April 18, 2013

Institutional Development and Stock Price Synchronicity: Evidence from China

Iftekhar Hasan
Fordham University and Bank of Finland

Liang Song
Michigan Technological University

Paul Wachtel
Stern School of Business New York University

Abstract

This paper investigates how and to what extent institutional development influences and permits firm-specific information to be incorporated into share prices, as measured by stock price synchronicity. Tracing the experience of China, an economy undergoing dramatic changes in the last 20 years with rich variation in experiences across provinces, this paper reveals that stock price synchronicity is lower when there is rigorous institutional development in terms of property rights protection, rule of law, and political pluralism. The paper also reports that better institutions have a more pronounced effect on stock price informativeness for firms with poor corporate governance.

***JEL Classification Numbers*:** G14; G15; G24; G38

***Keywords*:** Institutions; China; Stock price synchronicity.

Acknowledgement: The authors are grateful to Diyue Guo for excellent research assistance and to the editor and the reviewers for their suggestions. Earlier versions of this paper were presented at the conference on “Bridging the GAAP: Recent Advances in Finance and Accounting,” Hebrew University, Jerusalem, Israel, July 2010 and at the “Conference on Chinese Capital Markets,” New York University Center on US-China Relations, New York, May, 2011.

Institutional Development and Stock Price Synchronicity: Evidence from China

1. Introduction

The extensive literature that relates the quality of legal and political institutions to economic performance relies for the most part on cross country studies where the heterogeneity of country specific characteristics makes it difficult to identify the effects even with panel data (Acemoglu et. al., 2005; Glaeser et. al., 2004; Wachtel, 2011). In this paper we focus on one country, China, where the pace of institutional development has varied across the provinces and show how that has affected the quality of information in equity markets. Specifically, we use a panel of Chinese provinces to investigate the effect of institutions on stock price synchronicity. We show that the differences in synchronicity across China are in part due to the variation among the provinces in institutional characteristics regarding property rights protection, the extent of the rule of law and the degree of political pluralism.

There is a cross country literature that has shown that firm-specific stock return variation is high or stock price synchronicity is low in countries with more developed institutions because reliable firm specific information is more readily available (Morck, Yeung, and Yu, 2000). Further, countries where investors have more firm-specific information will also have greater efficiency of capital allocation and lower costs of capital (Durnev, Morck, and Yeung, 2004; Wurgler, 2000). However, a potential drawback of the cross country studies is that firms operating in different national environments are also affected by other country specific characteristics such as the diversity of historical experience. We are able to hold national characteristics constant by focusing on the province-level differences in institutional development.

Moreover, the cross country literature on synchronicity focuses on the effects of investor protection from the perspective of the legal and information environment, (Jin and Myers, 2006, and Fernandes and Ferreira 2009). The political environment may be equally important because politicians can change investor protections if they choose to do so (Pagano and Volpin, 2005). Political authorities can alter the legal environment with legislative changes or by changing the way laws are applied. An authoritarian political regime can enact new legislation or and completely change the existing legal environment related to investor protection. There is significant variation across China's provinces in the extent of influence of the Communist party and the quality of the political environment. We show that differences across the provinces in political pluralism influences stock price synchronicity.

Stock price synchronicity among the Chinese provinces has been examined by Gul, Kim and Qiu (2009) in a study of ownership concentration and corporate governance. We adopt their approach to the measurement of synchronicity and apply it to a study of local institutions. The measures of institutional development in China at the provincial level were first developed by Hasan, Wachtel and Zhou (2009) who relate use the data to explain difference in the growth rate across provinces.

The significance of institutional characteristics on synchronicity can be traced to Grossman and Stiglitz (1980) who argued that the level of informed trading and informative pricing, which is a central determinant of the level of firm-specific stock variation, is determined by the cost–benefit trade-off on information collection. Following their rationale, we reason that the poor institutional development increase the cost of information collection and reduce investors' incentives to collect private information. This reduces the information content of stock prices and increases stock price synchronicity. A priori, there are several reasons why poor institutional development could lead to less private information collection. First, in provinces that provide poor property protection for investors, the risk of expropriation by corporate insiders could make firm-specific information less valuable and informed risk arbitrage is unattractive. Second, even good regulations regarding information disclosure are often not fully enforced when there is poor rule of law. The entrenched managers are able to withhold relevant information to cover their own self-serving behavior.[1] Third, a more pluralistic political environment could reduce the uncertainty and opacity of political decision making because the dominant Communist party has to contend with non-party members and is subject to increased monitoring from them. Thus, greater political pluralism in a province will reduce the cost resulting from political risk from collecting private information which, in turn, decreases synchronicity.

[1] For a discussion of these issues in emerging markets see Chan and Hameed (2006), Fan and Wong (2005).

Rapid development over the last 20 years has both improved the development of Chinese institutions but also increased the variation among China's provinces in the level of institutional development. We use data for 31 Chinese provinces for the period 1998-2007 and show that stock price synchronicity is lower (i.e. the information content of stock prices is higher) in provinces with a better legal and political environment.

We will present a number of tests to support the robustness of our results. For example, Morck, Yeung, and Yu (2000) find that the relationship between investor protection and stock price synchronicity is different in emerging markets as compared to developed countries. Since, there are large differences in the level of development across China; we divide our sample between those provinces with above and below median GDP per capita. Our results are not driven by the differences between the two sub samples. We also explore some alternative explanations for the role of institutions. For instance, it is possible that poor provincial institutions may enhance the development of business groups, industry vertical integration, and operating diversification, which further increase stock price synchronicity (Khanna and Thomas, 2009). To examine these issues, we look at the interaction between our institutional measures and firm characteristics such as ownership that are related to better corporate governance. We find that better institutions have a more pronounced effect on stock price informativeness for firms with poorer corporate governance as measured by higher government ownership and lower foreign ownership. These results suggest that the negative relationship between institutional development and stock price synchronicity results from poor institutional development that provides less investor protection. This increases the cost of information collection and reduces investors' incentives to collect private information which further reduces the information content of stock prices and increases stock price synchronicity.

Our study contributes to the literature in several ways. First, as noted earlier, by using province level data from one country, we overcome the problem faced by all cross country studies regarding omitted country characteristics. Our study provides a unique focus on the effect of province-level investor protection in the single most important emerging country - China. Second, in addition to the effects of property rights and law enforcement, we also examine the effect of another important aspect of institutional development, political pluralism, a measure of the strength of democracy, on stock price informativeness which has not been investigated before. Third, China has a quota system to select companies from each province for listing or raising additional equity on a stock exchange. Du and Xu (2009) show that provinces in which listed firms have more firm-specific information incorporated into stock prices were rewarded with more stock quotas in the subsequent periods. Thus, our study shows that policies to improve institutions can also increase access to capital.

The remainder of the paper proceeds as follows. Section 2 discusses the specific hypotheses that we will test. Section 3 presents our sample, measures, data sources, and reports descriptive statistics. Section 4 describes our empirical methodology and provides the baseline estimates of the relationship between institutional development and stock price informativeness. Section 5 provides extensions of the results, including an examination of the investment behavior of firms, and our robustness tests; the final section concludes.

2. Hypotheses and Related Literature

From the 1980s, China has followed an incremental approach to reforming its centrally planned economy into a market system which has resulted in remarkably high growth rates sustained for almost three decades (Prasad and Rajan, 2006). Rapid economic growth both demands and facilitates the development of legal institutions and the evolution of political systems (Williamson, 1996). There are a few empirical studies of the role of institutional development in China showing, for example, that the institutional environment matters for Chinese firms' reinvestment decisions and for fostering entrepreneurship (Cull and Xu, 2005; Djankov, Qian, Roland, and Zhuravskaya, 2006).

An important feature of the evolution of the legal environment in China is that many of the laws adopted are enacted locally following national legislation so that their implementation varies from province to province (Krug and Hendrischke, 2003). Such variation is found for laws and regulations that ensure the protection of property rights (see, Hasan, Wachtel, and Zhou, 2009 for details). Thus, there is information available to examine the effect of property rights on stock price synchronicity.

Studies with cross country data have established the importance of intellectual property rights protection for economic growth (Gould and Gruben, 1996; Park and Ginarte, 1997). Hasan, Wachtel, and Zhou (2009) use the number of trade mark applications in Chinese provinces to proxy the awareness of property rights and show that it is related to growth rates.

