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PUZZLES IN THE CHINESE STOCK MARKET

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Abstract: Many companies on China's stock markets have separate, restricted classes of shares for domestic residents and foreigners. These shares are identical other than who can own them, but foreigners pay only about *one-quarter* the price paid by domestic residents. We argue that the generally higher level (and volatility) of domestic share prices is consistent with the simplest asset pricing model, assuming plausible differences—about 4 percentage-points—in expected rates of return by foreign and domestic investors. We attribute low Chinese expected returns to the limited alternative investments available in China. We then estimate how various company characteristics affect the relative price paid by foreigners in a panel of companies. We find, for example, that foreigners pay a lower relative price for companies with a higher proportion owned by the state—reflecting, surprisingly, a *higher* absolute price paid by *both* foreigners and domestic residents.

Keywords: emerging markets, segmented stock market, China

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Equity markets in China expanded rapidly following the opening of securities markets in the cities of Shanghai and Shenzhen in the early 1990s. Concerned that capital flows might "destabilize" markets, China restricted access by foreign investors, establishing separate classes of shares for domestic Chinese residents and for foreigners. Other than who can own them, these shares are legally identical, with the same voting rights and dividends. Nevertheless, foreign shares are typically far cheaper.

Domestic-only shares (known as A shares) are listed in either Shanghai or Shenzhen; foreign-only shares are listed in Shanghai or Shenzhen (B shares), or in Hong Kong (H shares). For H-share companies, the domestic A share generally trades in Shanghai; otherwise, the A and B shares trade in the same market. In 1997, about 90 companies had both a domestic and a foreign class of shares. Foreigners cannot legally purchase domestic-only shares; domestic residents cannot legally purchase foreign-only shares, or, given China's capital account restrictions, generally invest in assets abroad.[1]

Figure 1 shows the average relative price paid by foreigners in the three markets. Although at times there have been wide differences across markets, by late 1997 and early 1998 foreigners in all three markets typically paid less than one-quarter the price paid by Chinese residents for the corresponding share. China thus contrasts with most markets with investment restrictions, where foreigners pay a premium.[2]

Domestic share prices have also tended to be much more volatile, as shown in Table 1 and Figure 2. Stocks in most emerging markets are volatile, but the difference in volatility between two seemingly similar assets is striking. In Shanghai and Shenzhen, for example, A-share prices have daily standard deviations of around 3-1/4 percent, compared with about 2 percent for B-shares. The difference is particularly pronounced before 1996. Figure 2 shows that volatility has been more similar since late 1996, reflecting in part (though not completely, given the timing) foreigners' response to the mid-1997 Asian financial crisis.

In this paper, we interpret the generally higher level and volatility of domestic prices in terms of the standard dividend-discount model. We do not test a specific asset pricing model that might account for differences in shareholders's expected returns. However, the framework is sufficiently general to incorporate

[1] Although many markets have restricted foreign ownership, China differs in that *both* classes of shares are restricted. In 1994, only China and the Philippines restricted foreigners to special classes of shares (IFC 1995); by 1996, only China did so (IFC 1997). Claessens and Rhee (1994) provide an overview of investment restrictions.

[2] On the typical foreign "premium," see, for example, Hardouvelis, La Porta, and Wizman (1994), Domowitz et al. (1997), and Bailey and Jagtiani (1994). On the Chinese foreign discount, see, for example, Barings (1992), Bailey (1994), and the World Bank (1995).

any such explanation, yet specific enough to offer sharp insights. For example, the four-fold difference in share prices implies about a 4 percentage point difference in expected rates of return by foreign and domestic investors in this model, an amount we argue is plausible. The difference in expected returns also tends to imply the observed higher volatility of domestic shares: If domestic residents discount the future at a lower rate than foreigners, domestic prices respond proportionately much more to news about the future.

We discuss several reasons why Chinese investors may have lower expected rates of return than foreigners, arguing that this is plausibly due to a lack of alternative investments. The main alternative to stocks in China is bank deposits, since financial markets are poorly developed and Chinese capital controls make it difficult to invest overseas. These deposits tend to pay interest rates below world levels. In addition, we argue that Chinese investors may have a low equity premium, because stocks offer one of the few opportunities available to diversify their investments at all.[3]

We then look at a panel of companies with domestic and foreign shares, from 1993 through 1997, and estimate how various company characteristics (that may proxy for expected returns and dividend growth) affect share prices. We find, for example, that foreigners pay a lower price relative to the domestic price for small firms and for firms with greater state ownership, and that this is due to both foreign and domestic investors paying *higher* prices for small firms and firms with a higher share owned by the state.

Finally, we attempt to explain why the relative prices paid by foreigners have sometimes differed substantially across markets. Figure 1 shows that from late 1993 to mid-July 1995, Hong Kong H shares typically traded close to parity, and sometimes well above that. Although it seems plausible that foreign investors might have preferred trading in the larger, more transparent, and more liquid Hong Kong market, we find no evidence that foreigners paid higher absolute prices for H shares. Instead, the higher relative prices paid by foreigners in Hong Kong and Shenzhen over this period largely reflected the sharp declines in domestic share prices in Shenzhen, and for firms that had foreign H shares. The H-share results are particularly puzzling, since the domestic A share traded in Shanghai in any case. We are unable to identify characteristics of companies with H shares that explain why Chinese investors might have found them riskier or otherwise "disliked" them.

[3] Gordon and Li (1998) present a model of financial repression in which the government chooses to keep Chinese interest rates low as a form a taxation. Their model is one way of rationalizing our findings here.

I. How Puzzling are the Relative Foreign-Domestic Share Price Movements?

In this section we explore how the pricing differences displayed in Figure 1 might arise. First, we discuss institutional details that limit arbitrage.[4] Second, calibrating the simplest asset-pricing model, we find that a four-fold difference in share prices is consistent with foreigners expecting returns four percentage-points higher than domestic residents. This model also predicts that domestic shares should tend to be more volatile than foreign shares. Third, we discuss reasons why such differences in expected returns are plausible.

A. Arbitraging Price Differences is Difficult

Foreign shares are generally allowed to constitute no more than 49 percent of a company's total shares. In reality, they average about one third. The majority of domestic shares are non-traded shares owned by the state or by other companies, so fewer than half of all shares are tradeable.[5] Most traded A shares are held by small retail investors, since there are few large Chinese institutional investors; by contrast, foreign investors tend to be institutional investors such as mutual funds.

Why don't individuals try to arbitrage pricing differences between A and B shares? Over time, Chinese authorities have varied the strictness with which they enforce restrictions on ownership, and anecdotal evidence suggests that domestic residents can open foreign-share accounts relatively easily.[6] Nevertheless, a wide pricing gap remains. Chinese investors presumably fear that authorities will tighten restrictions in the future, and perhaps expropriate illegally purchased shares. Thus, prices cannot be arbitraged without risk, given the institutional features of the market.

Why don't companies arbitrage pricing differences by issuing only the higher-priced A shares? First, Chinese companies need government approval to list, a highly political process subject to aggregate quotas that generally bind for A shares. (The approval process also tends to be slow for B shares, since issues require greater disclosure; see World Bank (1995) and Xu and Wang (1997)) Second, firms may want the foreign exchange. Third, B-share companies are technically joint-ventures, with some tax advantages. Finally, the revenue difference may be small, since authorities severely restrict the prices of A-share IPOs.[7] [8]

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[4]Institutional details are constantly evolving. Our discussion is accurate as of 1999.

[5]Fan (1997) reports that in Shanghai, state ownership averaged 42 percent of shares outstanding for companies with B shares, and 35 percent of shares for companies without B shares.

[6] Several analysts in Shanghai estimated to us in conversation that domestic residents account for perhaps 40 percent of ownership of, and 60 to 80 percent of trading in, B shares.

[7] Su and Fleisher (1997) find that on the first day of trading, A-share prices typically rise about 11-fold relative to the IPO price; B shares typically rise about 1-1/2 fold. IPOs worldwide tend to be underpriced, but the A-share

B. Rationalizing Relative Share Prices in a Simple Asset Pricing Model

We now analyze relative share prices and volatilities using Gordon's (1962) simple asset pricing model, where differences in the level and volatility of prices reflect differences across investor groups in the expected returns used to discount future dividends. The model is sufficiently general that we need not specify why expected returns differ (the next subsection discusses plausible reasons), yet it remains simple enough to provide sharp insights.[9] This section and Section II focus primarily on time series implications, while Section III explores cross-sectional implications, using a panel of Chinese companies.

The price of a stock equals the present discounted value of future dividends. Suppose dividends D_t are expected to grow at constant rate g, and are discounted at constant expected rate of return r. Also, let k equal the ratio of dividends to earnings E_t. Then $P_t = D_t \int_0^\infty e^{gs} e^{-rs} ds = \frac{D_t}{r-g} = k \frac{E_t}{r-g}$.
If r and g are not in fact constant over time, one should interpret them as appropriate "average" values over the future.[10] Uncertainty is implicitly incorporated as an equity risk premium in the required return r. We will generally interpret r and g as real.

In this simple model, then, the domestic share price is:

$$P_{At} = k \frac{E_t}{r_A - g} \tag{1}$$

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underpricing is exceptional. The underpricing ensures considerable enthusiasm for new share issues; in addition, Basu and Li (1997) argue that IPO underpricing provides a means of transferring resources to government officials.

[8] Stulz and Wasserfallen (1995) argue that revenue-maximizing firms may choose to price discriminate between foreign and domestic investors if these groups have different elasticities of demand for shares. To explain a four-fold difference in price, however, their model requires very extreme departures from the usual perfect-markets assumption of an infinite elasticity of demand. For example, one can show that their equation (1) would imply a domestic-investor elasticity of demand of *at most* 4/3 (and less, if the foreign elasticity of demand is finite). Of course, restrictions on domestic issue prices make the relevant price ratio somewhat smaller, perhaps allowing more reasonable elasticities. For our purposes, Stulz and Wasserfallen provide one story for why expected returns may differ.

[9] Fernald and Rogers (1998), for example, discuss a consumption CAPM. Although simple, the model is complicated enough that it provides few sharp insights, and would be difficult to test because of the limited availability and dubious quality of Chinese macroeconomic data. Other more fully specified models suffer the same problems.

