lower firms' cost of capital. Alternatively, the different market structure and the dominance of retail relative to institutional investors might mean that trading volume affects liquidity to a very different degree in China. It is certainly notable that the mean and standard deviation of ILLIQ are on the order of 200 times larger in the US.

The coefficient on MAX is highly significantly negative in China, as in the US data, although again the magnitude is larger. This result is particularly striking given that this variable is effectively truncated at 10% due to the price move limits discussed above, and that in the US this effect is heavily concentrated in firms with the most extreme returns.

The truncation has two offsetting effects. First, it potentially degrades the information in MAX in China, which should intuitively lower the coefficient, but it also reduces the measured magnitude of the extreme returns, thus creating an upward bias in the coefficient. We interpret this result as strong evidence that, like US investors, Chinese investors pay up for lottery-like payoffs. Moreover, the fact that investors in China know that future returns will also be subject to this cap apparently does not diminish their appetite for high MAX stocks. This similarity in investor preferences is especially noteworthy considering potentially strong cultural differences between the two groups, and it raises the possibility that many of the behavioral biases documented for US investors may also hold more universally. The coefficient on REV is also significantly negative, as in the US.

In contrast to the results using US data, the average coefficient on BETA is economically large and significantly positive in the multiple regressions, although not when used by itself. Weighting with the square root of the number of firms in the cross-section increases both the magnitude and significance of the BETA coefficient. This is intuitive for a couple of reasons. First, as more diverse firms are added to the sample, the increased cross-sectional dispersion in the BETA covariate increases the precision of the cross-sectional coefficient estimate. In addition, given likely measurement error in the BETAs and associated attenuation bias in its coefficient estimate, an increase in the ratio of the cross-sectional variance of the true betas to that of the measurement error would reduce the attenuation bias and increase the coefficient estimate. Finally, the high measured equity premium in China, 40 basis points per month in the bottom panel, compared with a very small and negative premium in the US, is well justified theoretically. As we document in Section 3.2 and Table 7, China's equity market portfolio has very high volatility, twice that of the US, and this high market volatility is not diversifiable for domestic Chinese investors, who lack access to international capital markets.

3 Implications for managers and investors

The strong link between stock prices and firm fundamentals established in Section 2 has important implications for managers and investors. On one hand, the informativeness of prices about future profits suggests that the stock market is generating useful signals that help improve investment efficiency. At the same time, the consistency of pricing suggests that global investors may be overly skeptical about investing in China's stock market. Section 3.1 explores the relation between stock market informativeness and investment efficiency. Section 3.2 quantifies the opportunity cost to global investors and Chinese firms of China's continued market segmentation. These results highlight the value of a larger role for China's

stock market in the global economy.

3.1 Efficiency of corporate investment in China

Summarizing economic arguments that go back to Hayek (1945) and Fama (1970), Durnev, Morck, and Yeung (2004) state that "corporate capital investment should be more efficient where stock prices are more informative." They find a positive cross-sectional correlation between their measure of corporate investment efficiency and firm-specific variation in stock returns in US firms. More broadly, in a study of 65 countries, Wurgler (2000) finds a positive correlation between the efficiency of capital allocation and the development of the financial sector, and a positive correlation between efficiency and the amount of firm-specific information in domestic stock returns. This section examines the link between stock price informativeness and corporate investment efficiency in China and finds a strong positive association.

We define the efficiency of corporate investment as the unexpected change in existing equity value associated with a unit of unexpected investment, measured for each year t by the coefficient β_t in the following version of the cross-sectional regression proposed by Durnev, Morck, and Yeung (2004),

$$\frac{\Delta M_{i,t}}{A_{i,t-1}} = \alpha_t + \beta_t \frac{\Delta A_{i,t}}{A_{i,t-1}} + \gamma_t \frac{M_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t} \ . \tag{3}$$

Here, $M_{i,t-1}$ is beginning of year equity market value for firm i, $\Delta M_{i,t}$ is the change in that equity value based on the realized stock return, and A_i is the book value of firm i's assets. The second regressor above controls for the expected return on equity and we include industry fixed effects to control for differences in expected growth and depreciation rates of capital stock. Thus, we interpret the coefficient β_t above as the cross-sectional average net present value of a unit of unexpected corporate investment in year t.

Working in the US setting, Durnev, Morck, and Yeung (2004) go a step further. They put the change in firm market value instead of the change in equity market value on the left-hand side, they interpret the coefficient β_t as the marginal Tobin's q, and they measure efficiency of investment as the difference between this coefficient and one, based on the argument that the marginal q of firms that are investing optimally should be one. While this may be a reasonable approach in the US, where firms might be expected to be profit maximizers investing according to a first-order condition, we believe our direct profitability measure β_t is more appropriate for the Chinese setting.

As Lin, Cai, and Li (1998) clarifies, corporate finance in socialist countries is different

than in capitalist countries. Firms are not only units of production, they are also instruments of social planning, and make investment decisions and internal capital allocations according to a number of criteria. Chen, Jiang, Ljungqvist, Lu, and Zhou (2015) provide more recent evidence that state-controlled firms pursue a variety of social and political objectives, not just maximization of net present value. Similarly, with respect to value maximization, Whited and Zhao (2015) find that capital in China is misallocated both within firms and across firms. Therefore, the usual theoretical channel through which signals in prices affect managerial decisions is complicated by multiple objectives and constraints in China. Nevertheless, it is reasonable to assume that managers prefer more profitable investments, all else equal, and use stock market signals accordingly, so we still expect to see a positive time series relation between stock price informativeness about future earnings and profitability of corporate investment. It is also reasonable to treat innovations in net present value as accruing primarily to existing equity holders in China, rather than to both debt and equity holders, because corporate debt in China has been essentially riskless, and because new equity issued during a given year would likely be sold at approximately its present value. Thus, we take the change in existing equity value, instead of the change in firm value, as the dependent variable in the cross-sectional regression above, and the hurdle value of the coefficient β_t for positive net present value investment innovations is zero, instead of one, as in the specification of Durnev, Morck, and Yeung (2004).

Figure 6 presents the time series of estimates of the investment efficiency coefficient β_t from regression equation (3) above. The top panel plots the time series of these estimates for the full sample of non-financial firms with their White heteroskedasticity-consistent 95% confidence bands over the period 1996-2016. The bottom panel plots investment efficiency coefficients for both the full sample, and for the subsample of state-owned enterprises (SOEs), identified as those at least 35% state-owned, following the Hong Kong Stock Exchange definition. Although the average net present value of innovations in investment is consistently positive throughout the sample period, Figure 6 shows a clear downward time trend. This is consistent with broader macroeconomic evidence that as China has used centrally planned investment to drive its transition from a poor but fast-growing emerging market to a slower-growing middle income economy during this period, its investment has become less and less productive. The bottom panel also shows that the average profitability of investment at SOEs appears to be slightly lower than the full sample average. We test formally for an SOE effect on investment efficiency using a panel regression version of equation (3) with an SOE interaction with unexpected investment. We find that the investment efficiency coefficient is on average lower than that of non-SOEs by 0.026, but the t-statistic of -0.13 indicates that this difference is not statistically significant. The direction of this effect is consistent

with the findings of Chen, Jiang, Ljungqvist, Lu, and Zhou (2015) that internal allocations of capital within state-controlled business groups are less efficient than capital allocations within privately owned business groups.