The link between property right protection and the information in stock prices has been discussed in Morck, Yeung, and Yu (2000). They argue that poor protection for property rights could discourages informed risk arbitrage because expropriation risk will make such behavior less valuable and increase their cost of collecting firm-specific private information. The reduced informed trading will impede the capitalization of firm-specific information into stock prices and decreases firm-specific return variation. Thus, they show that the stocks of firms in economies with poor country-level property rights have relatively high synchronicity.

Our first hypothesis is**: H1:** *Stock price synchronicity is lower for firms in provinces with better property rights.*

Another notable feature of the evolution of the modern Chinese legal system was the spread of the rule of law and, specifically, the gradual development of institutional structures for the enforcement of rules and the settlement of disputes. For instance, in 1995, the State Compensation Law allowed citizens to sue the state (Burns, 1999). The functions of the Party and government in the people's congress system were separated to strengthen the rule of law (Burns, 1999). In this process, many members of the legal profession such as lawyers and judges were rehabilitated which significantly improved the quality of law enforcement (Hasan, Wachtel, and Zhou, 2009).

The effect of rule of law and related issues on firm-specific return variation was explored by Ball (2001) and Chan and Hameed (2006). Even when there are adequate laws on the disclosure of corporate information, they are often not fully enforced when there is poor rule of law. Entrenched managers might find it in their interest to withhold information which increases the cost of collecting private information and leads to less firm-specific information being reflected into stock prices. The cross country study by Morck, Yeung, and Yu (2000) related aspects of the rule of law such as an efficient judiciary to stock price synchronicity.

Our second hypothesis is: **H2:** *Stock price synchronicity is lower for firms in provinces with higher quality of law enforcement.*

China's leaders have long recognized the need for, albeit very gradual, political reform. While China is still a largely authoritarian communist state, there have been significant movements towards political pluralism (White, 1993, Chapter 8). For example, non-party members such as professional experts, entrepreneurs and members of minority political parties occupy approximately one third of the seats in the National People's Congress (NPC), the highest legislative body in China. This significantly contributes to elements of pluralism in Chinese political structures and decision making. The delegates to the NPC are elected by the provincial people's congresses and the degree of pluralism varies across provinces. Thus we will be able to examine the effect on stock price synchronicity of a more open and pluralistic political structure.

The cross country literature has shown that more democratic political environments are associated with economic growth (Rodrik and Wacziarg, 2006; Borner, Brunetti, and Weder, 1995). Shleifer and Vishny (1993) and Mauro (1995) document that poor quality of political institutions is associated with substantial economic costs, especially in developing economies. Further, the literature shows a positive association between liberal democracy and successful economic liberalization (e.g., Zack-Williams, 2001).

In the China, increasing numbers of non-party members are elected to both national and provincial People's Congresses. New members include many owners of private firms who have a motivation to promote the recognition and protection of private-property rights. If there is a higher proportion of non-Communist Party members in the provincial People's Congress than in the national People's Congress, we suggest that the province has a more pluralistic political environment. A more pluralistic political environment could lead to improved decision making due to increased debate and monitoring. This mechanism is similar to the competition among political parties in western countries; it improves the quality of the local government by reducing the uncertainty and opacity of political decision making. Thus, greater political pluralism in a province will reduce the costs resulting from political risk to collect private information which decreases synchronicity. Morck, Yeung, and Yu (2000) linked one aspect of the country-level quality of government, an absence of corruption, to stock price synchronicity.

Our third hypothesis is: **H3:** *Stock price synchronicity is lower for firms in provinces with more political pluralism, ceteris paribus.*

3. Data

3.1. Sample

Our sample covers the period 1998-2007 and includes all non-financial firms in China with available stock returns data from DataStream for at least 200 trading days in a particular year.[2] Altogether, the sample includes 1012 firms and 5570 firm-year observations.[3] Firms are assigned to the province where the company is incorporated. Each firm's location was collected by hand from the prospectus. Importantly, there is no evidence that firms are concentrated in particular regions; there are as many provinces (five) with 15-20 firms as there are with 60-65 firms.[4]

3.2. Measurement of stock price synchronicity

Stock price synchronicity is based on annual market model regressions for each firm where the daily stock returns are regressed on the returns of an industry index and the market index. That is, we estimate the following market model for each stock and each year using daily returns data:

$$Return_{it} = \alpha + \beta_1\ IndustryReturn_t + \beta_2\ MarketReturn_t + \varepsilon_{it} \qquad (1)$$

where $Return_{it}$ denotes the daily return for firm i and day t. $IndustryReturn_t$ is the industry return calculated as a value-weighted stock return of all other firms within the same industry as firm i (with $Return_{it}$ omitted); $MarketReturn_t$ is the value-weighted return for all firms; and ε_{it} represents unspecified random factors.

. The Chinese market has some unique features because there are both shares issued to domestic investors (A-shares) and two types of shares issued to foreign investors (B-shares that trade on the Shanghai or Shenzhen stock exchanges and H-shares that are traded in Hong Kong). The model specified above (1) uses A share returns. We also estimate market models that include the influence of foreign investors through B or H share trading. We follow the approach in Gul, Kim, and Qiu (2010) to account for differences among the various markets where Chinese shares are traded. For firms with only domestic A-shares, the extended model is equation (2a) which adds the world market returns:

$$Return_{it} = \alpha + \beta_1\ IndustryReturn_t + \beta_2\ MarketReturn_t + \beta_3\ WorldMarketReturn_t + \varepsilon_{it} \qquad (2a)$$

$WorldMarketReturn_t$ is the world market return calculated using the MSCI World index for day t. For firms with A and B-shares, we also add the value-weighted B-share market return $BShareMarketReturn_t$ as in equation (2b):

[2] We begin in 1998 because the province level data on the institutional environment are not available earlier and we end before the onset of the global financial crisis.

[3] We exclude the observation for the year in which a firm concludes its IPO.

[4] There are 22 provinces, 5 autonomous regions and 4 municipalities. The Special Administrative Regions are not included in the sample.

$$Return_{it} = \alpha + \beta_1\ IndustryReturn_t + \beta_2\ MarketReturn_t + \beta_3\ BShareMarketReturn_t + \beta_4\ WorldMarketReturn_t + \varepsilon_{it} \tag{2b}$$

And for firms with A and H-shares, we add the world market factor and the H-share market returns as in equation (2c):

$$Return_{it} = \alpha + \beta_1\ IndustryReturn_t + \beta_2\ MarketReturn_t + \beta_3\ HShareMarketReturn_t + \beta_4\ WorldMarketReturn_t + \varepsilon_{it} \tag{2c}$$

where $HShareMarketReturn_t$ is the value-weighted Hong Kong market return. Thus, the extended market model is estimated for each firm for each year using (2a) or (2b) or (2c).

The R_i^2 of the market model estimated for a particular firm in a particular year is our measure of its stock price synchronicity. A higher value of R_i^2 means higher stock price synchronicity with market movements and less firm-specific return variation.[5] Because R_i^2 is bounded within [0, 1], ψ_i, the logistic transformation of R_i^2, is our preferred measure of the annual stock price synchronicity for firm <u>*i*</u>:

$$\psi_i = \log(\frac{R_i^2}{1-R_i^2})$$

We will denote synchronicity from the domestic share model, equation (1), as $R_i^2(1)$ and synchronicity from the extended model, equations (2a-b-c), by $R_i^2(2)$. The corresponding logistic transforms are $\psi(1)$ and $\psi(2)$.

3.3. Measures of institutional development

We measure three aspects of province-level institutional development in China, each associated with one of our hypotheses: property rights protection, rule of law and political pluralism. A major challenge in our study is that direct measures of these phenomena are not available; only imperfect proxies exist. Following on the work of Hasan, Wachtel, and Zhou (2009), we were able to collect proxy measures from a variety of Chinese sources.

The variable *PropertyRights* is the number of domestic trademark applications per firm for a certain province and year. Firms will make use of trade marking if they are confident that the institutional environment in the province is good enough to actually protect the property rights that come with the trademark. Thus, a higher value of *PropertyRights* represents a higher

[5] A higher value of R_i^2 is also associated with larger estimates of β from the market model which is often interpreted as risk. Thus, increased synchronicity is the same as increased risk.

level of property rights protection. The data on domestic trademark applications is from the annual issues of the *Almanac of China's Property Rights* and the *Yearbook of China's Industrial and Commercial Administrative*, annual provincial yearbooks, and the government-sponsored trademark website, *China Trademark Online*. When the data is missing in a certain year, we use the product between the national data at that year and the proportions of applications in the province in 1998.