[10] If dividends do not grow exponentially, then the approximate "average" growth rate g depends on discount rates r. Hence, differences in expected returns imply differences in average g. But simulations confirm the robustness of the basic conclusions to follow—the model may approximate prices poorly, yet still capture much of the four-fold difference in prices. Similarly, the model approximates prices reasonably well if r and g are stochastic. Campbell and Shiller (1988) generalize this model by explicitly allowing time variation in expected returns and growth rates. Unfortunately, their approximation does not provide tractable insight into relative A- and B-share prices, since it depends on dividend-price ratios, which differ between A and B shares.

Including exchange rate changes in the foreign expected return r_B, the renminbi price of a foreign share is[11]:

$$P_{Bt} = k \frac{E_t}{r_B - g} \tag{2}$$

The relative price paid by foreigners averaged about 1/4 in early 1998. We can write this relative price as:

$$\frac{P_B}{P_A} = \frac{r_A - g}{r_B - g} \approx \frac{1}{4} \tag{3}$$

The earnings-price ratio, E/P, equals (r-g)/k. Hence, it follows that:

$$r_B - r_A = k\left[\frac{E}{P_B} - \frac{E}{P_A}\right]. \tag{4}$$

In early 1998, the median domestic earnings-price ratio was about 0.025 and the median foreign earnings-price ratio was about 0.10.[12] Hence:

$$r_B - r_A = 0.075k \tag{5}$$

In our sample, the dividend-payout ratio k averaged about 0.5 over the period 1993-1996. Taking 0.5 as the appropriate long-run average ratio, equation (5) implies that the required return differential was 0.375. Thus, a difference in expected returns of slightly less than 4 percent is consistent with the four-fold difference in prices between foreign and domestic investors. This finding is reassuring, since it seems plausible that a full asset-pricing model—one that seeks to explain r rather than simply taking it as given—can explain a 4 percentage-point difference in required rates of return across investor groups.

What can we say about volatility? In logs, the model implies:

$$\ln P = \ln D - \ln(r - g) \tag{6}$$

We will take the initial level of dividends (and earnings) as fixed, and consider fluctuations in r and g. (Conceptually, we take initial dividends and earnings as history, so that at a point in time, the expected

[11] Foreign shares are priced in foreign currency—U.S. dollars in Shanghai and Hong Kong dollars in Shenzhen and Hong Kong. Consider a U.S. investor in Shanghai who cares about foreign-currency returns. Let e represent the renminbi/$ exchange rate, so that $\dot{e}/e$ equals the expected rate at which the renminbi *de*preciates. If P_{Bt} is the foreign price in renminbi, then P_{Bt}/e is the dollar price. Suppose foreigners require a rate of return $\tilde{r}_B$. Then the foreign price is $P_{Bt}/e_t = k(E_t/e_t)/(\tilde{r}_B - (g - \dot{e}/e))$. Since g equals the growth rate of renminbi dividends, (g-$\dot{e}$/e) is the growth rate of dollar dividends. Equivalently, we can think about foreign investors discounting the stream of renminbi dividends at an exchange-rate-adjusted rate of return r_B, defined as ($\tilde{r}_B$+$\dot{e}$/e). The expression in the text follows directly.

[12] See the Appendix. Note that with multiple stocks, the ratio of domestic to foreign earnings-price ratios (whether calculated as a median or as total market earnings over total capitalization) need not match the market-average relative prices in Figure 1. Nevertheless, the calibrations are suggestive.

growth rate g incorporates expectations about growth from the previous period to the current date). More generally, equation (6) implies that the relative standard deviation of P_A and P_B is:[13]

$$\frac{Std.Dev.(d\ln P_A)}{Std.Dev.(d\ln P_B)} \approx \left(\frac{P_A}{P_B}\right)\cdot\left(\frac{Var(dg) + Var(dr_A) - 2Cov(dg, dr_A)}{Var(dg) + Var(dr_B) - 2Cov(dg, dr_B)}\right)^{1/2} \tag{7}$$

Suppose the only shocks are to the growth rate, dg. Since domestic prices are about four times higher than foreign prices, (7) implies that A-share volatility would then also be about four times higher. If there are also shocks to required returns, dr_A and dr_B, but these shocks have the same variance and are uncorrelated with shocks to the growth rate, then again domestic prices should be about four times as volatile as foreign prices.

The data are reasonably consistent with these predictions about volatility. Consider Shanghai. From Figure 1, A-share prices have typically been two- to four- times higher than B-share prices. Table 1 and Figure 2 show that A-share standard deviations have tended to be several times higher than B-share standard deviations, particularly before 1996.

If anything, however, relative standard deviations have tended to be *closer* than expected, given the large difference in relative prices. Equation (7) suggests that the reason for this must be that either the variance of dr_B exceeds that of dr_A, or that dg and dr_A covary positively. What is the evidence on these two possibilities? After mid-1996, two events made foreign required returns particularly volatile: speculation about enforcement of ownership restrictions and the Asian financial crisis. Press reports suggested that Chinese investors began investing heavily, though illegally, in B shares at that time. In December 1996 and May 1997, Chinese authorities imposed several new restrictions to control "excessive" speculation. Changes in willingness to hold B-shares illegally are like shocks to r_B. New policies also restricted bank lending for stock investment, thereby affecting domestic investors' ability to invest in all stocks, including foreign stocks. In addition, the Asian financial crisis in mid-1997 appeared to raise the risk premium demanded by foreign investors. Foreign share prices fell sharply—by mid-1998, they were less than half their mid-1997 levels. Because domestic shares were virtually unaffected, the relative price fell considerably. The 1997 peak in relative prices was around one-half (larger in Hong Kong, smaller in Shanghai). With earnings-price ratios of about 0.05 for foreign shares and 0.025 for domestic shares, equation (4) implies that the difference in

[13] Equation (7) assumes that relative prices are unchanged by shocks to r and g, which they are not. Simulations confirm that for small shocks, this equation is approximately correct.

expected returns was only about 1-1/4 percent. This suggests that the Asian crisis widened the difference in expected returns by about 2-1/2 percentage points.

A final time series implication is that there is no reason to expect P_A and P_B to be cointegrated, even though they both represent valuations of the same dividend stream. Of course, if all shocks were to g, they probably would be cointegrated. But shocks to r_A and r_B move P_A and P_B differently; unless these shocks are stationary, the prices will *not* be cointegrated. Also, the relative price P_B/P_A should have a unit root, since even shocks to g affect it. Hence, unless shocks to g, r_A, and r_B are stationary, the relative price will have a unit root. (If shocks to g, r_A, and r_B were stationary, then P_A and P_B would both be trend stationary.)[14]

II. Why Are Domestic Expected Returns Lower?

Models of asset pricing suggest several reasons why domestic and foreign expected returns might differ. First, and perhaps most important, since Chinese investors have few investment alternatives, they likely have a low required rate of return. In a CAPM, for example, a lack of investment alternatives suggests a low risk-free rate. In China, the main alternatives to the stock market are bank deposits and saving bonds, and neither has a market-determined interest rate. Gordon and Li (1998) argue that, with a closed capital account, the Chinese government effectively "taxes" Chinese savers by setting interest rates below world levels. Since China's tax system works poorly, the government may rely heavily on this saving tax, and hence set an interest rate well below world levels. In other words, China engages in financial repression. Chinese investors may find it worthwhile to save, despite low interest rates, particularly given an aging population with limited pension coverage and substantial uncertainty associated with economic reforms.

From mid-1993 until 1996, China indexed rates for long-term savings deposits and bonds (with maturities of three years or longer) to inflation, thereby guaranteeing a real return of about zero; non-indexed real returns were substantially negative during this period. Suppose we take zero to be the correct "risk-free"

[14] We tested for cointegration and unit roots using roughly four years of daily price data for each of our 57 companies described in Section II. We ran augmented Dickey-Fuller (1979) tests for a unit root in the relative price series and Engle-Granger (1987) tests for cointegration between A- and B-share prices. We reject the null of a unit root in the relative price 2 times at the 1 percent level, 5 times at 5 percent, and 10 times at 10 percent. We reject the null of no cointegration 4, 7, and 13 times at the 1, 5, and 10 percent levels, respectively. We therefore reject about twice as often as expected at 5 and 10 percent. However, given concerns about the size of these tests (Stock, 1994), the results appear consistent with the model's implication of no cointegration and a unit root in the foreign relative price.

rate in China. Since the real return on U.S. Treasuries was around 3 percent, this difference could explain much of the gap in expected rates of return.

Second, the risks for a foreign investor in China seem largely idiosyncratic, while the risks for a domestic investor seem more systematic. That is, shocks to Chinese stock returns that reflect economic and political events should have a low correlation with foreign consumption opportunities and a relatively high correlation with Chinese consumption opportunities. So one might expect that Chinese investments should be a better source of diversification for foreigners than for domestic residents. Nevertheless, the supply of Chinese equities is severely limited, so Chinese investors may find that stocks offer one of the few opportunities available to diversify their investments at all. Hence, they may not require much of an equity premium. After all, China's stock market is still relatively small—stock market float of about $70 billion (end-1997) amounts to only about 6 percent of the value of total bank deposits, compared with 300 percent in the United States. In addition, Bailey (1994) argues that since many foreign investors in China are from Hong Kong, China risk is, in fact, systematic for them. Although diversification considerations suggest these investors should invest in, say, the United States, they may nevertheless invest in China because they have better information about companies and the market.

Third, foreign investors may require a high rate of return to be compensated for exchange-rate risk, since an expected depreciation raises foreigners' yuan-denominated required return. (Equivalently, an expected depreciation lowers expected growth g in dollar terms).

Fourth, if low turnover makes trading difficult, investors may require a liquidity premium. The problem may be more severe for B-shares. Each stock tends to have small capitalization, so a big order sometimes leads to a large change in price. Institutional investors, who tend to hold large blocks of shares, often cite liquidity as a problem (See the World Bank, 1995.)

Finally, it is well known that investors do not diversify internationally anywhere near as much as asset-pricing models predict (e.g., Tesar and Werner, 1997). The required return for foreigners incorporates transactions costs, barriers to cross-border investment, information asymmetries, and any assessment that Chinese reforms will be reversed or that investments will be expropriated.[15]

[15] Of course, if reforms reverse, that affects both the foreign and domestic investors. Risk of expropriation, again, matters to the extent that it differs for foreigners and domestic residents. Chiu and Kwok (1998) argue that foreign investors in China have *better* information than domestic investors because of restrictions on the Chinese press.