Table 6 presents coefficients and t-statistics from time series regressions of the corporate investment efficiency on one-year lagged cross-sectional stock price informativeness measures and a time trend. The table shows that corporate investment efficiency in China is significantly positively associated with past stock price informativeness. This strong positive correlation supports the idea that corporate investment is more efficient when stock prices are more informative about future profits, and that China's stock market is generating useful signals for managers. It may be that a listing on the stock exchange in salutory information environments improves the efficiency of corporate investment for other reasons as well, for example, because disclosure and auditing standards in and of themselves lead to better managerial decision-making. The positive correlation may also flow from broader channels. For example, legal, regulatory, and accounting environments in which the stock market is functioning well are also those in which managerial investment decisions are more informed and better aligned with equity value maximization. In any case, this significant positive association between stock price informativeness and investment efficiency is an important empirical result and merits attention and careful consideration by financial market reformers in China.

3.2 Opportunities for global investors

China's stock market accounts for over 10% of the $80-trillion global equity market, but foreign investment in China's stock market remains extremely low. Although China ratified the QFII program in 2003, the RQFII program in 2011, and the Shanghai-Hong Kong Connect program in 2014, the quotas approved across these programs total only about $200B and the quotas themselves are not filled. This is a significant underweighting by foreign investors, even relative to documented home biases in international investing, such as those reported in Bekaert and Hodrick (2012).

The recent negotiations surrounding the decision by MSCI to include China A-shares in its emerging market index clarified many of the issues. Although the CSRC signaled a willingness to work out the necessary market reforms early on, MSCI postponed A-share inclusion in both 2015 and 2016, citing investor concerns about repatriation risk associated with limits on foreign withdrawals, liquidity risks associated with trading suspensions and one-day minimum holding periods, and other administrative delays. Bank analysts also cited broad skepticism of China's markets among global investors. In June 2017, MSCI

announced that it would include 222 A shares with a weight of less than 1% in its emerging market index, with future increases in A-share representation contingent on the success of negotiations with CSRC about further stock market reforms.

An important omission from the debate has been an assessment of the opportunity cost to global investors of underweighting China in their portfolio allocation. Table 7 summarizes the menu of risks and returns available to global USD equity investors, based on value-weighted stock market performance from 1995 to 2016. For China, the weighting uses tradable market value rather than total market value in the weighting. As the table shows, mean monthly excess returns in China have been almost double those of the US and Europe over the period. Stock market volatility in China has also been double that of the western markets. However, from the viewpoint of a well-diversified investor, asset volatility is not the right measure of an asset's contribution to portfolio risk. Instead, an asset's contribution to portfolio risk is measured by its covariance with the portfolio return. By this measure, China's stock market looks very attractive. Whereas the stock market returns across the developed economies are highly correlated, likely reflecting a high degree of financial market and economic integration, China's stock returns have very low correlation with the other markets. China's stock market offers global investors the opportunity for diversification as well as high average returns.

To quantify the extra return China's stock market offers global USD investors given its high mean and low correlation, Table 8 presents its Jensen's alphas with respect to the US and global Fama-French-Carhart factors over the period 1995–2016. The table presents alphas and their t-statistics for four different China portfolios: the broad market, small stocks minus big stocks, value stocks minus growth stocks, and winners minus losers. These market, size, value, momentum portfolios are constructed according to the methodology of Fama and French (1993), Carhart (1997), and the Ken French Data Library. We form the six 2×3 value-weighted size-book-to-market portfolios and the six 2×3 value-weighted size-momentum portfolios and construct the zero-cost size, book-to-market, and momentum zero-cost factor portfolios for China. We use tradable rather than total market value for portfolio weights. As the table shows, China's stock market delivered an alpha of approximately 1% per month to USD investors over the period. The alphas on the size and value portfolios are more statistically significant. Given the difficulty of short selling in China, the size and value portfolio returns are hypothetical, but they still point the way to potentially profitable trading strategies.

The high stock returns available in China suggest that investor skepticism may be overblown, especially in light of the quality of pricing documented in Section 2. Such high returns are consistent with the current equilibrium in which the stock market is almost entirely held by domestic Chinese investors who are effectively prohibited by capital controls

from diversifying into international markets and thus bear the full brunt of China's stock market volatility and discount stocks heavily. But these high potential returns for global investors also amount to a high cost of capital for Chinese firms. A large literature provides both theory and evidence on the positive effects of liberalization and integration on emerging markets' cost of capital, investment, growth, and investment opportunities for foreign investors through improvements in risk sharing across countries. For example, in samples of up to 16 emerging markets, Stulz (1999), Bekaert and Harvey (2000), and Bekaert, Harvey, and Lundblad (2003) find that opening a country to portfolio flows decreases its cost of capital without increasing its volatility or creating excessive contagion effects, although liberalizations do not generally lead to full market integration. In samples of up to 25 countries, Henry (2000a,b, 2003) and Chari, Henry, and Sasson (2012) find that stock market liberalizations reduce cost of capital and boost investment, growth, and wages. Chari and Henry (2004, 2008) study the effect of market liberalization at the firm level and show how stock prices and corporate investment respond to reductions in cost of capital that occur after liberalization. Our evidence suggests that China has much to gain from opening its stock market to the international investment community.

To illustrate the cost that constraints on international diversification impose on domestic Chinese equity investors, and further justify their high required returns, Table 9 shows the real annualized buy-and-hold CNY returns that would be earned by an investor holding 100% of wealth in China's stock market over our sample period. The exchange rate data are from Datastream and the CNY inflation data are from the World Bank. In contrast to the nominal average annualized monthly USD return of 17.17%, the real CNY annualized buy-and-hold return over 1995-2016 is only 9.01%. As the table shows, much of the difference is attributable to the toll that high volatility takes on buy-and-hold returns relative to average per period returns, about one-half the variance of returns. This helps to explain why undiversified Chinese investors would discount so heavily for the stock market's high variance. The table also includes US returns over the period. China's outperformance is somewhat less when measured in buy-and-hold-returns because the US stock market has much lower variance.

The table also shows returns over the period 2001-2014, which matches the sample period of Allen et al. (2017). They find that over the period 2001-2014, the cumulative real CNY buy-and-hold return on the equity of listed firms is -6%, for an annualized buy-and-hold return of -0.44%. The difference between this result and our 4.02% shown in Table 9 is at least partly attributable to the difference in weighting method. Allen et al. (2017) weight stock returns by total market capitalization, which relates to the market valuation of China's macroeconomy, while we weight by tradable market value, reflecting our focus on investment

opportunities. Weighting by total market capitalization gives more weight to the large state-owned enterprises, which did less well than the smaller private firms over the period.

4 Conclusions

This paper shows that, counter to common perception, stock prices in China are strongly linked to firm fundamentals. Since the reforms of the early 2000s, stock prices in China are as informative about future profits as they are in the US. Furthermore, although the market is largely segmented from international equity markets, Chinese investors price individual stock characteristics remarkably like investors in other large economies: they pay up for size, growth, liquidity, and long shots, and they discount for systematic risk. Price informativeness is significantly correlated with corporate investment efficiency, suggesting that stock prices are generating useful signals for managers. From the viewpoint of international investors, China's stock market offers high average returns and low correlation with other equity markets, yielding a four-factor alpha of over 1% per month.