The variable *RuleofLaw* is the number of lawyers per 10,000 people for a certain province and year. An increased presence of legal professionals in a province is associated with both the development of legal institutions and of the mechanisms for law enforcement. Thus, a higher value of the variable *RuleofLaw* represents a higher level of law enforcement. The number of lawyers in each province is taken from the *Statistics Yearbook of China's Legislation* and the annual issues of the *Statistics Yearbooks* of each province.[6] It is supplemented by additional information from Chinese web based resources such as the China Lawyering (*www.china-lawyering.com*) and China Lawyers Investigation (*www.007cn.cn*). If the data are missing, we use the interpolated value based on nationwide growth in the number of lawyers. Population data are from the National Bureau of Statistics of China.

The variable *PoliticalPluralism* as the proportion of non-Communist party members in the provincial People's Congress relative to the proportion in the National People's Congress for a certain province and year. If the provincial proportion of non-Communist Party members is higher than the national benchmark at that time, then the province arguably has a more open or pluralistic political environment. Thus, a higher value of the variable *PoliticalPluralism* indicates a higher level of political pluralism. The data on political pluralism is taken from the regional *People's Congress Yearbooks* of each province in China and the Examination and Approval Reporting Document issued by the Examination Committee of the People's Congress. Information on the membership structures of the People's Congress in six provinces is not available and data from neighboring provinces with similar political characteristics is used as an estimate.

3.4. Other variables

The set of control variables includes characteristics of firms and the macro environment that are known to influence synchronicity (Chan and Hameed, 2006; Gul, Kim, and Qiu, 2010).

---

[6] They provide data for 1990, 1995 and 2000–2002.

Specifically, we include the proportion of equity held by the government and by foreign owners (*GovernmentOwn* and *ForeignOwn*) for each firm-year. The government and foreign ownership data are from the NUS Business School's database of Chinese listed firms' ownership structure. We also include dummy variables for the share structure (*BShare* and *HShare* if the firm has issued B shares and H shares respectively).[7] Firm characteristics included are: a) *AccountingOpacity*, the ratio of the absolute value of accounting accrual to total assets, where accrual is equal to earnings after extraordinary items plus depreciation minus cash flow from operations; b) the annual trading turnover (*Volume*) which is the total number of shares traded in a year divided by the total number of shares outstanding at the end of fiscal year; c) *Size*, the logarithm of total assets; (d) *Leverage*, total liabilities divided by total assets; (e) *EarningVolatility*, the standard deviation of a firm's ROA for the preceding five-year period including the current year; (f) *MatketToBook*, the ratio of market value of assets to the book value of assets where the market value of assets is defined as the book value of assets minus the book value of equity plus the market value of equity; and (g) *Log(IPOAge)*, the logarithm of the firm age since IPO. The stock turnover data are from DataStream and the firm accounting data are from the Worldscope database

We also include two measures of industry size: (a) the logarithm of the number of firms in the industry to which a firm belongs (*IndustryByNumber*) and (b) the logarithm of the total assets of all firms in the industry that are in our sample (*IndustryBySize*). Industries are defined according to the one digit industry code from the Worldscope database. Macro variables in the set of controls are (a) the annual province-level growth rate in per capita real GDP (*GDPGrowth*), and (b) the per capita real GDP (G*DPPerCapita*). The real annual per capita GDP for each province is from China Economic Information Network Database. Table 1 presents a summary of variable names and definitions.

3.5. Descriptive statistics

The mean value of the three institutional variables, and the mean value of stock price synchronicity measured by $R^2(1)$ by province are shown in Figure 1.[8] Most of the provinces with higher institutional development have low stock price synchronicity. For example, Gan'Su

[7] Firms with B-shares and H-shares have to report in compliance with International Financial Reporting Standards or Hong Kong Generally Accepted Accounting Principles. The stricter disclosure rules would improve firms' information environments and reduce stock price synchronicity.

[8] The values are the means for all the available observations of companies in the province.

province has the highest stock price synchronicity. Moreover it has the lowest value for *PropertyRights* and the second lowest value for *RuleofLaw* and *PoliticalPluralism.* Bei'Jing has the lowest stock price synchronicity; it has the highest value of *PropertyRights* and *RuleofLaw* and the fourth highest value of *PoliticalPluralism.*

Summary statistics for the whole sample are shown in Table 2. All variables are winsorized at the 1 and 99 percentiles to exclude possible outliers. As shown in the table, the mean value of $R^2(1)$ is 0.490 while the mean value of $R^2(2)$ is 0.432.[9] The large standard deviations and wide ranges of both R^2 and ψ indicate that there is considerable cross-sectional variation in synchronicity. All of the institutional variables exhibit a reasonable amount of variation across time and province. On average, the state shareholder holds 31.0 percent and foreign shareholders hold 6.7 percent of shares outstanding, suggesting that the government still has a dominant impact on Chinese listed firms.

Table 3 presents the correlations between our province-level and firm-level variables. The correlation between the two synchronicity measures, $\Psi(1)$ and $\Psi(2)$ is 0.975. Measures of synchronicity are negatively correlated with property rights (*PropertyRights*), rule of law (*RuleofLaw*), and political pluralism (*PoliticalPluralism*). A firm's stock price synchronicity is lower when they are located in a province in which there is sounder institutional development in term of property rights protection, rule of law, and political pluralism. The simple correlations are consistent with our three hypotheses.

4. Baseline regression results

To test for the effects on synchronicity of property rights (H1), of rule of law (H2), and of political pluralism (H3), we estimate the following equation:

$$\psi_{it} = \alpha + \beta_1\, PopertyRights_{it} + \beta_2\, RuleofLaw_{it} + \beta_3\, PoliticalPluralism_{it} + (CONTROL_{it}) + (YearDummies) + (IndustryDummies) + \varepsilon_{it} \qquad (3)$$

where ψ_{it} is the measure of stock synchronicity for firm *i* and year *t*. The institutional environment variables *PropertyRights*, *RuleofLaw* and *PoliticalPluralism* are our primary interests and we expect that β_1, β_2 and $\beta_3 < 0$. CONTROL denotes a set of control variables

[9] These statistics are similar to the results reported with cross country data by Morck, Yeung, and Yu (2000) as well as in the study of China by Gul, Kim, and Qiu (2010).

including the variables *GovernmentOwn, ForeignOwn*, *BShare*, *HShare*, *AccountingOpacity*, *Volume*, *Size*, *Leverage*, *EarningVolatility*, *MarketToBook*, *Log(IPOAge), IndustryByNumber, IndustryBySize*, *GDPGrowth*, and *Log(GDPPerCapita)*. Finally, the regressions include fixed effects for the year (*YearDummies*) and industry (*IndustryDummies*).

Government related shareholders are more likely to be associated with expropriation risk and information asymmetry problems compared to foreign shareholders. Thus, we expect the coefficient on *GovernmentOwn* to be positive and the coefficient on *ForeignOwn* to be negative. Since foreign investors are presumably more skilled at collecting and trading on firm-specific information, we expect that the variables *BShare* and *HShare* are negatively correlated with stock price synchronicity. We expect that the coefficient on *AccountingQpacity* is negative because firms with higher accounting opacity have a worse information environment. We expect that the coefficient on *Volume* is negative because more trading will help incorporate more firm-specific information. We expect that the coefficient on the variable *Size* is positive because stocks of large firms are more likely to be aligned with the whole market. The coefficient on the variable *Leverage* is likely to be positive because the cost of collecting private information may be higher for the firms with greater risk of financial distress. We expect that the coefficient on *EarningVolatility* is negative because stocks of firms with higher earning uncertainty have more firm-specific variation. The coefficient of the variable *MarketToBook* is expected to be negative because stocks of firms with higher growth potential will incorporate more firm-specific information. We expect that the coefficient on *Log(IPOAge)* is positive because more of the time-invariant firm-specific information such as managerial quality is already incorporated in the stock price for older firms and firms-specific information that can be impounded in to the stock price is less available (Dasgupta, Gan, and Gao, 2010).

Estimates of Equation (3) with $\psi(1)$ as the dependent variable are shown in Table 4. The t-statistics are calculated using robust standard errors corrected for firm-level clustering which may from serial dependency in the firm data. The first three columns in the table show each of our key institutional variables separately estimated with OLS. The last two columns include all of the variables first estimated with OLS and then with GMM. Simultaneity among the variables is potentially serious problem. Thus, equation (5) of Table 4 shows estimates of the full equation using the two-step system GMM estimator. We treat all institutional variables and control variables excluding *IndustryByNumber, IndustryBySize, GDPGrowth*, and *Log(GDPPerCapita)* as endogenous and the other variables as exogenous. We also add another instrument *RelativeDistance*, which is defined as the distance from Beijing to each of the provincial capitals scaled by the longest distance from Beijing to a provincial capital. This variable is chosen because firms are less likely to be influenced by the central government if they are located in a province that is far from Beijing. The p-value of the Hansen test is larger than 0.1, suggesting our instruments are exogenous.[10] GMM estimates are not shown for the other specifications because the estimates are overidentified.