Together, these considerations suggest that a 4 percentage-point difference in expected rates of return between foreign and domestic residents is plausible. Hence, the fact that foreigners pay a lower price—and that foreign shares are typically less volatile—appears reasonable, if surprising.

III. Econometric Results from a Cross Section of Chinese Companies

Although foreign investors almost always pay less than Chinese investors, there are nevertheless substantial cross-company differences in the relative price paid by foreigners. We now explore these cross-company differences econometrically, using the Gordon pricing model from Section I as an organizing framework. We analyze a panel of annual data from 1993 to 1997 for 57 companies with both domestic and foreign shares, including all companies with both a foreign and domestic class of shares as of mid-1994. Appendix A describes our data and provides summary statistics.

The Gordon model suggests that a share's foreign relative price should depend on its expected growth rate g_i, and on the returns that foreigners and domestic residents expect to receive from holding shares in those companies, r_{Ai} and r_{Bi} . Although we do not directly observe each company's g_i, r_{Ai}, and r_{Bi}, various company characteristics that are observed may provide reasonable proxies for them.[16] We use these proxies in regressions with the following dependent variables: (i) the relative price, P_{Bi}/P_{Ai} (ii) A-share earnings-price ratios, (iii) B-share earnings-price ratios, and (iv) the difference in earnings-price ratios, $(E_i/P_{Ai} - E_i/P_{Bi})$. The first regression relates the relative price to these proxies; the second and third regressions indicate whether the relationship works through the domestic or foreign absolute price (as scaled by earnings). The fourth regression will also help us sort out why various proxies are, or are not, correlated with relative prices.

The Table below summarizes how the Gordon model predicts these four dependent variables should depend on g_i, r_{Ai}, and r_{Bi}, and also shows the sign of the derivative with respect to g_i, r_{Ai}, and r_{Bi}:

Consistent with this argument, they find that B-share prices tend to lead A-share prices. Dabora (1996) discusses (and dismisses) political, legal, exchange-rate, accounting, tax, and control considerations for the relative prices.

[16]Obviously, we are not trying to "test" the Gordon dividend-pricing model, since our entire discussion assumes the model is correct. Indeed, given the lack of direct measures of expected returns and growth rates, we could never reject the model, since one can always argue that our proxies are imperfect. Rather, the cross-sectional implications of the model provide a useful organizing framework for thinking about what factors the relative price should depend upon; we expect these implications will hold in other models, as well. Formal asset-pricing models suggest factors that should affect expected returns, and provide testable implications.

		Dependent Variable			
		P_B/P_A (1)	E/P_A (2)	E/P_B (3)	$E/P_A - E/P_B$ (4)
(a) Value in Gordon model		$\frac{r_A - g}{r_B - g}$	$\frac{1}{k}(r_A - g)$	$\frac{1}{k}(r_B - g)$	$\frac{1}{k}(r_A - r_B)$
Sign of Derivative with Respect to:					
(b)	g	-	-	-	0
(c)	r_A	+	+	0	+
(d)	r_B	-	0	+	-
(e)	k	0	-	-	+

One implication of the Gordon model is that high growth companies should have low foreign relative prices, as indicated by the negative sign in row (b). Both foreigners and domestic residents value high-growth companies–which should thus have low earnings-price ratios, as shown by the negative sign in columns (2) and (3) of row (b)--but the future dividends are valued proportionately more highly by domestic Chinese residents, because they discount the future at a lower rate. Although proxies for *g* are thus correlated negatively with the *ratio* of earnings-price ratios, as in column(1), they should nevertheless be uncorrelated with the *difference* in earnings-price ratios, as suggested by the zero in column (4).

Before presenting more fully-specified regressions, we provide evidence that companies with high expected growth do indeed have lower foreign relative prices. Assuming that high-growth companies have low earnings-price ratios, we test whether δ_B is positive in the following panel regression: $P_{Bit}/P_{Ait} = c + \delta_B(E_{it}/P_{Bit})$. Since P_B is on both sides of the regression, δ_B is biased downwards, against the prediction of our model (reflecting, for example, that higher r_B lowers P_B/P_A but raises E/P_B). Despite this bias, the coefficient estimate is 0.86, with a t-statistic of 3.6–strongly supporting the high-growth-low-relative-price prediction. (Using E/P_A gives even stronger results, but that coefficient is biased in our favor.) Thus, the data appear consistent with the hypothesis that high-growth companies have lower relative prices.

A second implication, shown in row (c) of the table above, is that proxies for domestic expected

returns r_{Ai} should be positively correlated with the foreign relative price. Higher r_{Ai} lowers the domestic price (and raises E_i/P_{Ai}, as shown in Column (2)) while leaving the foreign price unaffected, other things equal. Similarly, from row (d), proxies for foreign expected returns r_{Bi} should be negatively correlated with foreign relative prices, since they reduce foreign prices and raise foreign earnings-price ratios.

A third set of implications, shown in row (e), concerns the payout rate *k*. First, *k* should have no correlation with the relative price paid by foreigners, since it affects foreign and domestic prices equally. Second, given that higher payout rates imply faster and larger dividend flows for given earnings flows, thereby raising the share price, *k* should be negatively correlated with earnings-price ratios. Finally, *k* should be positively related to the difference in earnings price ratios, as shown in column (4).[17]

The challenge in testing these cross-sectional implications is to find suitable proxies for expected returns and growth rates. Earnings-price ratios helped us to confirm the implication that high growth companies have low foreign relative prices; but since expected returns and growth rates both affect the earnings-price ratio, it does not generally help us identify their separate effects. Hence, we do not use them further in our econometric work.

Instead, we draw on recent empirical finance literature, which relates realized returns to company and share characteristics such as capital-asset-pricing-model (CAPM) betas, company size, and share turnover. If expectations are not systematically biased, these variables are correlated with *realized* returns only if they are correlated with *expected* returns. If they are correlated with expected returns, they should then be correlated with our dependent variables.

In the CAPM, beta fully captures the expected excess return on a stock. However, other variables often appear to have more robust explanatory power for expected returns than beta.[18] For Chinese investors, stock-market betas are even less likely than usual to be correlated with a stock's expected return, since the small stock market proxies poorly for total wealth. Among U.S. firms, large firms appear to have lower expected returns (see, for example, Fama and French, 1992), perhaps because they are for some reason less risky (although Daniel and Titman (1997) argue that the data do not support this interpretation). If a stock is

[17]Note that the derivative is $-(r_{Ai} - r_{Bi})/k^2$, which is positive because $(r_{Ai} - r_{Bi}) < 0$.

[18] For example, in U.S. data, Fama and French (1992) find little role for beta; Kothari, Shanken, and Sloan (1995) do. In emerging markets, Rouwenhorst (1998) finds no role for beta; Claessens, Dasgupta, and Glen (1995) do. Most of these studies find that size is negatively related to returns.

illiquid, investors may require a liquidity premium.

Our approach focuses on explaining relative prices—not simply realized returns—so variables can matter in our regressions if they proxy for either expected returns *r* or expected growth *g*. In interpreting our results, it is thus important to keep in mind that variables such as beta that proxy for *r* might also proxy for *g*. For example, La Porta (1996) finds that small, high-beta U.S. companies tend to have higher expected-earnings growth, as measured by analysts forecasts. Our final regression, for $\left(E_i / P_{Ai} - E_i / P_{Bi} \right)$, should help identify that case, since only expected returns, not expected growth rates, should explain that difference.

We also consider additional variables. Firms with a high proportion of shares owned by the state may differ in expected growth or in their risk characteristics. Export-oriented firms may offer shareholders a hedge against currency depreciation and also provide Chinese investors a way to diversify away from China. Other company characteristics, such as industry, may also proxy for riskiness or expected growth.

Specification 1

The first column of Table 2 relates the relative price to year dummies (not shown), dummy variables for market location, and two interaction dummy variables: a Hong Kong dummy for the two years 1994-95 and a Shenzhen dummy for 1994-95.[19] The results capture the essence of Figure 1. The constant term shows the mean relative price in Shanghai for 1997, where B-shares typically traded at about 25 percent of the domestic price. The relative price tended to be higher outside Shanghai, by about 15 percentage-points in Shenzhen and 29 percentage-points in Hong Kong. In 1994 and 1995, the Shenzhen and Hong Kong differences were even larger, as shown by the interaction dummies. The adjusted R^2 indicates that market location and time dummies explain more than half of the variation in relative prices across firms.

Columns 2 and 3 show the corresponding earnings-price regressions. Compared with Shanghai, companies in Shenzhen or with Hong Kong H shares had higher earnings-price ratios for both domestic and foreign investors, although the difference is not significant for foreign investors in Hong Kong. One might have expected foreign investors to prefer stocks with foreign listings in the larger, better regulated, and more liquid Hong Kong market, leading to lower earnings-price ratios, but the data do not support this hypothesis.

Strikingly, the 1994-95 Hong Kong and Shenzhen interaction dummies are positive and significant in

[19] Note that the Hong Kong dummy reflects the location of the *foreign* listing, since the domestic listings for H shares are in Shanghai. For simplicity, we refer to companies with Hong Kong H shares as "Hong Kong" companies, even though they are Chinese companies with domestic listings in Shanghai.

the A-share earnings-price regression (column (2)), but insignificant (though negative) in the B-share regression (column (3)). Hence, the high relative price paid by foreigners for Hong Kong and Shenzhen companies primarily reflected the *low* price paid by Chinese residents, rather than the high price paid by foreigners. This low Chinese price appears to reflect a higher expected return r_{Ai} rather than a lower growth rate g_i, since a lower growth rate would reduce the B-share price (thereby raising E_i/P_{Bi}), which it does not. Column (4), which uses the difference in earnings-price ratios as the dependent variable, also suggests that the 94-95 dummies reflect a difference in expected returns.