The policy implications are clear. Despite the challenge of developing in the shadow of a massive state-subsidized banking sector, with only a fledgling institutional investor base, numerous constraints on its capacity for price discovery, and a highly uncertain economic environment, China's stock market appears to be pricing capital remarkably well, and seems ready for a greater role in domestic and international capital allocation. Additional regulatory reforms could increase incentives to produce information and facilitate information transmission, such as enabling better incorporation of negative information into prices by facilitating short-selling, relaxing the 10% collar on price movements, and minimizing trading suspensions. Limiting government interventions would also increase the firm-specific information content of prices and improve incentives to generate information about corporate profits, as opposed to government policy changes, further supporting investment efficiency. Liberalizing the flow of capital by opening up the IPO window to a broader and more heterogeneous set of firms and removing barriers to international investment, such as constraints on liquidity and the repatriation of profits, would further empower the market to attract capital, allocate it efficiently, and support economic growth.

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Table 1: Stock price informativeness in China 1995-2016

Coefficient estimates and t-statistics (in parentheses) for the coefficient on $\log(\frac{M_{i,t}}{A_{i,t}})$ in annual cross-sectional regressions of the form

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + b_t \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + d_t^s 1_{i,t}^s + \varepsilon_{i,t+k}$$

for China for forecasting horizons $k = 1$, 3 and 5 over the period 1995 to $2016 - k$. The variables are winsorized at the 1st and 99th percentiles. The last row presents the average across years of the coefficient estimates at each horizon.

	$k=1$		$k=3$		$k=5$	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
1995	0.004	(0.89)	0.037	(2.82)	0.063	(3.98)
1996	0.029	(3.96)	0.077	(5.43)	0.064	(2.65)
1997	0.049	(4.36)	0.069	(6.01)	0.040	(2.69)
1998	0.032	(6.64)	0.040	(4.44)	0.001	(0.12)
1999	0.020	(4.69)	0.011	(1.43)	-0.004	(-0.41)
2000	0.011	(2.06)	0.002	(0.37)	-0.019	(-2.12)
2001	0.010	(2.04)	0.021	(2.98)	0.012	(1.27)
2002	0.013	(2.88)	0.010	(1.59)	0.030	(2.28)
2003	0.027	(5.19)	0.037	(6.04)	0.063	(4.58)
2004	0.033	(6.59)	0.067	(6.71)	0.093	(5.97)
2005	0.030	(6.81)	0.072	(6.12)	0.073	(4.53)
2006	0.054	(7.78)	0.075	(7.08)	0.142	(4.45)
2007	0.046	(5.60)	0.071	(5.97)	0.098	(4.65)
2008	0.036	(7.14)	0.082	(6.71)	0.108	(6.73)
2009	0.029	(6.07)	0.080	(5.48)	0.069	(6.21)
2010	0.023	(6.94)	0.066	(7.22)	0.104	(7.16)
2011	0.033	(8.50)	0.043	(8.38)	0.108	(7.59)
2012	0.019	(5.64)	0.047	(7.70)		
2013	0.016	(8.93)	0.055	(8.26)		
2014	0.020	(7.77)				
2015	0.015	(8.10)				
Average	0.026		0.051		0.061	

Table 2: Stock price informativeness in the US 1995-2014 and comparison with China

Coefficient estimates for the US and China and t-statistics for the US (in parentheses) for the coefficient on $\log(\frac{M_{i,t}}{A_{i,t}})$ in annual cross-sectional regressions of the form

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + b_t \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + \varepsilon_{i,t+k}$$

for forecasting horizons $k = 3$ and 5 over the period 1995 to $2014 - k$. The columns labeled p-value report the probability level in percent at which the null hypothesis that the coefficients in the US and China are equal can be rejected in favor of the alternative hypothesis that the US coefficient is greater, under the assumption that the coefficient estimates are uncorrelated across countries.

	$k = 3$				$k = 5$			
	US		China		US		China	
	Coeff.	t-stat	Coeff.	p-value	Coeff.	t-stat	Coeff.	p-value
1995	0.066	(8.85)	0.037	3.2	0.067	(5.57)	0.063	40.8
1996	0.047	(5.82)	0.077	96.9	0.101	(9.16)	0.064	8.6
1997	0.059	(8.29)	0.069	77.6	0.026	(1.72)	0.040	74.6
1998	0.062	(12.07)	0.040	1.7	0.025	(2.14)	0.001	7.9
1999	-0.004	(-0.52)	0.011	91.2	0.026	(3.55)	-0.004	0.9
2000	-0.022	(-2.21)	0.002	98.1	0.037	(6.84)	-0.019	0.0
2001	0.041	(6.88)	0.021	1.6	0.056	(8.09)	0.012	0.0
2002	0.056	(14.79)	0.010	0.0	0.059	(9.84)	0.030	2.3
2003	0.060	(14.64)	0.037	0.1	0.058	(6.99)	0.063	60.5
2004	0.041	(6.02)	0.067	98.7	0.080	(7.20)	0.093	74.5
2005	0.048	(5.50)	0.072	95.3	0.053	(4.57)	0.073	83.4
2006	0.049	(3.60)	0.075	93.8	0.084	(8.97)	0.142	95.9
2007	0.072	(10.35)	0.071	47.0	0.075	(8.99)	0.098	85.0
2008	0.049	(12.29)	0.082	99.5	0.057	(9.53)	0.108	99.8
2009	0.080	(15.23)	0.080	50.1	0.078	(12.23)	0.069	23.5
2010	0.069	(12.06)	0.066	40.0				
2011	0.052	(10.41)	0.043	10.5				

Table 3: Cross-sectional variation in stock price informativeness 1995-2016

Coefficient estimates and their t-statistics (in parentheses) for the interaction between cross-sectional characteristics and $\log(\frac{M_{i,t}}{A_{i,t}})$ in panel regressions of the form

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + a^* X_{i,t} + (b_t + b^* X_{i,t}) \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + d_t^s 1_{i,t}^s + \varepsilon_{i,t+k}$$

for forecasting horizon $k = 1$ to 5 over the period 1995 to 2016-k. In the first panel, $X_{i,t}$ indicates whether firm i has H shares listed in year t. In the second panel, $X_{i,t}$ is the fraction of firm i's shares that are owned by the state and non-tradable at year t. In the third panel, $X_{i,t}$ is the vector of the H-share indicator and the nontradable state-owned fraction.