In all the results shown, we find that stock price synchronicity is lower when there is sounder institutional development in term of property rights protection, rule of law, and political pluralism. That is, our measures of institutional development all have the expected negative impact on synchronicity and, moreover, the coefficients are all statistically significant.

The effects of these institutional factors on stock price synchronicity are also economically relevant. We use the results reported in Column (4) of Table 4 to assess the impact of the institutional variables on stock price synchronicity. A one standard deviation increase in *PropertyRights* decreases stock price synchronicity (i.e. $\psi(1)$) by 0.154*0.484 or 0.075 which is about 2.5 percent of the range of synchronicity (the difference between the largest and smallest values of $\psi(1)$ is 2.993). A one standard deviation increase in *RuleofLaw* decreases stock price synchronicity by 0.050*0.715 or 0.036, roughly 1.2 percent of the range. Finally, a one standard deviation increase in *PoliticalPluralism* decreases stock price synchronicity by 0.119*0.119 or 0.014, just over 0.5 percent of the range. Taken together, these examples underline the importance that different institutional factors have for stock price synchronicity.

All the control variables have the expected signs in the OLS estimates though there are some exceptions with the GMM estimator. The coefficient on *GovernmentOwn* is significantly positive suggesting that higher state ownership is associated with less use of firm-specific information in determining stock prices. The coefficient on the variable *ForeignOwn* is significantly negative suggesting that higher foreign ownership increases the use of firm-specific information. However, this result is not found with the GMM estimator. The coefficients of the variables *Volume* and *MartketToBook* are significantly negative but only with OLS. Firms with

[10] The p- value for the Hansen test for equation (5) is 0.191 and the values for the AR(1) and AR(2) tests are 0.000 and 0.925 respectively.

high growth opportunity tend to commove less. The coefficient estimates of the remaining variable generally have the expected signs, but are insignificant.

The significant negative signs on *BShare* in Table 4 indicate that the presence of foreign investors increases the information content of stock prices. The degree of synchronicity of these firms is likely to differ from those restricted to the domestic stock market for at least two reasons. First, compared with firms that exclusively issued A-shares, these firms have stricter financial reporting regulation and their financial statements are more likely to be audited by international auditing firms. Second, foreign investors are more likely to have superior capabilities, resources, and skills to collect and process firm-specific information (Gul, Kim, and Qiu, 2010).

Since the number of firms with either B-shares (available to foreigners on the Shanghai or Shenzhen stock exchanges) or H-shares (trading in Hong Kong) is relatively small, we do not estimate the relationships separately. Instead, we use the measure of synchronicity from the extended market model (2a-b-c) to account for international market influences. Table 5 presents a summary of regression results using synchronicity calculated from the extended market model, $\psi(2)$, as the dependent variable. The coefficient estimates in Table 5 are qualitatively similar to those reported in Table 4. The presence of foreign traders is important but does not obviate the significance of local institutions.

5. Model extensions and robustness checks.

5.1. Alternative measures of institutional quality

Our proxies for institutional quality are an effort to measure the relevant characteristics directly. In this section, we compare our constructed institutional variables to published indices that measure related aspects of the institutional development of Chinese provinces. We were able to locate two such measures; although the data are limited, they are sufficient to test the robustness of our results.

The first measure is an index of administrative transparency constructed since 2009 by the Beijing University Center for Public Participation Studies and Supports (China Law Center, 2011). It is an assessment of local governments with regard to the transparency of government communication and efforts to build government systems. For the lack of any earlier data, we use the 2009 administrative transparency index for all years. The second measure is a broader index of marketization constructed by the National Economic Research Institute (NERI, 2010). The marketization index is available annually from 1997-2007. The index is based on a large number of indicators that reflect institutions and the economic structure. Among the elements of the index are the extent of state ownership, barriers to inter-regional trade, price controls, the environment for FDI and the financial sector, labor mobility and the legal framework (including a measure of patent registration).

These indexes are far from perfect for at least two reasons. First, they weight diverse bits of information with an arbitrary scaling; it is unclear how to properly interpret a unit increase in the index. Second, the actual components of the indices are not provided in the sources so their meaning is opaque. Nevertheless, we add the indexes to our baseline regressions as a robustness test.

Table 6 provides a summary of results; only coefficients for the institutional variables are shown. Each equation includes all the control variables shown in Table 4. The scaled marketization index is the province's marketization score relative to the average for all provinces in that year. We show each index separately and with our three proxy measures of institutional quality. There is a strong negative relationship between synchronicity and the marketization and the administrative transparency indexes. Further, the coefficients are reduced somewhat when we also include our proxy measures for property rights, rule of law and pluralism. Importantly, there is little difference in the coefficients on our three institutional proxies between the baseline estimates (column (4) Table 4) and the estimates in Table 6 that include the overall institutional indexes. After controlling for these additional institutional variables, our main results still hold.

A final robustness check is based on the changing nature of our political pluralism variable. In 2002, the Party revised its Charter to allow private entrepreneurs to join. Since then, many such "red capitalists" became members of the Chinese Community party and even members in the People's Congress, which have contributed to the pluralism (Dickson 2003; Chen and Dickson 2008). In a sense this reform represents an exogenous shock which might influence stock price synchronicity. In results not shown here, we add a dummy variable for this post reform era to our baseline equation. The coefficient on the dummy is significantly negative, suggesting that stock price synchronicity decreased after the party charter revision that allowed private entrepreneurs to join; further, the coefficients on the institutional variables are largely unaffected.

5.2 Threshold effects

Morck, Yeung, and Yu (2000) find that the relationship between investor protection and stock price synchronicity is different in emerging markets as compared to developed countries. To see if there are any similar threshold effects within China, we divide our sample into developing provinces with below median GDP per capita and developed provinces with above median per capita GDP. To test whether our results hold within both sub samples or mainly describe differences between the groups, we estimate synchronicity regressions for each sub sample and the results are summarized in Table 7. The coefficient estimates across these two sub samples are qualitatively identical to those reported in Table 4 which thus support our previous conclusions and indicate that our results are not driven by the differences between the sub samples.

5.3. Alternative explanations

In this paper, we have maintained that poor institutional development increases the cost of information collection and reduce investors' incentives to collect private information. This reduces the information content of stock prices and increases stock price synchronicity. However, there may be other explanations of our main results. For example, Khanna and Thomas (2009) use a unique dataset in Chile and show that two firms with more connections are more likely to have synchronized stock returns. Poor provincial institutions may enhance connectedness among managers resulting in the development of business groups, industry vertical integration, and operating diversification, all of which further increase stock price synchronicity. Another possibility is that regions with stronger institutions have a bigger investor pool. If investors favor firms in their home province then stock price synchronicity is lower.

In the only other study of synchronization among Chinese provinces, Gul, Kim, and Qiu (2010) argue that the state owners are more likely to be related to inefficient corporate governance and provide less protection for minority shareholders. If, in fact, the higher investor protection provided by the better institutional environment decreases the cost of information collection and increases investors' incentives to collect private information, which contributes to the incorporation of information into stock prices of firms, we expect that the effect of institutional development on synchronicity is more pronounced for firms with higher government ownership and there is a negative coefficient on this interaction variable.

To formally address these issues, we add interaction terms between our institutional development variables and the state ownership variable in the synchronicity regressions. The equations are estimated with OLS and include all the standard control variables shown in Table 4. The results are summarized in Table 8 which shows that the interactions between government ownership and the variables *PropertyRights* and *RuleofLaw* are negative and significant. This is true when all three variables and the interaction terms are in the regression together (column (4) of Table 8). That is the (negative) effect of institutional quality on synchronicity is more pronounced for firms with higher government ownership.