The time series of prices in Figures 3 and 4 show graphically the point that the high foreign relative prices primarily reflected the low price paid by Chinese residents. Figure 3 plots three foreign-only China indices as well as Hong Kong's Hang Seng index. All three foreign indices move closely together. Hence, the divergence in relative prices across markets that opened up in late 1993, and largely disappeared by 1996, did not reflect movements in foreign prices. Instead, as the top panel of Figure 4 shows, movements in domestic share prices explain the Shanghai-Hong Kong divergence. A domestic share index for Shanghai companies with B shares, labeled AB, moves closely with the broader Shanghai A-share index, but a domestic index for companies with Hong Kong H shares (labeled AH) substantially underperformed from mid-1993 to mid-1994. (Appendix A describes how we constructed these sub-indices). Similarly, comparing the top and bottom panels of Figure 4 shows that the increasing Shenzhen foreign relative price in 1994 reflects the poor performance of the Shenzhen A index relative to the Shanghai A index.[20]

The finding that Chinese investors required a larger expected return in Shenzhen could simply reflect a market effect—for example, transactions costs, taxes, or regulations could have made Shenzhen less desirable than Shanghai for Chinese investors. By contrast, the result that Chinese investors disliked stocks with foreign listings in Hong Kong or Shenzhen in 1994 and 1995 is more surprising. After all, for Hong Kong H shares, the domestic A shares trade in the same Shanghai market as the companies with a Shanghai

[20] A-share prices fell nearly 80 percent from their peak in February 1993 to their trough at the end of July 1994. At the beginning of August 1994, the Chinese authorities announced that there would be no new issues of A shares that year. The announcement set off a speculative boom in the A share market, which more than tripled between the beginning of August 1994 and the middle of September 1994. (About $1 billion in listings were postponed; between the end of July and mid-September A-share market capitalization rose from $23 billion to $65 billion.) This kind of episode gives rise to the widely held view among analysts in Hong Kong and Shanghai that the A-share market is a speculative casino, divorced from fundamentals. By contrast, we interpret the results in later regressions as suggesting that despite the substantial speculative element, prices do, to some extent, reflect fundamentals.

foreign B share, so it is not simply a market effect.

A plausible hypothesis is that Chinese investors disliked the *kinds of companies* with foreign listings in Hong Kong, rather than simply the fact that companies had a foreign listing there. For example, our sample of nine H-share companies disproportionately represent utilities and heavy industry; perhaps Chinese investors found those companies more risky–with a higher expected return–during the beginning of the cyclical downturn that began around 1994. In the specifications that follow, we attempt to control for various company characteristics that might be associated with pricing differences.

Specification 2

The second set of regressions of Table 2, in columns (5) to (8), add CAPM betas and the dividend-payout ratio.[21] As expected, the payout ratio has the expected negative sign in both the A- and B-share earnings-price regressions: increasing the payout rate by 1 percentage point reduces the A-share earnings-price ratio by about 0.6 percentage-points (significant at the 90 percent level), whereas it reduces the B-share earnings price ratio by about 1.8 percentage-points (significant at the 99 percent level). These two effects roughly cancel out in explaining the relative price, where the (negative) effect is not statistically significant. As predicted, the payout ratio is positively (and significantly) associated with differences in earnings-price ratios in column (8).

In many markets, we expect mature firms to have high payout rates but also low expected growth *g*. Then the dividend-payout rate might proxy for expected growth g. This effect implies that high payout rates should be associated with high earnings-price ratios—opposite to what we find. High payout rates should also be positively correlated with the foreign relative price—again, opposite to what we find. Hence, the growth-signaling effect of dividends is probably not too important in our sample.

Now consider the coefficients on beta. We estimate foreign betas relative to the MSCI global index and domestic betas relative to the corresponding domestic index, using 5-day differences in the log of prices. We calculate a separate beta for each year. All results are virtually unchanged when we use 10-day betas or using the sample-average weekly beta. As expected, β_B has a positive and statistically significant effect on

[21] We use the full-sample average payout rate. In principle, we should multiply *E/P* by the payout rate *k*. However, we prefer to enter *k* as a separate linear regressor, since observed values of the dividend-payout ratio measure the true long-run ratio imperfectly. Fewer than half the firms paid a cash dividend each year, and 9 of the 57 companies have never paid a cash dividend. Using *kE/P* as the independent variable, for companies where *k* is non-zero, has no qualitative effect on results that follow.

the foreign earnings-price ratio, and a negative and significant effect on the difference in earnings-price ratios.

By contrast, β_A enters the domestic earnings-price regression significantly *negatively*, implying that domestic investors pay *higher* prices for riskier companies. If this higher price reflected a lower required return r_A–contrary to the CAPM–then β_A should also be negatively correlated with the difference in earnings-price ratios in column (8). However, as seen in table 2, the effect is positive.

The anomaly posed by the negative estimate on β_A in the earnings-price regression probably reflects the fact that high-beta companies are also high-growth companies. To test this explanation, we added β_A to the B-share E/P regression from the previous column. If β_A proxies for unobserved growth g, then it should enter the B-share regression negatively. In regressions not shown, it indeed does, with a coefficient of -6.3 (percentage points), and a t-statistic of -2.6. Other variables in the regression are virtually unaffected.

If β_A proxied for growth alone, then it should be negative—not positive, even if insignificant— in the relative price regression, and would not be significant in the regression in column (8). Hence, it appears that β_A is positively associated with both r_A and g.

At least two anomalies remain. First, betas and payout ratios do not explain why Hong Kong and Shenzhen companies have higher foreign relative prices, especially in 1994 and 1995. Second, β_B is positive and significant in the relative price regression in column (5). However, β_B is positively correlated with the foreign earnings-price ratio, and hence negatively with the foreign price. In the next specification, we add additional proxies that may help account for these anomalies.

Specification 3

Table 3 adds additional company-specific proxies for risk and growth, which could help control for the extent to which β_A and β_B proxy for growth g or factors that affect expected returns. These variables could also capture company characteristics correlated with market location, thereby explaining why Chinese investors paid less in 1994 and 1995 for companies with foreign listings in Hong Kong.

In particular, we add the following five variables: a dummy variable for whether the firm exports a high share of its output, **export**; the percentage of total shares owned by the state, **% state-owned**; (one period lagged) **sales**, as a proxy for size[22]; **turnover**, defined as the average ratio of daily trading volume to

[22] We use sales rather than market capitalization to minimize problems of endogeneity. If, for example, a firm's A-share price is high (and hence, the earnings-price ratio is low) for reasons unrelated to size, that will increase

shares outstanding; and observed **sales growth** from 1993-1997. Sales and turnover have different values each year; the export dummy, percent state-owned, and growth rate of sales are taken to be constant over time. Results appear strongest for **% state owned**: Foreigners pay lower relative prices for firms with a higher share owned by the state. Strikingly, the lower foreign relative price reflects higher prices paid by (i.e., lower earnings-price ratios for) domestic investors, rather than lower absolute foreign prices. Indeed, the third column shows that foreigners pay higher prices for firms that have a higher share owned by the state.

Why do all investors pay higher prices for companies with a higher share owned by the state? According to the Gordon model, either expected returns on these companies are lower or their expected growth is higher. The results in column (4) may give some clues, since proxies for expected growth should not explain the *difference* in earnings-price ratios. The t-statistic of 1.7 on **% state-owned** is (barely) significant at the 10 percent level, suggesting that differences in expected returns play a role. That is, it appears that foreign expected returns fall relative to domestic expected returns as the state share rises. Even if there are no differences in growth rates across companies, a larger decline in foreign than domestic expected returns could be consistent with the observed decline in the foreign relative price, since the relative price depends on $(r_A - g)/(r_B - g)$, and the numerator goes to zero more quickly than the denominator.[23] However, the expected growth rates may also be higher for companies with a larger state share, even if that does not appear to be the entire story.

The state share is probably highest in restructured state-owned-enterprises (SOEs), and SOEs are usually considered poor performers, in part because of poor corporate governance. Xu and Wang (1997) find that listed companies with high state-ownership share tend to have low labor productivity, suggesting poor current performance. However, although these SOEs may be poor performers with low current earnings, investors may expect performance to improve after listing, so they pay high prices relative to current earnings. In other words, there is so much room for improvement that these are regarded as high g companies.[24] Moreover, firms with higher state ownership may also have better political connections,

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capitalization, giving rise to a spuriously negative relationship.

[23] A numerical example may help. Consider two companies with g = 4. Suppose company A, which has a low state share, has r_B=10 percent and r_A=6 percent. Then P_B/P_A equals 1/3, and (E/P_A-E/P_B) equals -4 percent. Suppose company B, which has a high state share, has r_B=8 percent and r_A=5 percent–i.e., the state share has twice as large an effect on the foreign expected return. Then P_B/P_A falls to 1/4, and (E/P_A-E/P_B) rises to -3 percent.

[24] We thank John Campbell for suggesting this interpretation.

ensuring access to various forms of financial or other support, reducing the risk premium associated with these firms. Alternatively, the state may simply tend to keep a higher share in better quality companies, for which investors pay more (lower required returns or higher expected growth). Given that %state-owned enters the regression for the difference in earnings-price ratios positively (see column (4)), it must be the case that foreign investors value these connections–or better quality of the companies–more than domestic investors.

Qualitatively, **export** shows the same pattern as the state share–i.e., negatively correlated with the foreign relative price and with earnings-price ratios, and positively correlated with the difference in earnings-price ratios. However, the results are weak–the coefficient is statistically significant only for the domestic earnings-price ratio. Not surprisingly, export orientation appears more important for domestic residents than foreigners. For foreigners, exports may help hedge against exchange-rate depreciation (reducing r_B), but also may reduce diversification benefits (raising r_B). By contrast, for domestic residents these firms should unambiguously have a lower domestic r_A and higher domestic price, since exporting firms allow Chinese residents to hedge somewhat against depreciation *and* diversify outside China.

Results for the **sales** variable indicate that foreigners pay a statistically significantly higher relative price for larger firms. Larger firms also have significantly higher domestic earnings-price ratios—i.e., lower prices; the effect on foreign earnings-price ratios is not significant. Hence, the higher relative price reflects the fact that the proportional effect on the domestic price is larger. The effect on domestic prices could reflect higher domestic expected returns for large firms. However, it is unclear why large firms should have higher expected returns, given the evidence from other markets (discussed earlier) suggesting that large firms usually have *lower* expected returns. Larger size could instead proxy for lower expected growth g, since low-growth firms should have higher foreign relative prices; possibly the lack of effect on foreign prices reflects an offsetting size effect on expected returns (i.e., large firms have lower r_B as well as lower g).