H shares listed					State ownership				
k=1	k=2	k=3	k=4	k=5	k=1	k=2	k=3	k=4	k=5
-0.007	-0.012	-0.017	-0.028	-0.041					
(-2.79)	(-4.10)	(-4.00)	(-4.63)	(-5.11)					
					-0.005	-0.008	-0.005	-0.002	0.008
					(-2.04)	(-1.94)	(-0.88)	(-0.25)	(0.75)
-0.007	-0.012	-0.017	-0.028	-0.042	-0.005	-0.008	-0.005	-0.001	0.010
(-2.64)	(-3.92)	(-3.91)	(-4.56)	(-5.17)	(-1.93)	(-1.84)	(-0.80)	(-0.15)	(0.88)

Table 4: Summary statistics and cross-sectional return regressions for China 1995–2016

The top panel reports time series averages of summary statistics in the monthly cross-section for the predictor variables. The second and third panels report time-series averages of slope coefficients and associated Newey-West adjusted t-statistics (in parentheses) from monthly cross-sectional regressions of firm returns on firm-specific predictor variables 1995–2016. The second panel shows ordinary time-series averages of coefficient estimates. The bottom panel shows average monthly coefficient estimates weighted by the square root of the number of firms in the monthly cross-section. BETA is the Scholes-Williams-Dimson beta obtained from regressing daily firm return on daily current, lead, and lagged market returns over the previous month. SIZE is the log of total market value of equity at the end of the previous month in USD. BM is the Fama-French book-to-market ratio of book value of equity to market value of equity at the end of the previous calendar year. MOM is Jegadeesh-Titman momentum defined as the cumulative stock return over months $t-12$ to $t-1$. ILLIQ is Amihud illiquidity measured as the average over the previous month of the daily ratio of the absolute value of the stock return to the total USD value of shares traded. MAX is the Bali-Cakici-Whitelaw maximum daily stock return over the previous month. REV is Jegadeesh-Lehmann short-term reversal defined as the return on the stock over the previous month.

	BETA	SIZE	BM	MOM	ILLIQ	MAX	REV
Mean	1.05	19.74	0.40	0.222	0.0073	0.059	0.020
Std. deviation	0.71	0.81	0.24	0.386	0.0179	0.031	0.108
Skewness	-0.57	0.99	0.24	1.86	9.76	2.95	1.77
5th percentile	0.11	18.67	0.13	-0.259	0.0005	0.029	-0.117
25th	0.73	19.16	0.26	-0.022	0.0020	0.042	-0.044
50th	1.07	19.62	0.37	0.163	0.0045	0.055	0.005
75th	1.39	20.17	0.52	0.400	0.0089	0.072	0.068
95th	1.96	21.25	0.81	0.884	0.0209	0.100	0.203
Coefficient	0.10						
(t-statistic)	(0.48)						
		-0.86					
		(-4.46)					
			0.61				
			(1.21)				
				0.01			
				(0.03)			
					266.0		
					(2.73)		
						-17.60	
						(-5.99)	
							-3.22
							(-3.45)
	0.27	-0.88	0.58	0.25			
	(1.85)	(-4.97)	(1.19)	(1.00)			
	0.29	-0.70	0.71	0.24	224.7		
	(1.94)	(-3.96)	(1.55)	(0.97)	(2.37)		
	0.35	-0.88	0.51	0.31		-19.33	
	(2.39)	(-4.96)	(1.08)	(1.32)		(-8.16)	
	0.18	-0.85	0.59	0.14			-3.31
	(1.32)	(-4.76)	(1.23)	(0.58)			(-3.77)
	0.32	-0.67	0.70	0.20	256.6	-16.38	-2.38
	(2.31)	(-3.74)	(1.64)	(0.82)	(2.46)	(-7.01)	(-2.29)
WLS	0.41	-0.73	0.37	0.17	294.6	-14.42	-3.94
	(4.41)	(-3.60)	(1.08)	(0.65)	(2.74)	(-6.72)	(-4.26)

Table 5: Summmary statistics and cross-sectional return regressions for the US 1995–2016

The top panel reports time series averages of summary statistics in the monthly cross-section for the predictor variables. The second and third panels report time-series averages of slope coefficients and associated Newey-West adjusted t-statistics (in parentheses) from monthly cross-sectional regressions of firm returns on firm-specific predictor variables 1995–2016. The second panel shows ordinary time-series averages of coefficient estimates. The bottom panel shows average monthly coefficient estimates weighted by the square root of the number of firms in the monthly cross-section. BETA is the Scholes-Williams-Dimson beta obtained from regressing daily firm return on daily current, lead, and lagged market returns over the previous month. SIZE is the log of total market value of equity at the end of the previous month in USD. BM is the Fama-French book-to-market ratio of book value of equity to market value of equity at the end of the previous calendar year. MOM is Jegadeesh-Titman momentum defined as the cumulative stock return over months $t-12$ to $t-1$. ILLIQ is Amihud illiquidity measured as the average over the previous month of the daily ratio of the absolute value of the stock return to the total USD value of shares traded. MAX is the Bali-Cakici-Whitelaw maximum daily stock return over the previous month. REV is Jegadeesh-Lehmann short-term reversal defined as the return on the stock over the previous month.

	BETA	SIZE	BM	MOM	ILLIQ	MAX	REV
Mean	0.91	19.75	0.61	0.124	1.1398	0.070	0.010
Std. deviation	1.36	1.89	0.46	0.483	4.2608	0.049	0.125
Skewness	0.22	0.15	1.52	1.20	6.85	2.18	3.44
5th percentile	-1.24	16.71	0.10	-0.497	0.0003	0.021	-0.184
25th	0.12	18.37	0.29	-0.181	0.0034	0.037	-0.063
50th	0.83	19.70	0.50	0.049	0.0292	0.057	0.003
75th	1.65	21.05	0.81	0.320	0.3174	0.087	0.073
95th	3.29	23.03	1.51	1.035	5.7526	0.167	0.227
Coefficient	-0.05						
(t-statistic)	(-0.46)						
		-0.17					
		(-2.55)					
			0.42				
			(2.33)				
				-0.05			
				(-0.12)			
					0.073		
					(1.63)		
						-2.56	
						(-1.05)	
							-1.86
							(-2.93)
	-0.06	-0.16	0.22	0.12			
	(-0.80)	(-2.25)	(1.16)	(0.34)			
	-0.06	-0.15	0.22	0.13	0.051		
	(-0.84)	(-2.21)	(1.17)	(0.35)	(1.50)		
	0.00	-0.20	0.19	0.07		-5.39	
	(0.00)	(-3.65)	(1.06)	(0.19)		(-3.17)	
	-0.07	-0.13	0.25	0.09			-2.39
	(-0.96)	(-1.84)	(1.33)	(0.23)			(-4.09)
	-0.03	-0.15	0.23	0.09	0.057	-3.77	-2.09
	(-0.42)	(-2.80)	(1.29)	(0.25)	(1.71)	(-1.98)	(-3.36)
WLS	-0.02	-0.16	0.23	0.19	0.056	-3.48	-2.30
	(-0.36)	(-2.70)	(1.19)	(0.54)	(1.92)	(-1.72)	(-3.65)

Table 6: Stock price informativeness and corporate investment efficiency 1995–2016

Coefficients and their Newey-West adjusted t-statistics (in parentheses) from time series regressions of corporate investment efficiency on one-year lagged cross-sectional stock price informativeness measures with a time trend. Corporate investment efficiency is the coefficient β_t estimated in cross-sectional regressions of the form

$$\frac{\Delta M_{i,t}}{A_{i,t-1}} = \alpha_t + \beta_t \frac{\Delta A_{i,t}}{A_{i,t-1}} + \gamma_t \frac{M_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t} \ .$$

The stock price informativeness measures include the predicted variation, coefficient, and marginal R^2 of the regressor $\log(\frac{M_{i,t}}{A_{i,t}})$ in cross-sectional regressions of the form

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + b_t \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + d_t^s 1_{i,t}^s + \varepsilon_{i,t+k} \ ,$$

for forecast horizons $k = 3$, 4, and 5. The variables are winsorized at the 1st and 99th percentiles.

		k=3	k=4	k=5
Predicted variation	Coeff	6.28	5.15	9.54
	t-stat	(1.42)	(1.02)	(3.86)
Coefficient	Coeff	4.32	3.54	6.51
	t-stat	(1.70)	(1.20)	(4.10)
Marginal R^2	Coeff	4.24	8.29	8.48
	t-stat	(1.53)	(2.23)	(2.52)

Table 7: Stock market returns in large economies 1995–2016

Annualized means and volatilities (in %) of monthly USD excess returns in stock markets in four large economies and their correlations over the period January 1995 to December 2016.