Next we test whether provincial institutional development has a more significant impact on synchronicity for firms with lower foreign ownership. To do so, we add interaction terms between our institutional development variables and the foreign ownership variable to the synchronicity regressions. Foreign shareholders are less likely to be associated with expropriation risk and information asymmetry problems (e.g., Kang and Stulz, 1997; Jiang and Kim, 2004). If, in fact, the higher investor protection provided by the better institutional environment decreases the cost of information collection and increases investors' incentives to collect private information, which contributes to the incorporation of information into equity prices, we expect to find that the effect of institutional development on synchronicity is more pronounced for firms with lower foreign ownership and there is a positive coefficient on this interaction variable. The estimates in columns (5) to (8) of Table 8 show that the coefficients on the interactions between foreign ownership and the three institutional development variables are all positive and significant. This is true when the interactions with the three institutional variables are considered individually or when all three variables and the interaction terms are entered into the regression together in column (8) of Table 8. That is increased foreign ownership decreases the size of the negative effect of institutional quality on synchronicity.

In summary, we find that better institutions have a more pronounced effect on stock price informativeness for firms with higher government ownership and lower foreign ownership. [11] These results suggest that the poor institutional development provides less investor protection. This increases the cost of information collection and reduces investors' incentives to collect

[11] The interpretation of the interaction terms is symmetric, that is, higher foreign ownership and lower state ownership matter more for stock price synchronicity in provinces with poor institutions.

private information. This further reduces the information content of stock prices and increases stock price synchronicity.

In addition, West (1988) and Siew, Yang, and Zhang (2010) suggest that low stock price synchronicity may be associated with a poor information environment, which questions the validity of stock price synchronicity to measure stock return informativeness. Veldkamp (2006) provides a theoretical model to show that low stock price synchronicity is a good measure of a better information environment and empirical studies cited already are supportive (e.g. Morck, Yeung, and Yu. 2000). If low stock price synchronicity means that there is more information in stock prices, then investment should be more sensitive to lagged company valuation for firms with lower stock price synchronicity. We can explore this specifically with our data by estimating equation (5):

$$Investment = \alpha + \beta_1 Q + \beta_2 Q * DR\_\Psi(1) + \beta_3 Q * DR\_AccountingOpacity + (YearDummies) + (IndustryDummies) + \varepsilon_{it} \quad (5)$$

where the dependent variable, *Investment*, is capital expenditure scaled by beginning-of-year book assets. *Q* is equal to *MarketToBook* at the end of the previous year. *DRΨ(1)* is the scaled decile rank score of *Ψ(1)*. *DRAccountingOpacity* is the scaled decile rank score of *AccountingOpacity*. To obtain these scaled decile rank score, we classify the observations in each year into deciles from 0 to 9 and then scale these ranks to range between 0 and 1. Table 9 presents estimates of equation (5). The *Q* coefficients are significantly positive, reflecting that the company valuation is significantly associated with investments. Moreover, the $Q * DR\_\Psi(1)$ coefficients are significantly negative, which implies that investment is more sensitive to lagged company valuation for firms with lower stock price synchronicity. The results suggest that managers depend on the information content of stock prices about the firms' fundamentals to make their investment decisions and lower stock price synchronicity is a good measure of stock return informativeness. These findings are consistent with the results reported in Chen, Goldstein, and Jiang (2007).

5.4. Additional robustness checks

In this section we summarize some additional robustness tests that, in the interest of space are not shown although they are available from the authors on request.

First, estimates of the market model are based on daily returns and a potential bias can be introduced by non-synchronous trading because some stocks do not trade every day (Scholes and

Williams 1977; French, Schwert, and Stambaugh 1987). In order to account for this, we also estimated the market models with lagged industry and market returns without any noticeable effect on the results. In addition, we estimated the market models with weekly rather than daily data which does not alter our results and conclusions either.

Second, we varied the windows used to winsorize the data to 2 and 98 percentiles or 5 and 95 percentiles. Our results are still robust to such variation in the size of the data set.

Third, some variables such as *Ruleoflaw* have interpolated values for certain years. To ensure that interpolation of this variable does not affect our results, we use the firm-year observations without those interpolated values to estimate our base line synchronicity regression. We obtain similar results and the same conclusions.

Fourth, four large municipalities (Beijing, Chongqing, Shanghai, and Tianjin) are under much stronger control by the central government than the other provinces. Thus, we re-estimated the models without these four municipalities, and find that our results are robust. Similarly, we find that our results are robust when the institutional variables are clustered at the region level.

6. Conclusions

China has experienced dramatic changes over the last 20 years in the establishment of secure property rights, the enhancement of law enforcement, and the liberalization of political institutions with varied experience across China's 31 provinces. In fact, it provides a unique opportunity to examine the effects of institutions within one national environment rather than the more common cross country panel approach. Specifically, the paper investigates whether and how stock price synchronicity is associated with province-level institutional characteristics unique to China.

The province-level institutional variables we examine for the period 1998-2007 include property rights, rule of law, and political pluralism. Evidence suggests that the development of awareness of property rights, law enforcement, and political pluralism are associated with more stock price informativeness. Additionally, better institutions have a more pronounced effect on stock price informativeness for firms with higher government ownership and lower foreign ownership.

Our evidence has some clear policy implications for emerging economies which suffer from high stock price synchronicity. We know from Wurgler (2000) and Durnev, Morck, and

Yeung (2004) among others that the efficiency of capital allocation and investment will be improved if stock prices incorporate more firm-specific information (i.e. synchronicity is reduced). And our results show convincingly that institutional improvements are associated with reduced stock price synchronicity thus establishing a clear channel by which improvements in the institutional environment are associated with improved economic outcomes.

References

Ball, R. 2001. Infrastructure requirements for an economically efficient system of public financial reporting and disclosures. Brookings Papers on Financial Services: 127-182.

Acemoglu, D., S. Johnson and J. Robinson. 2005.Institutions as a Fundamental Cause of Long-Run Growth, chapter 6 in P. Aghion and S. N. Durlauf, Eds., Handbook of Economic Growth, Elsevier, Volume 1, Part A, Pages 385-472.

Borner, S., A. Brunetti, and B. Weder, 1995. Political Credibility and Economic Development. St. Martin's Press, New York.

Burns, J.P., 1999. The People's Republic of China at 50: National political reform. The China Quarterly 159, 580–594 (Special Issue: The People's Republic of China after 50 Years).

Chan, K., A. Hameed, 2006. Stock price synchronicity and analyst coverage in emerging markets. Journal of Financial Economics, 80(1): 115-147.

Chen, J., and Dickson, B., 2008, Allies of the state: democratic support and regime support among China's private entrepreneurs, China Quarterly, 196: 780–804.

Chen, Q., and I. Goldstein, and W. Jiang, 2007, Price informativeness and investment sensitivity to stock price, Review of Financial Studies, 20 (3), 619-650

Cull, R. and L.C. Xu, 2005. Institutions, ownership, and finance: The determinants of profit reinvestment among Chinese firms. Journal of Financial Economics 77 (1): 117-146.

China Law Center, Yale Law School, 2011. Summary of the 2009 Annal Report on China's Administrative Transparency.

http://www.law.yale.edu/documents/pdf/Intellectual_Life/ch_OGIWA_2009_Report_Exec_Summary_English_FINAL__1-28-11_.pdf

Dasgupta, S., J. Gan, and N. Gao, 2010. Transparency, stock return synchronicity, and the informativeness of stock prices: theory and evidence. Journal of Financial and Quantitative Analysis 45(5), 1189-1220.

Dickson, B., 2003. Red Capitalists in China: The Party, Private Entrepreneurs, and Prospects for Political Change, New York, Cambridge University Press.

Djankov, S., Y. Qian, G. Roland, and E. Zhuravskaya, 2006. Who are China's entrepreneurs? American Economic Review 96 (2), 348-352.

Du, J. L. and C. G. Xu, 2009. Which firms went public in China ? A study of financial market regulation. World Development 37(4), 812-24.

Durnev, A., R. Morck, and B. Yeung, 2004. Value-enhancing capital budgeting and firm-specific stock return variation. Journal of Finance 59(1): 65-105.

Fan, J. and T.J. Wong, 2005. Do external auditors perform a corporate governance role in emerging markets? Evidence from East Asia. Journal of Accounting Research 43 (1): 35-72.

Fernandes, N., and M.A. Ferreira, 2009. Insider trading laws and stock price informativeness. Review of Financial Studies 22 (5): 1845-1887.

French, K., G.W. Schwert, and R. Stambaugh, 1987. Expected stock returns and volatility. Journal of Financial Economics 19: 3-30.

Jiang, L. and J.B. Kim, 2004. Foreign equity ownership and information asymmetry: evidence from Japan. Journal of International Financial Management and Accounting 15(3): 185-211.

Glaeser, E. L., R. La Porta, F. Lopez-de-Silanes and A. Shleifer. 2004. Do Institutions Cause Growth? Journal of Economic Growth 9(3): 271-303.

