Exploring Stock Market Dynamics in China: A Macroeconomic Model of Investment, Cash Flow, and Stock Returns

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Abstract

This project develops a macroeconomic model to address several key features of the Chinese stock market: high but converging investment rates, declining net cash flow, and low stock returns. I constructed a simple growth model incorporating distortions toward over-investment and analyzed the transition path. The model successfully replicates the observed patterns of investment and net cash flow but predicts higher stock returns during the transition period, which contradicts the empirical data. I present indirect evidence suggesting that stock overvaluation may contribute to the low returns. This project is ongoing, and future research will integrate factors such as speculative behavior and the impact of low-interest loans injection from the banking sector after 2008 to offer a more comprehensive explanation for the observed low stock returns in China.

Keywords: Chinese stock market; transition path; investment rates; net cash flow; stock returns; overvaluation

1 Introduction

A hallmark of China's macroeconomics is its exceptionally high investment rate. However, since 2008, the returns on these investments have been declining after a period of sustained high levels. Many macroeconomic studies attribute this decline to the inefficiency of investments, which adversely affects investment returns. Concurrently, Chinese listed companies demonstrate a similar pattern of overinvestment. Compared to firms in other major equity markets, companies listed on the A-share market exhibit higher investment levels, lower net cash flow, and reduced stock returns. This project aims to bridge the gap between macroeconomic literature on China's overinvestment and financial studies of the Chinese stock market.

In examining the performance of China's listed companies, recent empirical work by Allen *et al.*, (2024) offers several crucial insights. Their research reveals that:

- The investment rate (Capital Expenditure/Total Asset) is higher than in other countries but is declining and converging towards the global average.
- Net cash flow rate (Net Cash Flow/Total Asset) is lower compared to other countries, is declining, and the gap with the global average is widening.
- Stock returns are lower than in other countries.

Allen also compares A-share listed firms with Chinese firms listed abroad. Notably, both categories exhibit similar trends in investment and net cash flow, although externally listed firms perform better. However, their stock market performances diverge: externally listed firms achieve higher stock returns despite having lower market-to-book ratios, while domestic A-share firms display moderate valuations but lower returns.

To address these observations, I developed a growth model incorporating distortions towards overinvestment. Specifically, I analyzed two scenarios: investment subsidies and managers' repressed discount rates. I find that the transition dynamic of the model could account the observed trend in investment and net cash flow. Starting from a state of insufficient capital, the distortion towards overinvestment temporarily elevates the investment rate, but it will eventually converges

to the depreciation rate. However, this distortion leads to a permanent decrease in the net cash flow rate, as firms reinvest the additional profits into future growth rather than distributing them as dividends. This pattern aligns well with the empirical data. However, the model predicts rising stock values and high, though converging, returns - outcome that contradict the A-share market's decade-long stagnation and persistently low returns.

I present indirect evidence suggesting that low stock market returns may be related to some form of overvaluation in the Chinese market. The similar investment and net cash flow trends observed in both domestically and externally listed shares indicate shared fundamentals (with externally listed firms performing slightly better, although the difference is not substantial). Despite comparable fundamentals, their stock market performance stands in stark contrast. While domestic firms maintain moderate market-to-book ratios and low returns, externally listed firms exhibit much lower market-to-book ratios but achieve higher stock returns. This discrepancy implies that domestic firms may be overvalued. Two potential explanations for this overvaluation are considered: a predominance of irrational and overly optimistic retail investors or a significant presence of corporate investors with excessively low discount rates. Determining which factor drives the overvaluation requires further empirical investigation.

This project is still ongoing, with further work required to enhance its empirical and theoretical components. Empirically, additional data is needed to better understand the relationship between listed companies and the broader corporate sector, as well as the relationship between equity and bank financing. Listed companies is not a representative sample of China's entire corporate sector and may differ significantly from unlisted firms, particularly in terms of financial access and capital structure. Since 2008, a notable divergence has emerged between listed firms and the overall corporate sector. While leverage within the broad corporate sector continues to decline, listed firms have seen an increase in leverage and long-term debt, with this gap widening over time. A comprehensive analysis of these heterogeneity is crucial for understanding the role of China's capital market within the broader macroeconomy.

From a theoretical standpoint, the model requires further refinement. Specifically, it should be developed into a stochastic model to account for the high volatility observed in the A-share market—a distinctive feature compared to other major global capital markets. Additionally, incorporating the impact of low-rate loan injections from the banking sector into the model is essential. This adjustment will not only address key trends in the capital structure of listed firms but also provide a broader macroeconomic perspective on the equity market.

This project contributes to the macroeconomic literature by highlighting the significance of transitional features and high investment rates in understanding China's economy. Previous research, such as Song *et al.*, (2011), establishes a benchmark for using transitional models to explain China's macroeconomic trends. Chang *et al.*, (2016) emphasizes the importance of high investment rates in explaining China's experience and introduces preferential credit and collateral constraints into Song's model to account for rising investment rates during China's transition. Other studies explore institutional factors, such as agency problems between central and local governments (Xiong, 2018) and the expansion of the real estate sector (Bai *et al.*, 2020; Jiang *et al.*, 2022), contributing to China's high investment rates. Additionally, this project relates to finance literature examining the efficiency of China's stock market and its companies. Allen *et al.*, (2024) offers a detailed empirical comparison of the Chinese stock market with major international markets. Prior to this, Hu *et al.*, (2018) conducted a systematic review of the Chinese financial market, documenting findings similar to those of Allen, such as low market returns and performance disparities between large and small companies.