	China	US	Europe	Japan
Mean	14.77	7.83	6.44	0.24
Volatility	31.63	15.32	17.51	17.95
Corr. with US	0.19			
Corr. with Europe	0.23	0.80		
Corr. with Japan	0.13	0.45	0.50	

Table 8: Alphas of China portfolios with respect to US and global factors 1995–2016

Monthly alphas (in %) of USD returns on the China market, size, value, and momentum factor portfolios with respect to the US and global Fama-French-Carhart factors, and their Newey-West adjusted t-statistics (in parentheses) over the period January 1995 to December 2016.

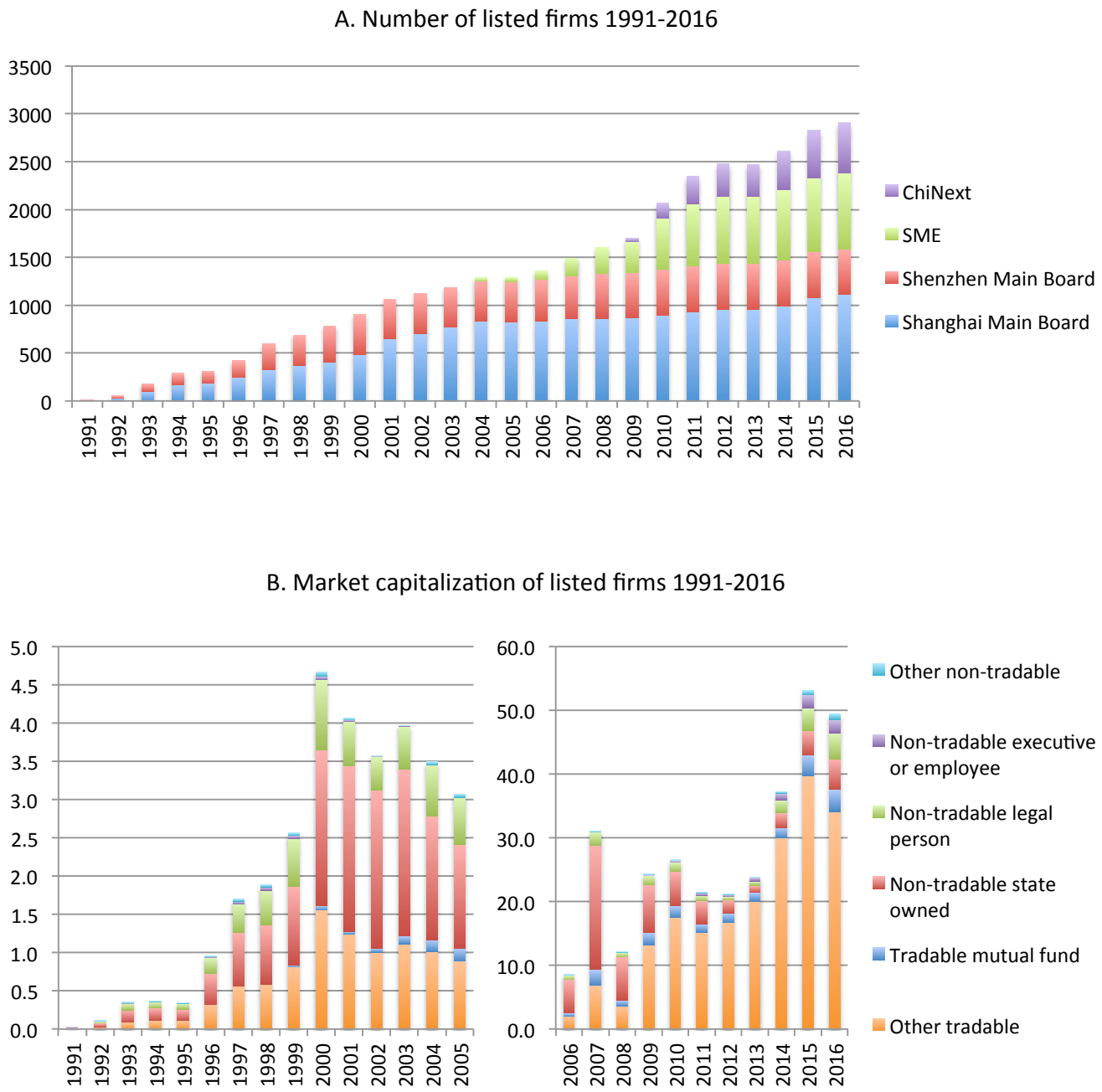
China portfolio		US factors		Global factors	
		1-factor	4-factor	1-factor	4-factor
RMRF	Alpha	0.97	0.97	0.99	0.91
	t-stat	(1.39)	(1.34)	(1.47)	(1.27)
SMB	Alpha	1.25	1.26	1.25	1.29
	t-stat	(4.63)	(4.56)	(4.64)	(4.63)
HML	Alpha	0.73	0.72	0.74	0.71
	t-stat	(2.26)	(2.38)	(2.28)	(2.24)
WML	Alpha	0.10	0.06	0.10	-0.01
	t-stat	(0.38)	(0.23)	(0.37)	(-0.02)

Table 9: Average monthly vs. buy-and-hold returns 1995–2016

Average monthly nominal USD returns in the top row, real CNY buy-and-hold returns in the bottom row, and the volatility, currency, and inflation effects that explain the difference, in the middle rows, for the China and US stock markets over two sample periods. All quantities are annualized and in percent.