The World Bank (1995) argues that B-share liquidity is very poor, so that foreign investors may require a liquidity premium. Table 3 shows that daily **turnover** in the foreign market is never economically or statistically significant, suggesting that liquidity is not important in explaining B-share prices. Of course, if low liquidity raised all foreign earnings-price ratios equally, we might not detect its effect. Nevertheless, our results are consistent with the comparable levels of earnings-price ratios in Shanghai's B-share market

and Hong Kong's seemingly much more liquid market, as measured by the broad Hang Seng index. By contrast, A-share turnover is significantly positive in the foreign relative price regression in column (1), and in the 'difference' regression of column (4).

These signs are the opposite of what we expect if domestic liquidity reduces expected returns r_A; that is, we expect higher liquidity to raise the A-share price and hence reduce the relative price. However, A-share liquidity has an economically small and insignificant effect on the domestic earnings-price ratio, so that is not the channel. Instead, A-share turnover affects the foreign relative price and the earnings-price difference by affecting B-share prices: in regressions not shown, higher A-share turnover is associated with lower foreign earnings-price ratios, i.e., higher foreign prices. It is not clear why A-share turnover should be associated with lower r_B. Possibly, greater A-share turnover leads to greater revelation of information to foreign investors, information that is already priced into the A-share market. Possibly, higher A-share activity spills over into greater illegal arbitrage by Chinese residents in the B-share market.

The final variable in the regression is observed **sales growth** from 1994 to 1997, as a proxy for earnings-growth g.[25] Higher growth companies should have lower earnings-price ratios, i.e., higher prices, but in Table 3 we find the opposite. This may reflect that actual sales growth is a particularly poor proxy for expected growth in our sample, which corresponds to a cyclical downturn in China's business cycle. As policymakers tightened credit after 1993, output growth and inflation slowed steadily. If companies with high expected growth rely disproportionately on credit markets—perhaps because they lack current cash flow—then actual sales growth could well be negatively correlated with true long-run growth prospects over our sample. Because of these considerations, we find our earlier regression results–which showed that foreign relative prices are higher for companies with higher B-share earnings-price ratios–more persuasive evidence that high growth companies have lower foreign relative prices.

As a final comment on the first set of regressions in Table 3, note that the puzzles observed in Table 2 remain: the foreign relative price appears higher in Hong Kong and Shenzhen, especially in 1994 and 1995, and the A-share beta continues to be negatively and significantly related to domestic earnings-price

[25]We use growth in sales rather than earnings, since (i) Putting earnings in an earnings-price regression is more subject to endogeneity bias, and (ii) Sales growth has fewer extreme outliers (for example, if earnings are very small, percentage-changes can be large). In any case, results are robust to using earnings growth rather than sales growth, reflecting the statistically significant correlation of 0.4 between the two series. Results are also robust to using annual sales growth lagged a year.

ratios.

Specification 4

The regressions so far are misleading if conditions in particular industries contribute to the cross-sectional variability in earnings-price ratios. For example, the state's ownership share is higher in some industries than others. Suppose these industries tend to have high growth rates and low earnings-price ratios; then the state-ownership variable would proxy for that industry effect. To check this, the second set of regressions in Table 3 adds industry fixed effects. The industries are listed in the notes to Table 3. Although statistical significance usually falls, especially on the dividend-payout rate, none of the qualitative conclusions are affected. The state-ownership share, in particular, remains robust, indicating that it does not simply proxy for industries that happen to have low earnings-price ratios. Indeed, the state-share is now statistically significantly positive in explaining differences in earnings-price ratios.

Analysis of Sub-Periods

Table 4 re-estimates the regressions from Table 3 for two sub-periods: 1994-95 and 1996-97. Reducing the sample generally reduces statistical significance, but these sub-period regressions do give insight into why variables have the significance they do in the full-sample regressions. The Hong Kong and Shenzhen dummies now measure the effect during those sub-periods, and are statistically significant in both sub-periods. The significance of the Hong Kong dummy in 1994-95 is further evidence that the puzzle of why Chinese investors paid less in Shanghai for companies with their foreign listings in Hong Kong does not reflect the effects of the variables we have included, since these regressions implicitly allow the coefficients on those variables to differ across sub-periods.

Some results appear stronger in the first period, others in the second period. The strength of the beta results appears to come almost completely from the 1996-97 period, since neither the A- nor B-share betas are significant in 1994-95. The state-ownership results are relatively robust across time periods, although the relationship with foreign earnings-price ratios appears much stronger in the later period. Size is somewhat more important in the earnings-price regressions in the earlier period, particularly for foreign investors (although in the sub-periods, size is never statistically significant in the foreign E/P regressions). Sales growth is more important in the later period.

IV. Conclusion

In China's segmented stock market, domestic investors pay about four times more than foreign investors for essentially identical assets. Time series and cross-sectional evidence generally suggest that the interesting question is *why domestic investors pay so much*, rather than why foreign investors pay so little. We argue that given the difficulties and risks to arbitrage, this apparently puzzling pricing difference is consistent with the simplest asset pricing model and roughly a 4 percentage-point difference in expected returns by foreign and domestic investors (and even lower before the Asian crisis). We attribute the apparently low expected returns of Chinese investors primarily to the lack of investment alternatives in China. Other factors may also be at work, such as a low domestic equity premium, expectations of a Chinese devaluation, or a sizeable home-bias in foreign investment.

As noted in Section I, anecdotally it appears that despite legal barriers, domestic investors can and often do purchase foreign shares. Shleifer and Vishny (1997) argue that in most markets, arbitrage is difficult because it relies on a small number of highly specialized agents. But in the Chinese market, millions of small investors are very well-informed about the pricing differences (prices are posted almost instantaneously), and so could each take a tiny position against pricing anomalies. Shleifer and Vishny, among others, argue that arbitrage often fails because pricing differences might persist, causing would-be arbitragers to lose money in the short run. But in China, the domestic investors would, at a minimum, earn much higher dividend yields, which compensates them somewhat for the risk that foreign shares underperform in the short run. Thus, it appears that although legal barriers often appear porous, the risk that policymakers might crack down in the future is enough to offset sizeable differences in expected returns.

Finally, using a panel of Chinese companies, we identify several variables associated with cross-company differences in the relative price paid by foreigners and in earnings-price ratios. As the dividend-pricing model predicts, foreigners pay higher relative prices for companies with lower expected growth rates. As the CAPM predicts, foreign investors pay lower prices for firms with higher market betas. Foreigners also pay lower prices relative to domestic residents for small firms and for those with a higher share still owned by the state. But these lower *relative* prices do not reflect lower levels of foreign prices. Indeed, both foreign and Chinese residents tend to pay *higher* prices (as measured by lower earnings-price ratios) for small,

export-oriented, high-dividend-paying firms with larger state ownership.

The most notable remaining anomaly, then, is why did Chinese investors in Shanghai pay less in 1994 and 1995 for companies with their foreign listings in Hong Kong? We try, but fail, to identify characteristics of companies with Hong Kong H shares that can explain the domestic pricing.

A deeper question is why China differs from other emerging markets, where foreigners generally pay a premium. After all, other countries have capital controls and investment restrictions that might allow differences in required returns; so why don't those markets also have a foreign discount? Gordon and Li (1998) provide one interesting perspective, arguing that market segmentation in China is equivalent to a system of optimal corporate taxation, where the use of regulation rather than explicit taxes has the advantage of having lower administrative costs. They argue that other emerging markets have tax systems that lead to similar economic outcomes to China's foreign discount. The equivalence between regulation and taxation only holds, however, if the government owns *all* equity shares when the policy is decided on. Otherwise, existing owners receive a capital gain when restrictions on new share issues are put in place. In this view, China was in the unique position of deciding how to raise revenue from the first issues of corporate equity.

Certainly, China differs along many dimensions from most emerging markets—such as its unique transition path away from central planning towards a reliance on market forces—so it is difficult to say for sure why China's experience differs from that of other countries. We view these cross-country differences as an important avenue for future research.

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Table 1
Descriptive Statistics

Mean, standard deviation, minimum and maximum of daily percent change
(July 15, 1993 to January 13, 1998)

	Mean	Min.	Max.	Standard Deviation		
				Full Sample	1993-95	1996-98
Shang. A Index	0.034	-18.4	30.9	3.27	3.76	2.51
Shang. B Index	-0.013	- 1.3	12.2	1.95	1.50	2.40
Shenzh A Index	-2.71	-19.6	29.6	3.26	3.54	2.86
Shenzh B Index	-0.010	-16.7	12.5	2.18	1.08	3.05
H shares	-0.028	-17.7	15.8	2.70	2.30	3.12
Hang Seng (Hong Kong)	0.022	-14.7	17.2	1.83	1.61	2.07
S&P 500	0.066	-7.1	5.0	0.77	0.54	0.97
Topix (Japan)	-0.028	-5.3	6.6	1.11	1.08	1.15

Note: All percentages calculated as 100 times the change in the log of the index.