Gould, D. M., W.C. Gruben, 1996. The role of intellectual property rights in economic growth. Journal of Development Economics 48 (2): 323-350.

Grossman, S., and J. Stiglitz, 1980. On the impossibility of informationally efficient markets, American Economic Review 25: 393-408.

Gul, F., J. Kim, and A.A. Qiu, 2010. Ownership concentration, foreign shareholding, audit quality, and stock price synchronicity: evidence from China. Journal of Financial Economics 95(3): 425-442.

Hasan, I., P. Wachtel, and M. M. Zhou, 2009. Institutional development, financial deepening and economic growth: evidence from China. Journal of Banking and Finance 33: 157-170.

Khanna,T. and C. Thomas, 2009. Synchronicity and firm interlocks in an emerging market. Journal of Financial Economics 92 (2): 182-204.

Krug, B., and H. Hendrischke, 2003. China incorporated: Property rights, networks and the emergence of a private business sector in China. Managerial Finance 29 (12): 32-44.

Kang, J.K. and R. Stulz, 1997. Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan. Journal of Financial Economics 46: 3-28.

Mauro, P., 1995. Corruption and growth. Quarterly Journal of Economics 110 (3), 681-712.

Morck, R., B. Yeung, and W. Yu. 2000. The information content of stock markets: why do emerging markets have synchronous stock price movements? Journal of Financial Economics 58(1): 215-260.

Jin, L., and S. Myers. 2006. R^2 around the world: new theory and new tests. Journal of Finance 79: 257-292.

National Economic Research Institute, 2010. NERI Index of Marketization of China's Provinces, 2009 Report. (in Chinese) Economic Science Press.

Pagano, M., and P.F. Volpin. 2005. The political economy of corporate governance. American Economic Review 95 (4): 1005-1030.

Park, W.G., and J.C. Ginarte, 1997. Intellectual property rights and economic growth. Contemporary Economic Policy 15: 51-61.

Prasad, E.S., and R.G. Rajan, 2006. Modernizing China's growth program. American Economic Review 96 (2): 331-336.

Rodrik, D., and R. Wacziarg, 2006. Do democratic transition produce bad economic outcome? American Economic Review 95 (2), 50-55.

Shleifer, A. and R. Vishny, 1993. Corruption. Quarterly Journal of Economics 108 (3): 599-617.

Scholes, M. and J. Williams. 1977. Estimating betas from nonsynchronous data. Journal of Finance 5: 309-328.

Teoh, H.S., Y. Yang, and Y. L. Zhang, 2010. R-square and market efficiency. Working Paper, University of California, Irvine and Chinese University of Hong Kong.

Veldkamp L., 2006. Information markets and the comovement of asset prices. Review of Economic Studies. 73(3): 823-845

Wachtel, P. 2011. The evolution of the finance growth nexus, Comparative Economic Studies 53 (3): 475-88.

West, K. 1988. Dividend innovations and stock price volatility. Econometrica 56: 37-61.

White, G., 1993. Riding the Tiger, the Politics of Economic Reform in Post-Mao China. Stanford University Press, Stanford.

Williamson, O. E., 1996. The Mechanisms of Governance. Oxford University Press, New York.

Wurgler, J., 2000. The financial markets and the allocation of capital. Journal of Financial Economics 58: 187-214.

Zack-Williams, A.B., 2001. No democracy, no development: Reflections on democracy & development in Africa. Review of African Political Economy 27: 213–223.

Table 1
Variable Definitions

$R^2(1)$	The R^2 of the market model in equation (1).
$R^2(2)$	The R^2 of the market models in equation (2).
$\Psi(1)$	Logarithmic transformation of $R^2(1)$
$\Psi(2)$	Logarithmic transformation of $R^2(2)$
PropertyRights	The number of trademark applications per firm in a province; proxy for the awareness of property rights.
RuleofLaw	The number of lawyers per 10,000 people in a province; proxy for rule of law.
PoliticalPluralism	The proportion of non-Communist party members in the provincial People's Congress relative to the proportion in the National People's Congress
GovernmentOwn	The percentage of shares held by government owner(s) at year beginning
ForeignOwn	The percentage of shares held by foreign owner(s) (Hong Kong, Taiwan, other countries) at year beginning
Bshare	An dummy variable which equals 1 if a firm issues B-shares and 0 otherwise
Hshare	An dummy variable which equals 1 if a firm issues H-shares and 0 otherwise
AccountingQpacity	The absolute value of accounting accrual, accrual is equal to earnings after extraordinary items plus depreciation minus cash flow from operations, and then divided by total assets
Volume	The total number of shares traded in a year, scaled by the total number of shares outstanding at the end of fiscal year
Size	The logarithm of total assets
Leverage	Total liabilities divided by total assets
EarningVolatility	The standard deviation of a firm's ROAs over the preceding five-year period, including the current year
MarketToBook	Market value of assets over book value of assets. Market value of assets are measured as book value of assets minus book value of equity plus market value of equity
Log(IPOAge)	The logarithm of the firm age since IPO
IndustryByNumber	The logarithm of the number of firms in the industry to which a firm belongs
IndustryBySize	The logarithm of year-end total assets of all sample firms in the industry to which a firm belongs
GDPGrowth	Annual growth rate in per capita real GDP
GDPPerCapita	The per capita GDP deflated to the base year of 1998
Log(GDPPerCapita)	The logarithm of per capita GDP deflated to the base year of 1998

Table 2
Descriptive Statistics

Variables are defined in Table 1; data are winsorized at the 1 and 99 percentiles.

Variables	Mean	Std dev	Min	Max
$R^2(1)$	0.490	0.176	0.133	0.821
$R^2(2)$	0.432	0.174	0.132	0.830
$\Psi(1)$	-0.231	0.340	-1.921	1.072
$\Psi(2)$	-0.332	0.333	-1.921	1.042
PropertyRights	0.472	0.484	0.002	5.011
RuleofLaw	0.691	0.715	0.101	7.451
PoliticalPluralism	1.016	0.119	0.651	1.434
GovernmentOwn	0.310	0.132	0.000	0.716
ForeignOwn	0.067	0.046	0.000	0.399
Hshare	0.039	0.193	0.000	1.000
BShare	0.131	0.337	0.000	1.000
AccountingOpacity	0.202	0.078	0.009	0.438
Volume	2.080	0.716	0.211	3.511
Size	20.670	1.035	19.120	22.812
Leverage	0.385	0.219	0.121	0.962
EarningVolatility	0.203	0.139	0.000	0.492
MarketToBook	2.773	1.566	0.726	5.491
IPOAge	11.645	4.026	2.000	18.000
IndustryByNumber	5.232	1.193	3.261	6.693
IndustryBySize	26.776	1.169	24.145	28.410
GDPGrowth (%)	7.200	4.526	-17.100	21.574
GDPPerCapita (RMB)	1704.574	1005.678	413.000	12613.000

Table 3
Correlation Matrices

Variables are defined in Table 1. The superscripts, ***, **, and * denote the 1%, 5%, and 10% levels of significance, respectively.

Panel A: Province-level variables

	Average value of Ψ(1) for each province year	*PropertyRights*	*RuleofLaw*	*PoliticalPluralism*	*GDPGrowth*
Average value of Ψ(1) for each province year	1				
PropertyRights	-0.524***	1.000***			
RuleofLaw	-0.481***	0.489***	1.000		
PoliticalPluralism	-0.358***	0.219***	0.336***	1.000	
GDPGrowth	-0.123**	0.050	0.079	0.160***	1.000
Log(GDPPerCapita)	-0.110*	0.013	0.079	0.130**	0.727***