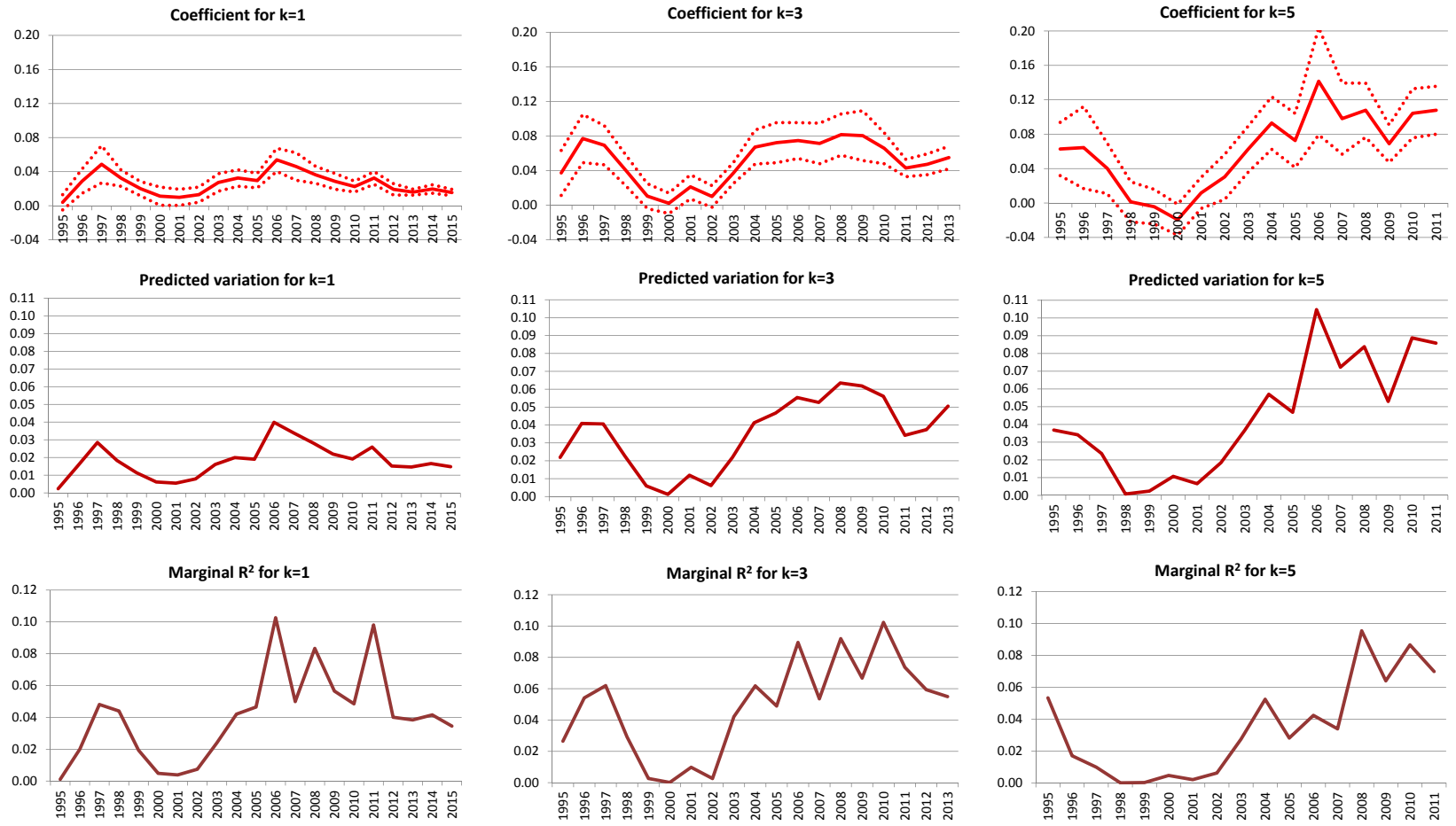
	1995-2016		2001-2014	
	China	US	China	US
Avg monthly nom USD return	17.17	10.46	12.74	7.02
0.5*Var of monthly nom USD return	5.03	1.17	4.36	1.20
Avg monthly USD return on CNY	0.90	0.90	2.07	2.07
Avg CNY inflation	2.37	2.37	2.34	2.34
Approx real CNY BHR return	8.88	6.02	3.98	1.40
Actual real CNY BHR return	9.01	6.04	4.02	1.41

Figure 1: Number of firms and market capitalization on China's stock market 1991-2016



Panel A shows the number of firms listed on the Shanghai and Shenzhen main boards and the Shenzhen SME and ChiNext boards. Panel B shows the total market capitalization of these listed firms in trillions of RMB, split at year 2006 to accommodate the significant increase in scale, categorized by the type of share and holder.

Figure 2: Stock price informativeness in China 1995-2016

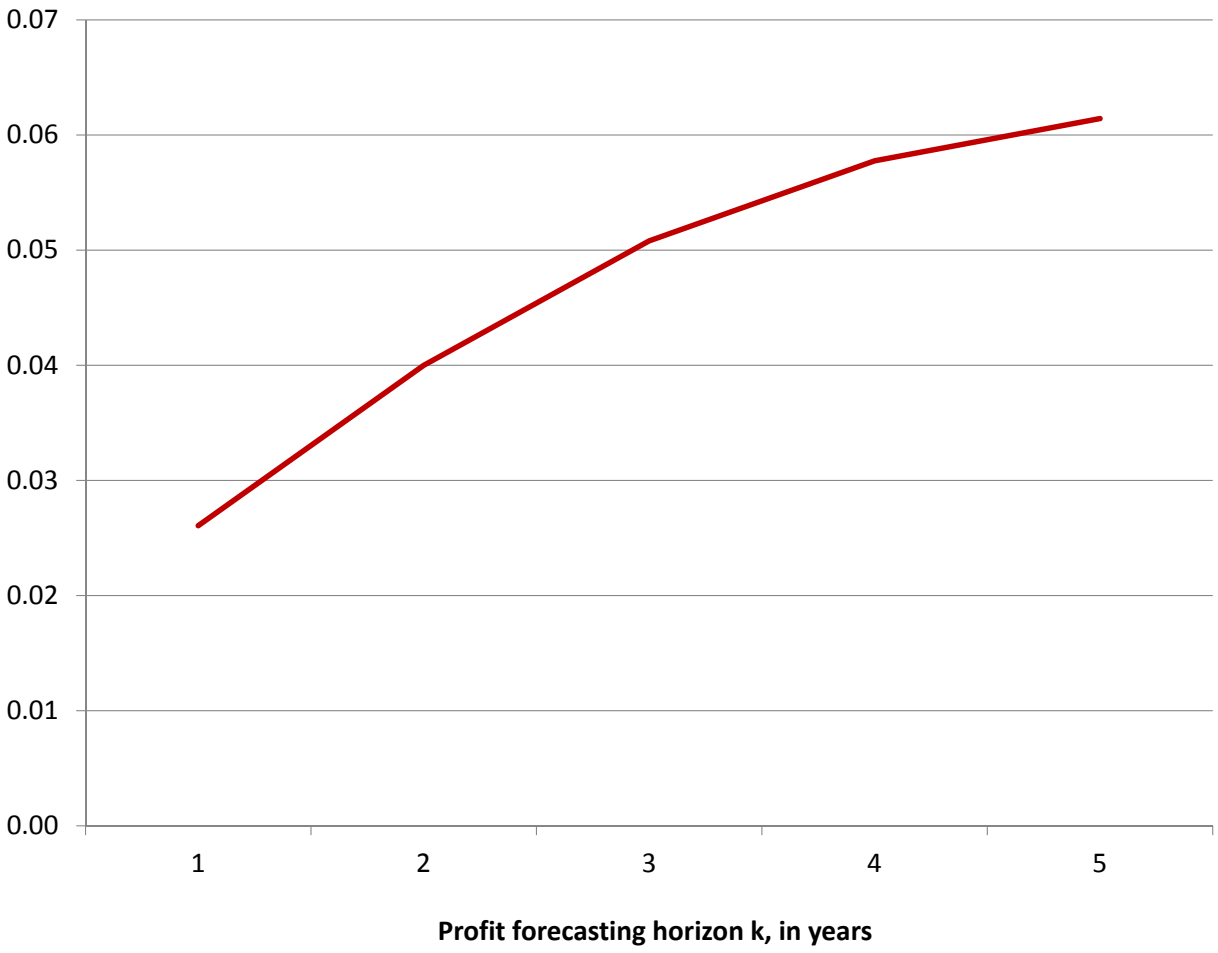


Results from annual cross-sectional regressions of the form

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + b_t \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + d_t^s 1_{i,t}^s + \varepsilon_{i,t+k}$$

for forecasting horizons $k = 1$, 3, and 5 over the period 1995 to $2016 - k$. The top plots show the coefficients on $\log(\frac{M_{i,t}}{A_{i,t}})$ and their 95% confidence bands, the middle plots show the predicted variation, which is the coefficient times the standard deviation of the regressor, and the bottom plots show the marginal R^2 of this regressor.