Table 2
Foreign Relative Prices and Earnings/Price Ratios: The Role of Market Location and Beta

Regressor	Dependent Variable							
	Rel. P P_B/P_A **(1)**	**A Share** E/P_A **(2)**	**B Share** E/P_B **(3)**	**Diff.** $E/P_A - E/P_B$ **(4)**	**Rel. P** P_B/P_A **(5)**	**A Share** E/P_A **(6)**	**B Share** E/P_B **(7)**	**Diff.** $E/P_A - E/P_B$ **(8)**
Constant	24.5*	0.058	0.66	-0.62	19.0*	3.07*	2.05	-5.04*
	(2.71)	(0.44)	(0.97)	(0.69)	(6.87)	(1.12)	(1.08)	(1.84)
Shenzhen	14.6*	1.48*	2.65*	-1.04	15.8*	1.63*	1.81	-0.91
	(3.08)	(0.52)	(1.16)	(0.83)	(3.44)	(0.52)	(1.30)	(0.92)
Hong Kong	28.6*	1.61*	2.10	-0.70	23.8*	1.91*	1.68	-0.85
	(4.31)	(0.72)	(1.54)	(1.14)	(4.55)	(0.71)	(1.71)	(1.21)
HK 94-95	25.5*	2.80*	-1.98	4.83*	22.6*	2.51*	-1.48	3.99
	(6.64)	(1.08)	(2.33)	(1.70)	(7.57)	(1.07)	(0.29)	(2.01)
Shen 94-95	20.6*	2.92*	-0.30	3.09*	18.3*	2.73*	3.27	1.82
	(4.73)	(0.78)	(1.72)	(1.23)	(5.92)	(0.79)	(2.22)	(1.58)
β_A	----	----	----	----	7.34	-2.90*	----	3.77*
					(6.73)	(1.08)		(1.80)
$\beta_{B,\,msci}$	----	----	----	----	1.91*	----	1.10*	-0.58*
					(0.98)		(0.37)	(0.26)
Payout ratio	----	----	----	----	-2.31	-0.56	-1.79*	1.25*
					(1.86)	(0.30)	(0.71)	(0.49)
Adj. R^2	.54	.43	.19	.10	.44	.44	.25	.15

Notes: Results from panel regressions on annual data for 57 companies from 1993-97. All coefficients and standard errors (in parenthesis) are multiplied by 100. All regressions include time effects (with 1997 the omitted time dummy), whose coefficients are not reported. HK 94-95 and Shen 94-95 are the product of the market dummies with a dummy variable equal to 1 in 1994 and 1995 and zero otherwise. P_B refers to the foreign price, whether a B share in Shanghai or Shenzhen, or an H-share in Hong Kong.

Table 3
Regressions Explaining Relative Prices and Earnings/Price Ratios

Regressor	Dependent Variable							
	Rel. P P_B/P_A **(1)**	**A Share** E/P_A **(2)**	**B Share** E/P_B **(3)**	**Diff.** $E/P_A - E/P_B$ **(4)**	**Rel. P** P_B/P_A **(5)**	**A Share** E/P_A **(6)**	**B Share** E/P_B **(7)**	**Diff** $E/P_A - E/P_B$ **(8)**
Constant	10.0	-2.28	-1.39	-2.93	18.5	-1.51	2.82	-9.73*
	(13.4)	(1.86)	(4.58)	(4.08)	(16.1)	(2.21)	(6.44)	(4.71)
Shenzhen	15.4*	1.98*	2.52*	-1.85	14.2*	2.05*	2.54	-1.78
	(3.15)	(0.46)	(1.28)	(0.96)	(3.43)	(0.53)	(1.42)	(0.95)
Hong Kong	16.0*	1.20	1.44	-1.53	16.6*	1.39	0.97*	-0.65
	(4.08)	(0.66)	(1.72)	(1.24)	(4.61)	(0.74)	(0.20)	(1.37)
HK 94-95	20.3*	1.54*	-1.58	3.14	20.3*	1.63	-1.50	4.83*
	(6.59)	(0.98)	(2.80)	(2.00)	(6.41)	(0.98)	(2.84)	(1.78)
Shen 94-95	25.1*	2.63*	2.59	3.52*	23.9*	2.68*	3.22	4.05*
	(5.71)	(0.78)	(2.28)	(1.73)	(5.76)	(0.79)	(2.38)	(1.55)
β_A	3.49	-2.45*	----	2.59	4.59	-2.49*	----	3.58*
	(6.00)	(0.97)		(1.82)	(6.04)	(1.00)		(1.85)
$\beta_{B,\ msci}$	0.80	----	0.87*	-0.65*	0.22	----	0.85*	-0.62
	(0.87)		(0.37)	(0.26)	(0.89)		(0.39)	(0.43)
Payout ratio	-2.57	-0.55*	-1.72*	1.12*	0.46	-0.27	-1.54	0.75
	(1.64)	(0.26)	(0.71)	(0.50)	(2.21)	(0.35)	(1.00)	(0.68)
Export	-2.34	-0.72*	-1.21	0.45	-1.60	-0.68*	-1.15	0.52
	(2.20)	(0.33)	(0.95)	(0.67)	(2.48)	(0.39)	(1.12)	(0.72)
% State owned	-18.2*	-3.38*	-6.33*	2.43	-15.1*	-3.63*	-7.21*	3.72*
	(4.82)	(0.76)	(2.08)	(1.46)	(5.13)	(0.83)	(2.30)	(1.53)
Log(Sales (t-1))	7.44*	0.93*	0.56	0.44	5.78*	0.83*	0.56	0.28
	(1.01)	(0.16)	(0.43)	(0.31)	(1.17)	(0.19)	(0.52)	(0.34)
Log (Turnover)$_A$	5.36*	-0.12	-----	1.76*	5.05*	-0.12	----	0.91
	(2.23)	(0.30)		(0.68)	(2.23)	(0.32)		(0.60)
Log (Turnover)$_B$	1.18	----	-0.41	-0.34	0.70	----	0.16	-0.69
	(1.57)		(0.62)	(0.48)	(1.81)		(0.78)	(0.54)
Sales Growth	0.07	0.31*	0.81*	-0.51*	-0.06	0.27	0.92	-0.65*
	(0.85)	(0.13)	(0.37)	(0.26)	(1.09)	(0.17)	(0.49)	(0.31)
Adj. R^2	.60	.56	.30	.19	.62	.56	.28	.15

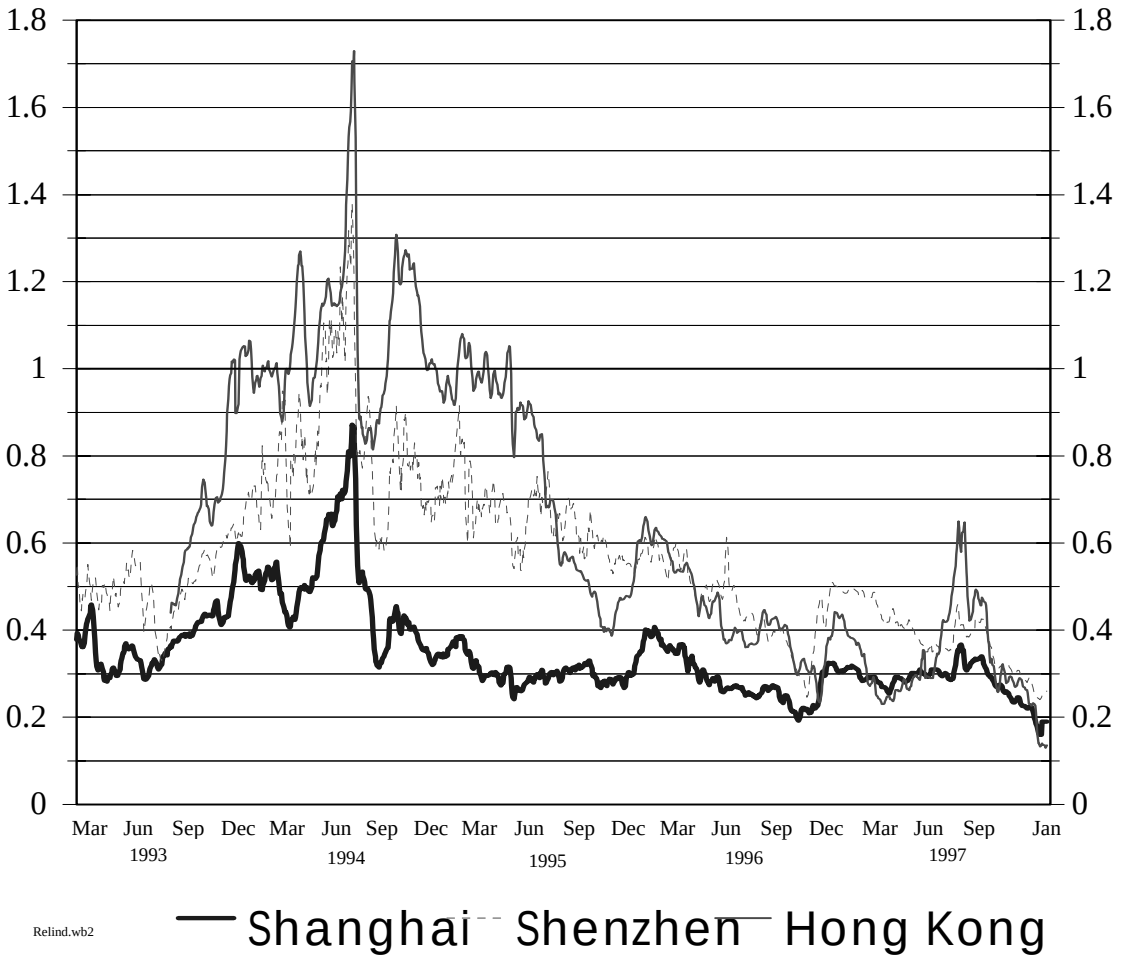
Notes: Results from panel regressions on annual data for 57 companies from 1993-97. All coefficients and standard errors (in parenthesis) are multiplied by 100. All regressions include time effects. Export is a dummy variable for whether the firm exports a large share of output. Sales growth is average annual growth rate of sales from 1993-1996. The last three regressions include industry fixed effects for: Chemicals; Food; Services; light Manufacturing; Textiles; Property; Industrial & Steel; Construction; Transportation; and Utilities.