Panel B: Firm-level variables

	Ψ(1)	*Ψ(2)*	*Government Own*	*Foreign Own*	*Hshare*	*BShare*	*Accounting Opacity*	*Volume*	*Size*	*Leverage*	*Earning Volatility*	*Market ToBook*	*IPOAge*	*Industry ByNumber*
Ψ(1)	1													
Ψ(2)	0.975***	1												
GovernmentOwn	0.618***	0.615***	1											
ForeignOwn	-0.390***	-0.392***	-0.496***	1										
Hshare	-0.089***	-0.087***	-0.120***	0.105***	1									
BShare	-0.332***	-0.330***	-0.228***	0.096***	-0.012	1								
AccountingOpacity	0.288***	0.289***	0.277***	-0.381***	-0.090***	-0.099***	1							
Volume	-0.312***	-0.313***	-0.309***	0.419***	0.098***	0.110***	-0.928***	1						
Size	-0.011	-0.008	-0.007	0.004	-0.019	0.011	0.001	0.004	1					
Leverage	0.003	0.003	-0.030	0.011	0.019	0.007	0.016	-0.011	0.009	1				
EarningVolatility	0.003	0.002	0.003	-0.002	-0.015	-0.002	-0.007	-0.001	-0.013	0.006	1			
MarketToBook	0.062***	0.063***	0.172***	-0.144***	-0.013	-0.047***	0.151***	-0.158***	0.011	-0.008	-0.019	1		
IPOAge	-0.174***	-0.167***	-0.029**	-0.051***	0.016	0.027**	-0.010	0.003	-0.010	-0.007	0.012	0.011	1	
IndustryByNumber	0.004	0.003	0.005	-0.016	-0.014	-0.045	0.008	-0.006	0.003	-0.023*	-0.005	-0.013	-0.024	1
IndustryBySize	0.008	0.006	0.018	-0.009	-0.054	0.024	0.011	-0.012	-0.006	-0.006	-0.015	-0.004	-0.024	0.433***

Table 4
The Effect of Property Rights, Rule of Law, and Political Pluralism on Stock Price Synchronicity

All variables are defined in Table 1. The dependent variable is *Ψ(1)*. Year and industry dummies are included in all equations and the sample size is 5570. Numbers in parentheses represent absolute values of t-statistics where the standard errors are corrected for clustering at the firm level. The superscripts, ***, **, and * denote the 1%, 5%, and 10% levels of significance, respectively.

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) GMM
PropertyRights	-0.193***			-0.154***	-0.118***
	(16.243)			(12.292)	(7.82)
RuleofLaw		-0.093***		-0.050***	-0.032***
		(17.091)		(8.940)	(4.04)
PoliticalPluralism			-0.322***	-0.119**	-0.188**
			(7.265)	(2.490)	(2.44)
GovernmentOwn	1.097***	1.175***	1.242***	1.070***	0.734***
	(20.529)	(22.486)	(23.109)	(20.194)	(10.34)
ForeignOwn	-0.541***	-0.534***	-0.483***	-0.563***	0.138
	(5.548)	(5.248)	(4.605)	(5.839)	(1.16)
BShare	-0.159***	-0.178***	-0.194***	-0.154***	-0.265***
	(8.153)	(9.878)	(10.223)	(8.198)	(5.77)
HShare	-0.032	-0.039	-0.043	-0.031	-0.368***
	(1.398)	(1.563)	(1.625)	(1.426)	(3.05)
AccountingOpacity	0.153	0.113	0.099	0.156	0.175
	(1.429)	(1.031)	(0.878)	(1.485)	(0.64)
Volume	-0.030**	-0.036***	-0.040***	-0.028**	-0.040
	(2.494)	(3.045)	(3.291)	(2.456)	(1.44)
Size	-0.002	-0.003	-0.001	-0.003	0.005
	(0.762)	(0.987)	(0.243)	(0.952)	(0.73)
Leverage	0.029**	0.033**	0.036**	0.032**	0.072**
	(2.037)	(2.250)	(2.427)	(2.257)	(2.25)
EarningVolatility	0.001	-0.003	0.007	0.001	0.108**
	(0.024)	(0.153)	(0.321)	(0.049)	(2.30)
MarketToBook	-0.010***	-0.011***	-0.011***	-0.010***	-0.007
	(4.977)	(5.438)	(5.382)	(5.022)	(1.50)
Log(IPOAge)	0.012	0.014	0.019	0.011	-0.008
	(0.822)	(0.942)	(1.186)	(0.796)	(-0.28)
IndustryByNumber	0.004	0.010	0.009	0.006	-0.005
	(0.471)	(1.153)	(1.072)	(0.732)	(0.28)
IndustryBySize	-0.003	-0.005	-0.004	-0.004	0.004
	(0.471)	(0.756)	(0.549)	(0.637)	(0.36)
GDPGrowth	-0.001	-0.004***	-0.003*	-0.001	-0.000
	(0.904)	(2.589)	(1.960)	(0.907)	(0.02)
Log(GDPPerCapita)	-0.052*	-0.010	-0.027	-0.043	-0.062**
	(1.758)	(0.343)	(0.867)	(1.494)	(2.29)
Adj. R^2 or Wald $\div^2$ for (5)	0.567	0.544	0.518	0.577	616.78

Table 5
The Effect of Property Rights, Rule of Law, and Political Pluralism on Stock Price Synchronicity with Extended Model

All variables are defined in Table 1. The dependent variable is *Ψ(2).* Year and industry dummies are included in each equation, as well as all of the control variables shown in Table 4. Not all regression coefficients are presented here in order to conserve space. The sample size is 5570 and numbers in parentheses are the absolute values of t-statistics where the standard errors are corrected for clustering at the firm level. The superscripts, ***, **, and * denote the 1%, 5%, and 10% levels of significance, respectively.

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) GMM
PropertyRights	-0.167***			-0.131***	-0.095***
	(14.058)			(10.955)	(6.17)
RuleofLaw		-0.081***		-0.044***	-0027***
		(14.720)		(7.807)	(3.53)
PoliticalPluralism			-0.301***	-0.127***	-0.185
			(6.777)	(2.684)	(2.42)**
GovernmentOwn	1.082***	1.148***	1.205***	1.056***	0.771***
	(20.567)	(22.364)	(22.930)	(20.228)	(10.76)
ForeignOwn	-0.546***	-0.541***	-0.497***	-0.566***	0.144
	(5.690)	(5.445)	(4.873)	(5.954)	(1.15)
BShare	-0.158***	-0.174***	-0.188***	-0.154***	-0.264***
	(8.808)	(10.496)	(10.799)	(8.878)	(5.99)
HShare	-0.029	-0.035	-0.039	-0.028	-0.346***
	(1.272)	(1.435)	(1.494)	(1.289)	(3.04)
Adj. R^2 or Wald ÷ ^{2} for (5)	0.547	0.530	0.510	0.555	625.49

Table 6
Effect of Alternative Institutional Indexes on Stock Price Synchronicity

Variables are defined in Table 1. The dependent variable is *Ψ(1)*. Each equation contains all the control variables shown in Table 4 as well as year and industry dummies. Numbers in parentheses represent absolute values of t-statistics that are adjusted using standard errors corrected for clustering at the firm level. The superscripts, ***, **, and * denote the 1%, 5%, and 10% levels of significance, respectively.

	Administrative Transparency		Marketization		Scaled Marketization	
Index	-0.004***	-0.001**	-0.040***	-0.025***	-0.214***	-0.135***
	(6.819)	(1.969)	(11.589)	(7.527)	(11.322)	(7.565)
PropertyRights		-0.155***		-0.131***		-0.131***
		(12.246)		(11.162)		(11.208)
RuleofLaw		-0.039***		-0.042***		-0.044***
		(6.375)		(7.687)		(8.064)
PoliticalPluralism		-0.122***		-0.087*		-0.095**
		(2.631)		(1.811)		(2.010)
Sample size	5380	5380	5532	5532	5532	5532
Adj. R^2	0.527	0.580	0.547	0.589	0.545	0.589

Table 7
Stock Price Synchronicity in Sub samples

Variables are defined in Table 1. The dependent variable is *Ψ(1)*. Each equation includes year and industry dummies as well as all the control variables shown in Table 4. Numbers in parentheses represent absolute values of t-statistics that are adjusted using standard errors corrected for clustering at the firm level. The superscripts, ***, **, and * denote the 1%, 5%, and 10% levels of significance, respectively.