Figure 3: Stock price informativeness in China by forecasting horizon k

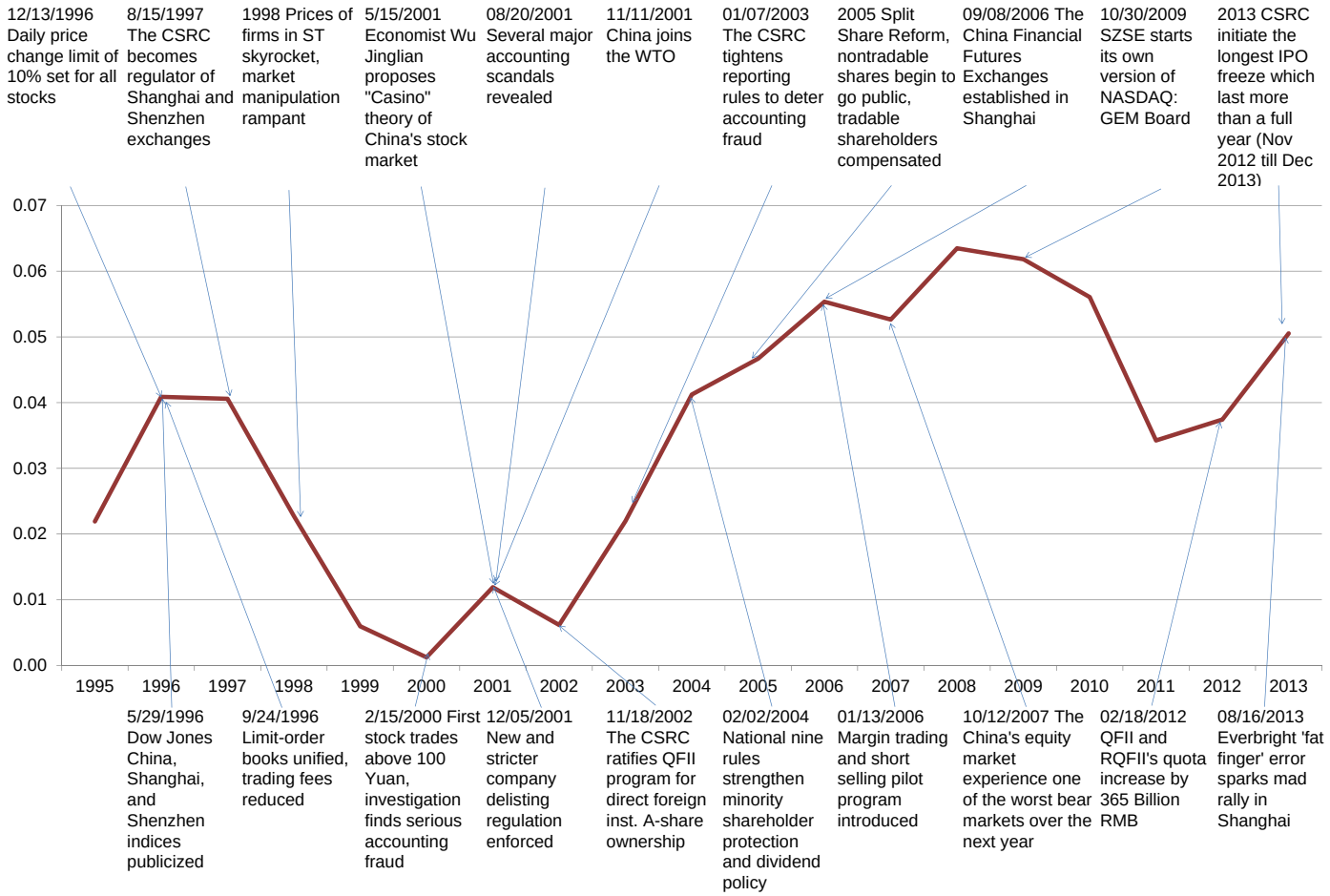


Time series average of the coefficient b_t from annual cross-sectional regressions of the form

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + b_t \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + d_t^s 1_{i,t}^s + \varepsilon_{i,t+k}$$

for forecasting horizons $k = 1$ to 5 over the period 1995 to $2016 - k$.