Table 4
Regressions over the 1994-95 and 1996-97 Sub-Periods

Regressor	1994-95				1996-97			
	Rel.P P_B/P_A **(1)**	**AShare** E/P_A **(2)**	**BShare** E/P_B **(3)**	**Diff.** $E/P_A - E/P_B$ **(4)**	**Rel.P** P_B/P_A **(5)**	**A Share** E/P_A **(6)**	**BShare** E/P_B **(7)**	**Diff.** $E/P_A - E/P_B$ **(8)**
Constant	-0.44	-4.62	6.72	-8.41	20.8	0.98	2.71	-5.13
	(31.3)	(3.06)	(6.38)	(5.83)	(13.1)	(2.65)	(6.15)	(5.42)
Shenzhen	41.8*	4.30*	5.64*	1.41	15.2*	2.12*	2.53	-1.94
	(6.35)	(0.69)	(1.61)	(1.18)	(2.69)	(0.57)	(1.43)	(1.11)
Hong Kong	34.7*	2.37*	0.15	0.96	17.3*	1.56*	1.92	-1.60
	(7.71)	(0.83)	(1.91)	(1.43)	(3.41)	(0.71)	(1.94)	(1.41)
β_A	12.5	-1.57	----	1.54	-3.24	-2.90*	----	2.99
	(11.6)	(1.48)		(2.16)	(6.43)	(1.37)		(2.65)
$\beta_{B,\,msci}$	-0.14	----	0.02	0.07	1.62	----	1.15*	-0.84*
	(2.01)		(0.54)	(0.37)	(0.86)		(0.49)	(0.35)
Payout ratio	-4.35	-0.66	-0.83	0.05	-1.30	-0.42	-2.59*	2.07*
	(2.97)	(0.39)	(0.80)	(0.55)	(1.82)	(0.39)	(1.07)	(0.75)
Export	-4.40	-0.70	-0.01	-0.43	-0.38	-0.79	-1.72	0.83
	(4.36)	(0.52)	(1.18)	(0.81)	(2.31)	(0.47)	(1.33)	(0.95)
% State owned	-28.1*	-3.21	-0.72	-2.82	-12.2*	-3.87*	-9.60*	5.53*
	(9.70)	(1.20)	(2.61)	(1.80)	(4.97)	(1.06)	(2.92)	(2.05)
Log (Sales(t-1))	9.81*	1.38*	0.84	0.72	6.05*	0.58*	-0.16	0.62
	(2.04)	(0.25)	(0.55)	(0.38)	(1.07)	(0.23)	(0.62)	(0.44)
Log (Turnover)$_A$	5.59	-0.44	-----	1.65*	4.83*	0.03	----	1.75
	(4.32)	(0.49)		(0.80)	(2.42)	(0.46)		(1.00)
Log (Turnover)$_B$	1.10	----	0.66	-0.91	1.30	----	-0.82	-0.13
	(3.67)		(0.92)	(0.68)	(1.55)		(0.82)	(0.64)
Sales Growth	0.51	0.35	0.02	-0.03	-0.19	0.40*	1.47*	-0.81*
	(1.71)	(0.23)	(0.45)	(0.32)	(0.92)	(0.20)	(0.53)	(0.38)
Adj. R^2	.56	.55	.10	.04	.59	.35	.26	.21

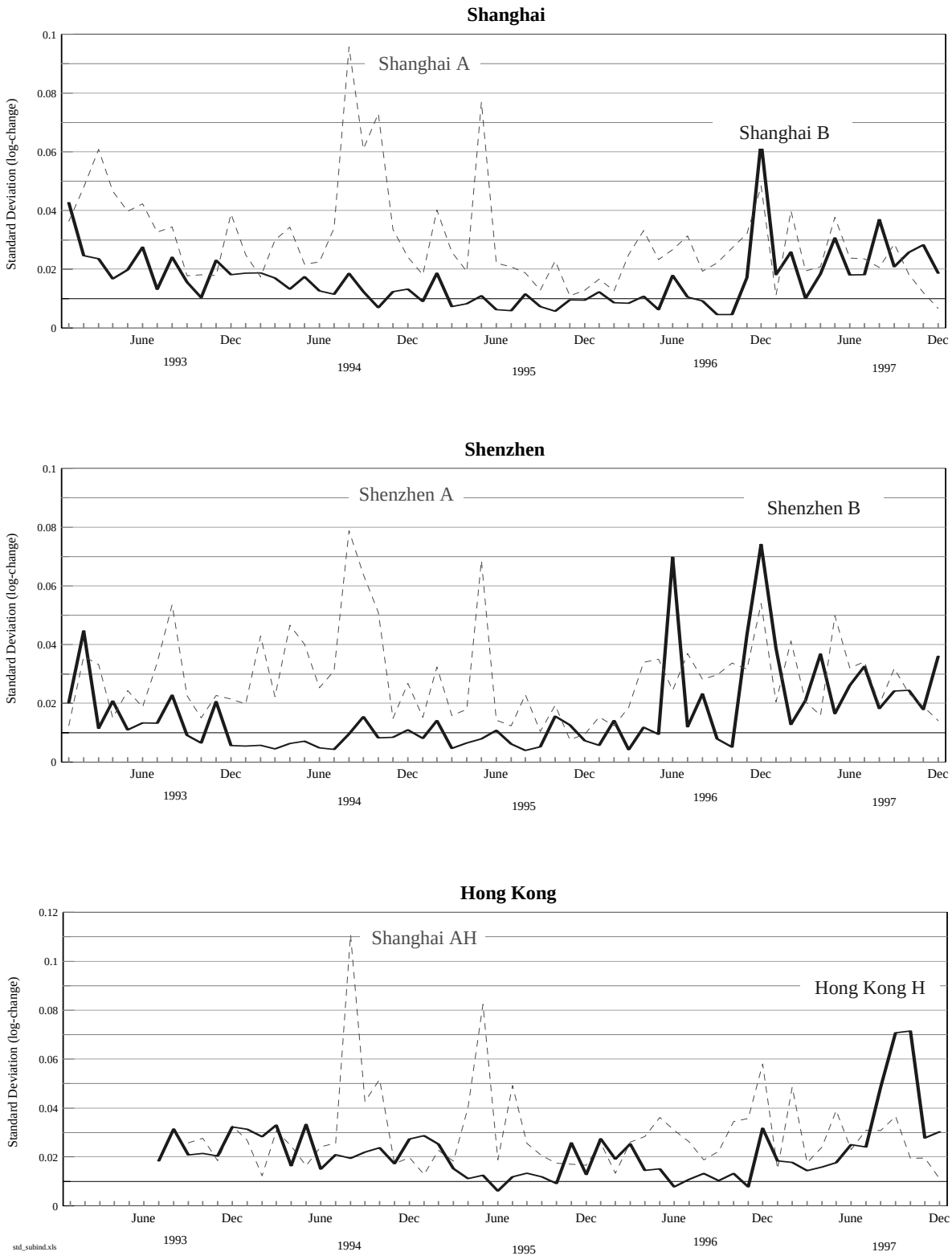
Note: Results from panel regressions on annual data for 57 companies from 1994-95 and 1996-97, respectively. All coefficients and standard errors (in parenthesis) are multiplied by 100. All regressions include time effects.

Figure 1
Relative Price Paid by Foreigners



Note: Average prices for foreign-only shares relative to prices for corresponding domestic-only shares, using capitalization (domestic plus foreign shares) weights. In Shanghai and Shenzhen, foreign and domestic shares trade on the same exchange. For Hong Kong H shares, the corresponding domestic share trades in Shanghai. Foreign prices are converted into Chinese renminbi. Before February 1997, series are computed from our sample of companies (28 in Shanghai, 20 in Shenzhen, and 9 in Hong Kong). Since February 1997, series are from Credit Lyonnais.

Figure 2
Monthly Standard Deviations of Daily Percentage Change in Price

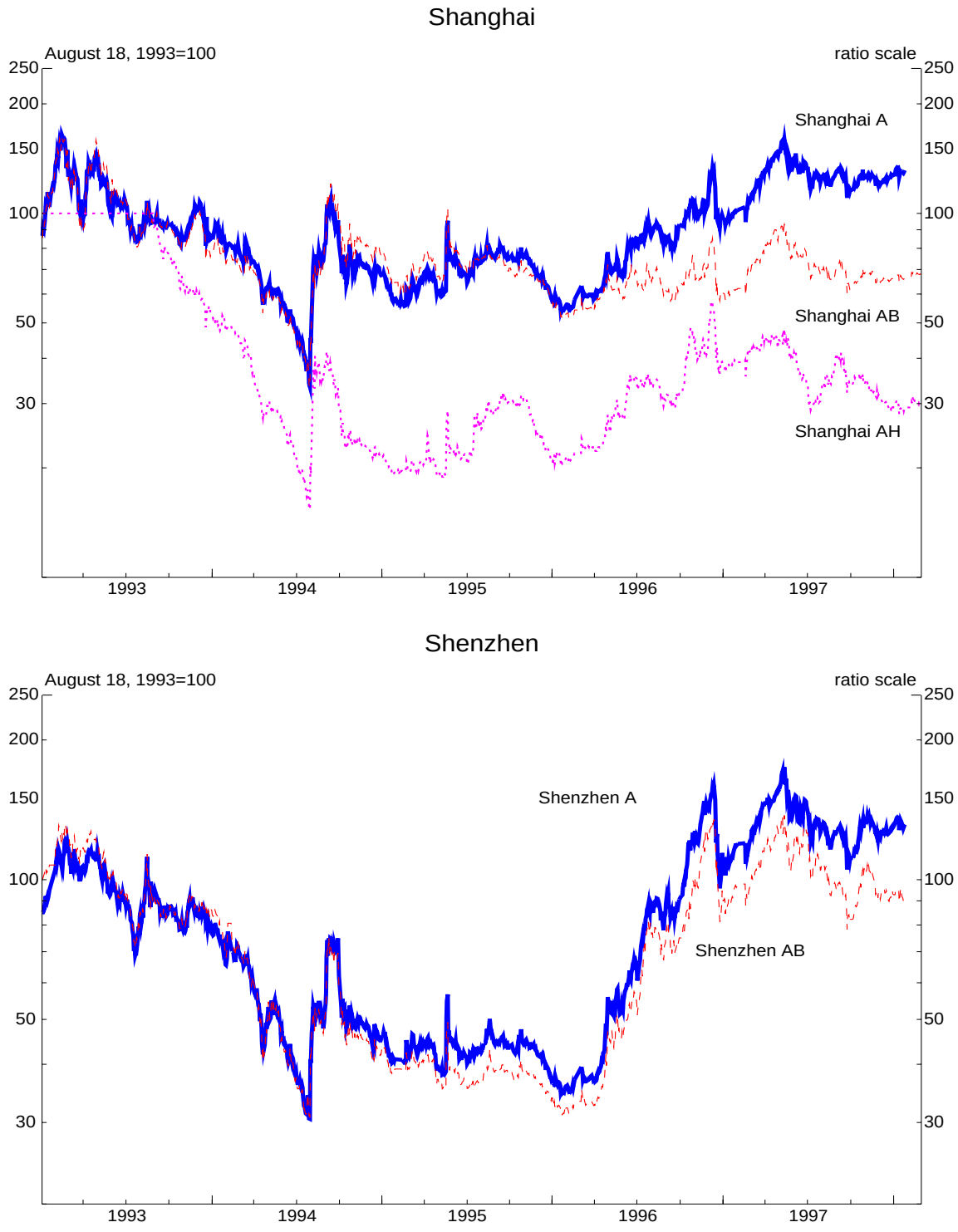


Note: Figures show standard deviations, by month, of the daily change in the log of the market indices. Domestic indices are the subindices for companies with foreign shares, as described in Appendix A.