	Developed Province Sub sample				Developing Province Sub sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PropertyRights	-0.186***			-0.152***	-0.205***			-0.182***
	(13.876)			(9.914)	(11.346)			(10.643)
RuleofLaw		-0.084***		-0.023***		-0.106***		-0.086***
		(14.319)		(3.057)		(12.630)		(12.315)
PoliticalPluralism			-0.423***	-0.138**			-0.180***	-0.120*
			(7.696)	(2.361)			(2.696)	(1.955)
Sample size	2861	2861	2861	2861	2709	2709	2709	2709
Adj. R^2	0.600	0.570	0.552	0.603	0.533	0.517	0.486	0.555

Table 8
The Effect of State and Foreign Ownership on the Relation between Institutional Development and Stock Price Synchronicity

Variables are defined in Table 1. The dependent variable is *Ψ(1)*. Each equation includes the standard set of control variables and year and industry dummies. However, only the coefficients on institutional and ownership variables and the interactions are shown in the table. Numbers in parentheses represent absolute values of t-statistics that are adjusted using standard errors corrected for clustering at the firm level. The superscripts, ***, **, and * denote the 1%, 5%, and 10% levels of significance, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PropertyRights	-0.051			-0.010	-0.312***			-0.252***
	(1.605)			(0.309)	(12.452)			(9.646)
RuleofLaw		-0.060***		0.021		-0.150***		-0.088***
		(2.867)		(1.005)		(10.223)		(5.802)
PoliticalPluralism			-0.451***	-0.218**			-0.636***	-0.357***
			(4.127)	(1.968)			(7.690)	(4.572)
PropertyRights GovernmentOwn*	-0.669***			-0.695***	-	-	-	-
	(4.686)			(5.045)	-	-	-	-
*RuleofLaw * GovernmentOwn*		-0.154		-0.329***	-	-	-	-
		(1.606)		(3.464)	-	-	-	-
*PoliticalPluralism * GovernmentOwn*			0.491	0.371	-	-	-	-
			(1.343)	(1.054)	-	-	-	-
PropertyRights ForeignOwn*	-	-	-	-	1.512***			1.282***
	-	-	-	-	(6.254)			(5.116)
*RuleofLaw * ForeignOwn*	-	-	-	-		0.731***		0.481***
	-	-	-	-		(4.552)		(2.931)
*PoliticalPluralism * ForeignOwn*	-	-	-	-			4.284***	3.342***
	-	-	-	-			(4.819)	(4.378)
GovernmentOwn	1.358***	1.264***	0.746**	1.151***	1.077***	1.169***	1.244***	1.052***
	(16.252)	(15.434)	(1.988)	(3.246)	(20.264)	(22.483)	(23.206)	(20.068)
ForeignOwn	-0.486***	-0.531***	-0.484***	-0.503***	-1.225***	-1.005***	-4.804***	-4.824***
	1.358***	1.264***	0.746**	1.151***	(8.246)	(7.242)	(5.439)	(6.428)
Sample size	5570	5570	5570	5570	5570	5570	5570	5570
Adj. R^2	0.572	0.545	0.519	0.585	0.572	0.547	0.521	0.584

Table 9
The Effect of Stock Price Synchronicity on the Relation between Investment and Stock Price

The dependent variable is *Investment*, which is defined as capital expenditure scaled by beginning-of-year book assets. *Q* is equal to *MarketToBook* at the end of the previous year. *DRΨ(1)* is the scaled decile rank score of *Ψ(1)*. *DRAccountingOpacity* is the scaled decile rank score of *AccountingOpacity*. Each equation also includes year and industry dummies. Numbers in parentheses represent absolute values of t-statistics that are adjusted using standard errors corrected for clustering at the firm level. The superscripts, ***, **, and * denote the 1%, 5%, and 10% levels of significance, respectively.

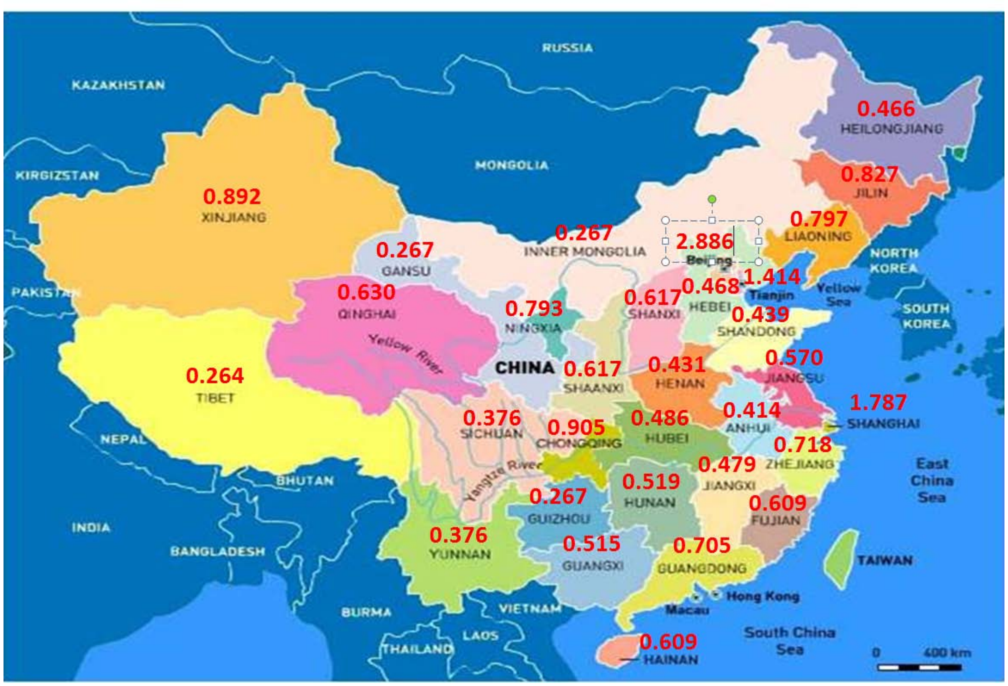
	(1)	(2)	(3)
Q	0.017***	0.022***	0.021***
	(9.405)	(9.157)	(8.301)
*Q*DRΨ(1)*		-0.008***	-0.008***
		(3.518)	(3.459)
*Q*DRAccountingOpacity*			0.002
			(0.680)
Sample size	5570	5570	5570
Adj. R^2	0.036	0.039	0.039

Figure 1
Institutional Development and Stock Price Synchronicity

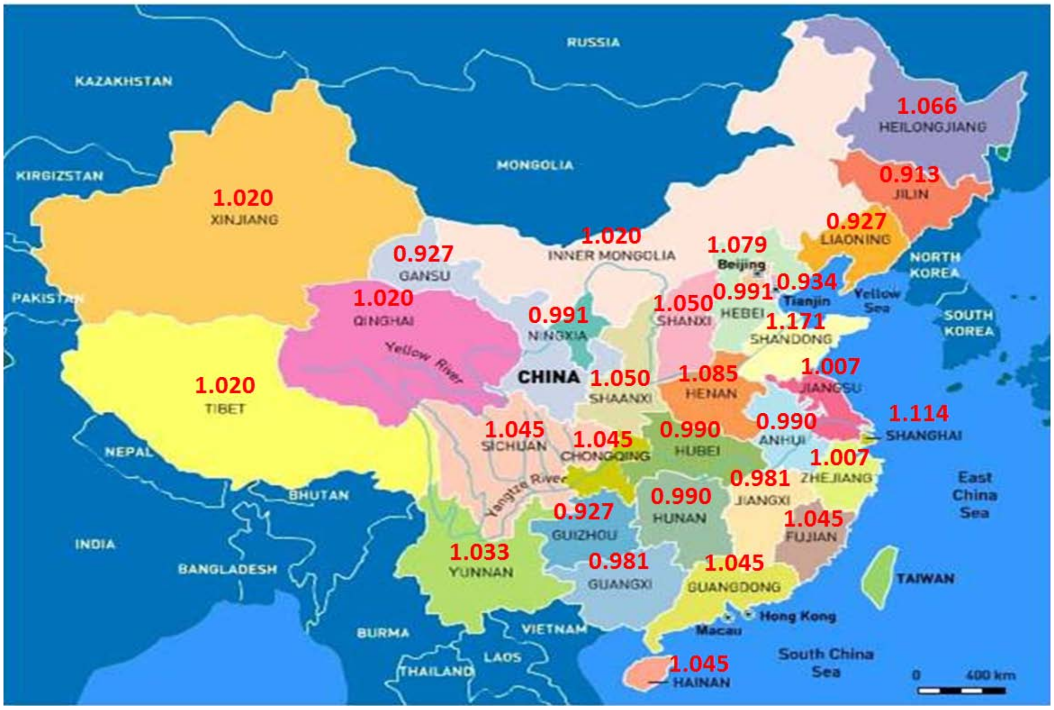
The figure presents the mean value of *PropertyRights*, the mean value of *Ruleoflaw*, the mean value of *PoliticalPluralism*, and the mean value of $R^2(1)$ for each province. All variables are as defined in Table 1.

Property Rights (The number of trademark applications per firm in a province) - Provincial Distribution

Rule of Law (The number of lawyers per 10,000 people in a province) - Provincial Distribution



Political Pluralism (The proportion of non-Communist party members in the provincial People's Congress relative to the proportion in the National People's Congress) - Provincial Distribution



R Square - Provincial Distribution