Figure 4: Stock price informativeness, regulatory reforms, and news events

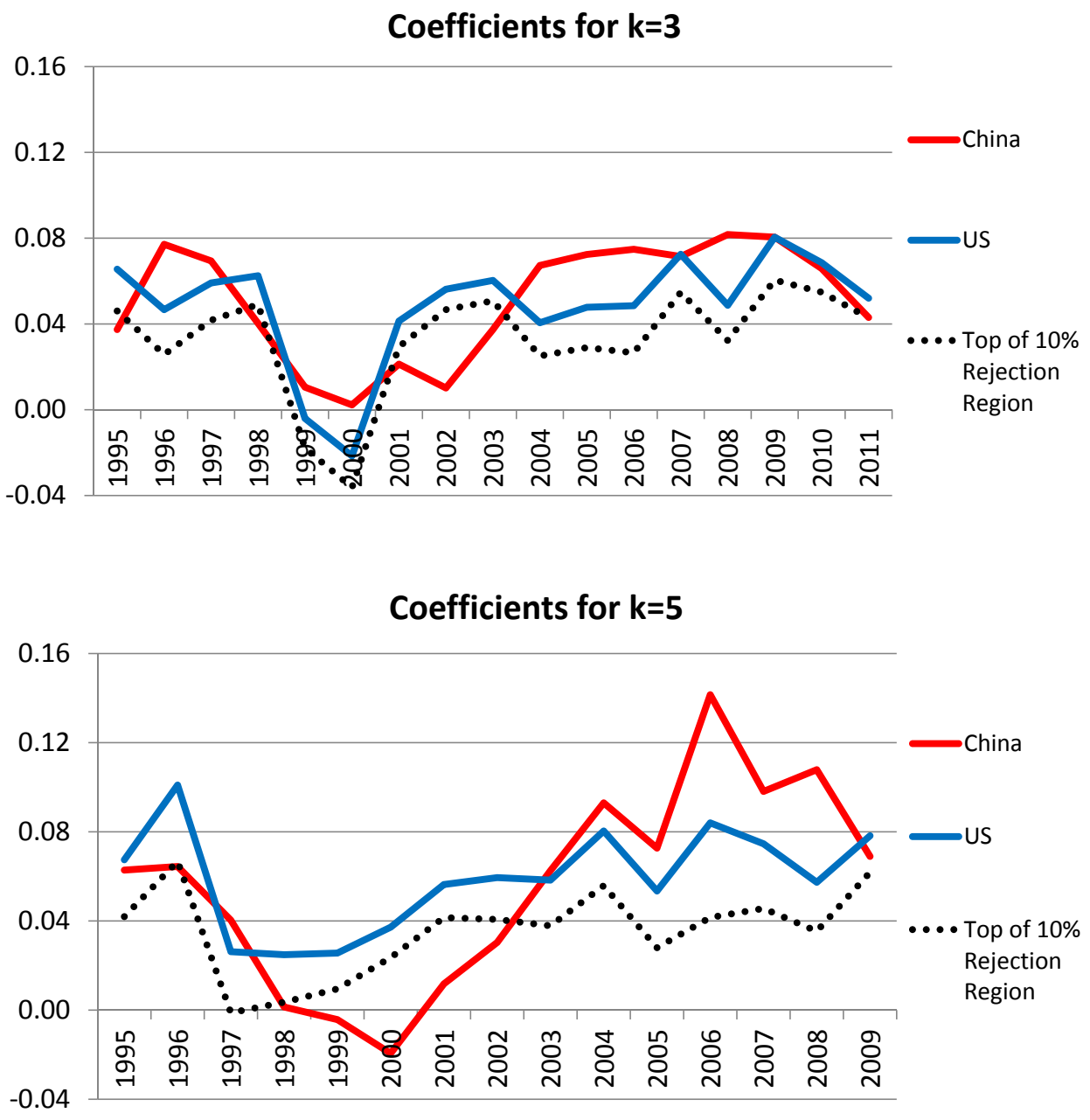


Predicted variation for the regressor $\log(\frac{M_{i,t}}{A_{i,t}})$ in annual cross-sectional regressions

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + b_t \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + d_t^s 1_{i,t}^s + \varepsilon_{i,t+k}$$

for forecasting horizon $k = 3$, and the timing of various reforms and events that plausibly affected this predicted variation.

Figure 5: Stock price informativeness: China vs. US

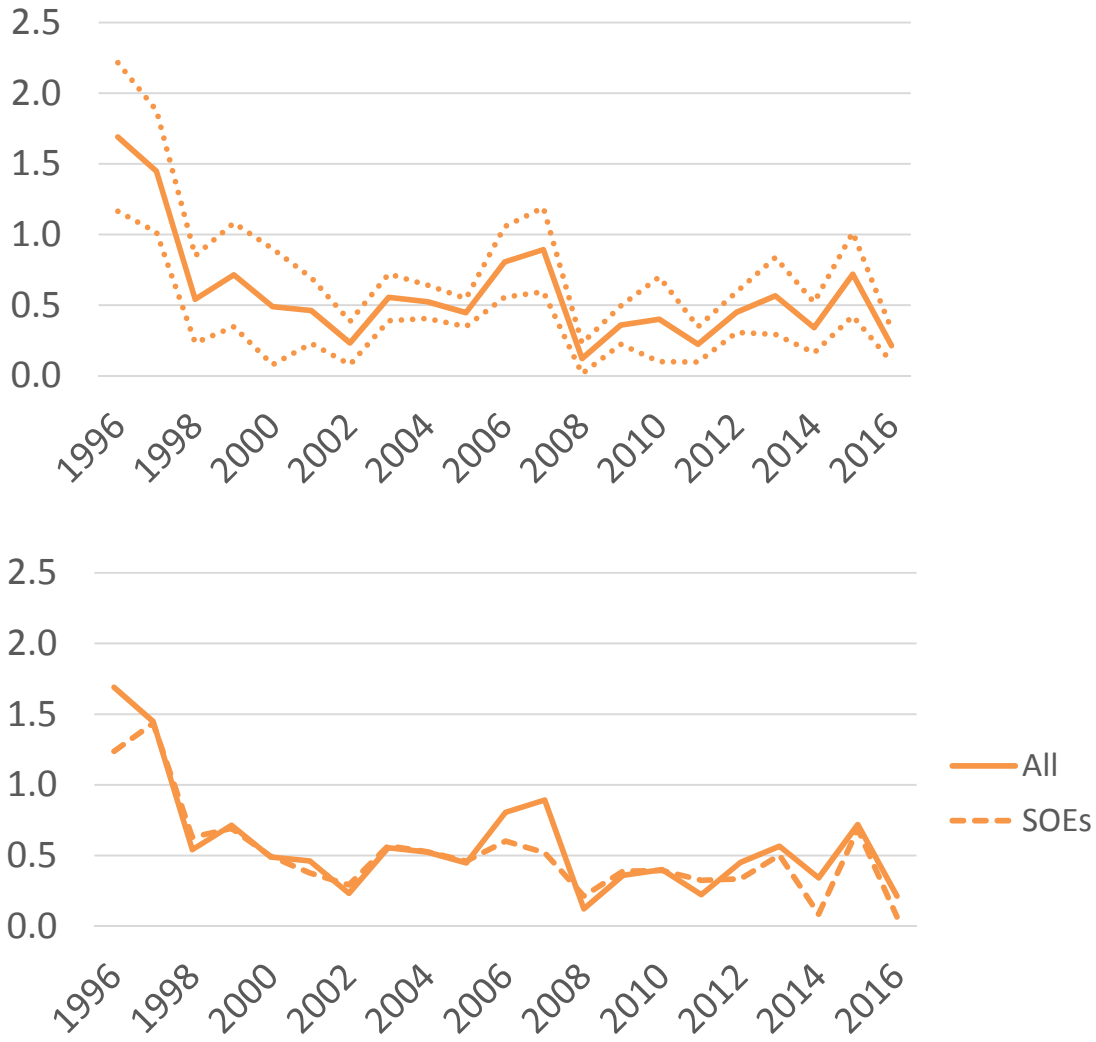


Coefficients b_t for China and the US from annual cross-sectional regressions

$$\frac{E_{i,t+k}}{A_{i,t}} = a_t + b_t \log(\frac{M_{i,t}}{A_{i,t}}) + c_t(\frac{E_{i,t}}{A_{i,t}}) + d_t^s 1_{i,t}^s + \varepsilon_{i,t+k} \ .$$

The dotted line shows the highest China price informativeness level for which the hypothesis that prices in China are as informative as in the US can be rejected at the 10% level in a one-sided test.

Figure 6: Efficiency of corporate investment in China



The top panel shows the investment efficiency coefficients β_t and their 95% confidence bands in cross-sectional regressions of unexpected change in equity market value on unexpected investment,

$$\frac{\Delta M_{i,t}}{A_{i,t-1}} = \alpha_t + \beta_t \frac{\Delta A_{i,t}}{A_{i,t-1}} + \gamma_t \frac{M_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

for the full sample of nonfinancial firms in each year $t = 1996$ to 2016. The bottom panel shows the same series of cross-sectional investment efficiency coefficients for both the full sample and for the subsample of SOEs only.

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