Figure 3
China Stock Indices Available to Foreign Investors

Sources: Bloomberg and Reuters.

Figure 4
Domestic Shanghai and Shenzhen Subindices



Notes: Shanghai and Shenzhen A indices are from Reuters. Shanghai and Shenzhen AB indices are A-share prices for companies with foreign B shares; AH indices are Shanghai A-share prices for companies with Hong Kong H shares. AB and AH indices are capitalization weighted, as described in Appendix A.

Appendix A: Data and Market Description

Market Description

Table A-1 provides an overview of China's two official exchanges, in Shanghai and Shenzhen. These markets opened in 1990 and 1991, respectively. Two classes of shares trade in Shanghai and Shenzhen. A shares are available only to domestic Chinese residents, and trade in Chinese currency, known as renminbi or yuan. B shares are legally available only to foreigners, and trade in foreign currency—U.S. dollars in Shanghai, and Hong Kong dollars in Shenzhen. A and B shares have the same voting rights and earn the same dividends. Shares cannot be cross-listed—for example, Shanghai shares cannot be listed in Shenzhen, and no firm has multiple classes of foreign shares (firms do have ADRs, as described below).

As of December 1997, more than 600 companies had listed A shares in either Shanghai or Shenzhen; about 100 companies had listed B shares. About three-quarters of the companies (76 of the 100) with B shares also had an A share trading on the same exchange. Total capitalization in Shanghai and Shenzhen was about $200 billion, with foreign-only shares accounting for $4.5 billion of this.

Between 1993 and 1997, 39 Chinese companies issued foreign-only "H shares" in Hong Kong. H shares are priced and traded in Hong Kong dollars, and like B shares, are legally available only to non-Chinese residents. As of December 1997, 13 of the 39 H-share companies had issued A shares in Shanghai, and 3 more had issued A shares in Shenzhen. No companies have more than one foreign listing—e.g., no company has both Shanghai B and Hong Kong H shares. H shares differ from B shares in at least three ways. First, H shares trade in the much larger, more liquid, and better understood Hong Kong market. Second, H-share companies must meet Hong Kong securities rules and regulations as well as the looser Chinese ones, and hence probably provide better information to investors. Third, H-share companies tend to be much larger than companies with B shares in Shanghai or Shenzhen.

Foreigners could also buy Chinese companies in other markets, particularly in the form of American Depository Receipts (ADRs) in New York. For at least two of these ADRs, the underlying security is a distinct class of shares, known as N shares, that do not trade elsewhere. Other Chinese companies also have ADRs or Global Depository Receipts (GDRs), where the underlying security is either a B or an H share. In most cases, no additional revenue was raised from issuing the ADR or GDR. In addition, three Chinese joint-venture companies established Bermuda subsidiaries to issued U.S. shares (see Bailey, 1994, and World Bank, 1995), and a number of so-called "Red Chips"— Hong Kong-incorporated enterprises that are primarily owned by mainland companies—have issued shares in Hong Kong.

Data Sources and Construction

Our main sources of data on Chinese companies, share prices, and stock indices are Reuters and Bloomberg. We obtained daily price and volume data from Reuters for 57 companies that had a foreign and domestic share listing as of June 30, 1994; this arbitrary cutoff date provides a reasonable compromise between the desire to have as many companies as possible in our cross section, and the desire to have as many years of data as possible on each of the companies in our sample. Our sample includes 28 Shanghai A-B pairs, 20 Shenzhen A-B pairs, and 9 Shanghai A-Hong Kong H pairs. (Until recently, all Hong Kong H-share companies had their domestic listing in Shanghai.) We obtained data from the date these shares were first listed, so the starting date of companies in our sample differ. We have data through the end of 1997 for these stock pairs.

Data on company characteristics came primarily from the company "description" pages on Bloomberg, which includes data on sales, earnings-per-share, dividends, and, usually, a couple of sentences describing the companies's products and sometimes its major markets. (Bloomberg's coverage of the Chinese market has improved considerably in recent years; when we began this project, neither Bloomberg nor Reuters had much information on company characteristics.) We labeled firms as exporters if the short description in Bloomberg suggested they exported a substantial share of their production. For about a third of our sample, Barings (1992) contains data on "Exports as a percentage of total sales," which confirmed that the Bloomberg descriptions were usually reliable.

We augmented these data from a variety of sources. For number of shares outstanding by class, we

relied on company reports filed with the Shanghai Stock Exchange, which we obtained from Internet Securities (www.securities.com). (Despite the name, these reports unfortunately have relatively little qualitative or quantitative company data). The number and type of shares outstanding generally correspond to end-1995. Although Bloomberg rarely provides a complete breakdown on the types of shares outstanding for each company, it does include data on the total number of shares, which we used as a check on our series. (Chinese companies fairly frequently undergo stock splits or have rights issues, which change the number of shares outstanding. The income statements on Bloomberg account for these accounting changes in calculating earnings per share, so the data should be internally consistent. The prices on Reuters and Bloomberg are also adjusted to ensure that changes in the number of shares does not cause a spurious jump in the price series.)

For most companies, Bloomberg does not contain data for 1992 and 1993, and often not for 1994. Where possible, we fill in data on H and B share companies from Internet Securities or Baring Securities (1992, 1994, 1995), which contain data on a number of companies going back to about 1990.

For the market-average price-earnings ratios cited in Section II, we used several sources, all of which are consistent with our claim that in early 1998, foreign PE ratios were around 10 and domestic PE ratios were around 40. First, we calculated the median PE ratio from our set of companies for end 1997 and early 1998, using earnings from 1996. Second, from Bloomberg, we obtained daily indices for PE ratios for Shanghai and Shenzhen A- and B-shares and Hong Kong H shares. These indices appear to cover a broader sample of companies, and probably incorporate more recent earnings figures, but details of construction are unclear. Third, until April 1998, Bloomberg had a daily story showing a cross-section of foreign relative prices and foreign PE ratios. Company coverage is similar, though not identical, to our sample. The median foreign PE ratio was 9.5; the median domestic PE ratio was 41.3.

To construct Figure 1, we first calculated the relative price paid by foreigners (P_B/P_A) for each company by converting the foreign price into renminbi using the daily New York exchange rate. Second, we weight the company relative-prices using daily capitalization weights to create a market average.

Through 1993, China had a dual exchange rate, with an official rate and a parallel floating rate. All B-share transactions, including the payment of dividends, took place at the parallel floating rate in the Shanghai Foreign Exchange Adjustment Center. When we convert share prices into a common currency, we therefore use the floating rate until the end of 1993, and the single unified rate since then. This is the standard practice in, say, Barings (1992, 1994, 1995), Bailey (1994), and World Bank (1995). Bloomberg also provides a relative price series, created by Credit-Lyonnais. This series is available only from August 1996, but it corresponds fairly closely with our own series.

We constructed the Shanghai and Shenzhen A-share subindices, shown in Figure 4, using the 57 companies in our sample. We constructed the subindices as Tornquist indices, weighting the growth rates of company prices (measured as the change in the log price) by shares in total capitalization. In a standard Tornquist index, the weights on price-growth between t and t-1 would be the average capitalization weight in periods t and t-1. To accommodate new companies, we use the weights in t-1. Hence, as desired, a new company does not affect the index when it first enters the market, since its weight is zero. It enters the index the day after it enters the market, when its weight becomes non-zero.

Table A-1; Major Stock Markets for Chinese Companies

	Shanghai (A and B Shares)	Shenzhen (A and B Shares)	Hong Kong (H Shares)
Date of First Chinese Listing	19 December 1990	3 July 1991	July 1993
Date Available to Foreigners	28 February 1992	19 December 1991	July 1993
# A Shares Listed (Dec. 1997)	366	257	--
# B or H Shares Listed (Dec. 97)	50	49	39
A-Share PE Ratios (Dec. 1997)	46	45	--
B- or H-Share PE Ratios (Dec 97)	13	10.5	13.7
A-Share Capitalization ($bil, 12/97)	$104	$93	--
B/H-Share Capitaliz. ($bil., 12/97)	$2.2	$2.3	$6.5

Source: Bloomberg.

Table A-2; Summary Statistics– Regression Variables

Variable	Full	Shanghai	Shenzhen	Hong Kong
Relative price (P_B/P_A)	0.47	0.33	0.56	0.71
EP_A	0.034	0.019	0.047	0.047
EP_B	0.063	0.052	0.077	0.063
β_A	1.01	1.00	1.01	1.05
β_B	-0.18	-0.22	-0.36	0.37
Payout rate(dividends/earnings)	0.43	0.45	0.38	0.50
Export Dummy Variable	0.40	0.36	0.45	0.43
Percent State Owned	0.45	0.43	0.50	0.40
log(Sales)	6.44	6.31	6.28	7.39
Daily $Turnover_A$	0.024	0.027	0.019	0.028
Daily $Turnover_B$	0.003	0.004	0.002	0.006
Chemicals	0.14	0.10	0.10	0.34
Food	0.09	0.04	0.15	0.09
Services	0.09	0.14	0.05	0.00
Light Manufacturing	0.26	0.29	0.34	0.00
Textiles	0.11	0.18	0.05	0.00
Property	0.09	0.07	0.15	0.00
Industrial & Steel	0.14	0.22	0.00	0.23
Construction	0.05	0.04	0.05	0.11
Transportation	0.07	0.00	0.15	0.11
Utilities	0.02	0.00	0.00	0.11

Notes: the mean value of the listed variable for the full sample of 57 companies and for those listing in Shanghai, Shenzhen, and Hong Kong. "*B*" in the table refers to either a foreign B share or a foreign H share. The final set of variables are the "average" values of industry dummy variables, and hence indicate the percentage the companies in each market in each category. Data are annual over 1993-97.