2 Stylized Facts

This section presents several stylized facts about China's macroeconomic variables and stock market. I will first compare China's aggregate investment rate and investment returns with those of other countries, followed by a discussion of key characteristics of the Chinese stock market. The empirical evidence on Chinese stock market primarily draws from Allen et al. (2024), though I offer a distinct interpretation of these findings.

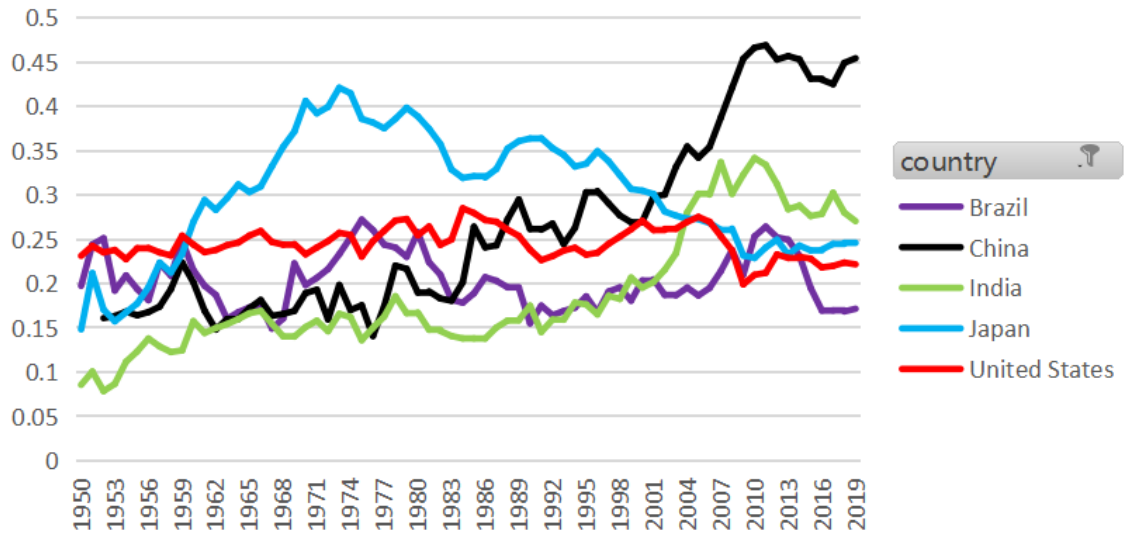

Figure 1: International Comparison of Investment/GDP Ratio

Figure 1 illustrates the investment rates of major countries worldwide. China's investment rate has increased rapidly and remains at around 45%, significantly higher than most other countries. This rate surpasses the historical peak of Japan during its East Asian Growth Miracle and exceeds that of other large developing nations such as India and Brazil.

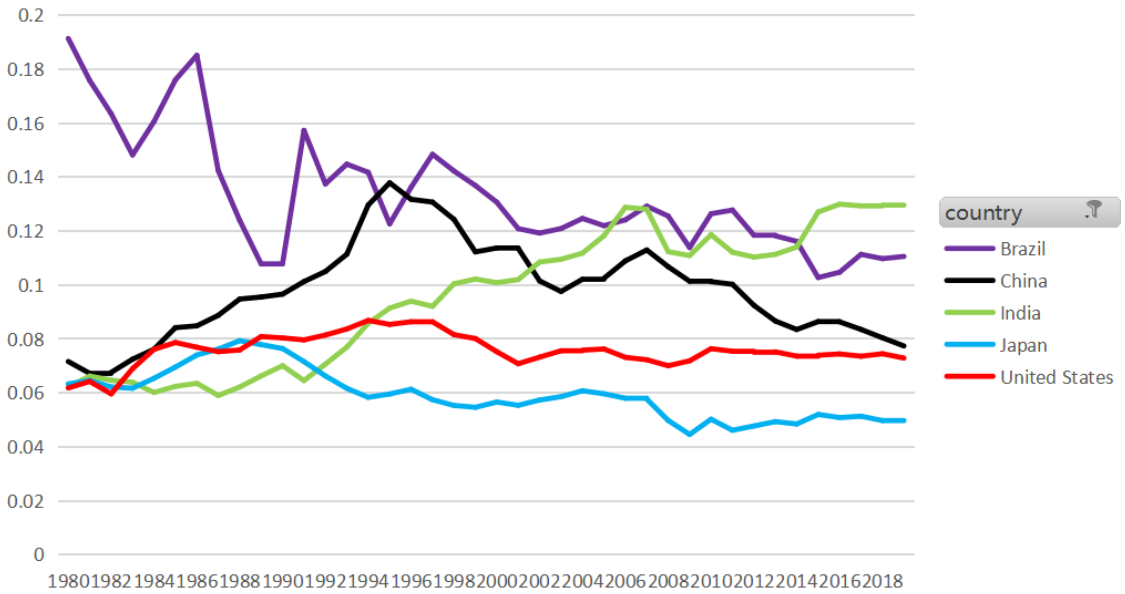

Figure 2: International Comparison of Investment Returns

Figure 2 presents the investment returns for the same set of countries. Despite China's high investment rate, its investment returns have not been correspondingly high and have declined since 1994. Notably, China's investment returns are lower compared to those in India and Brazil.

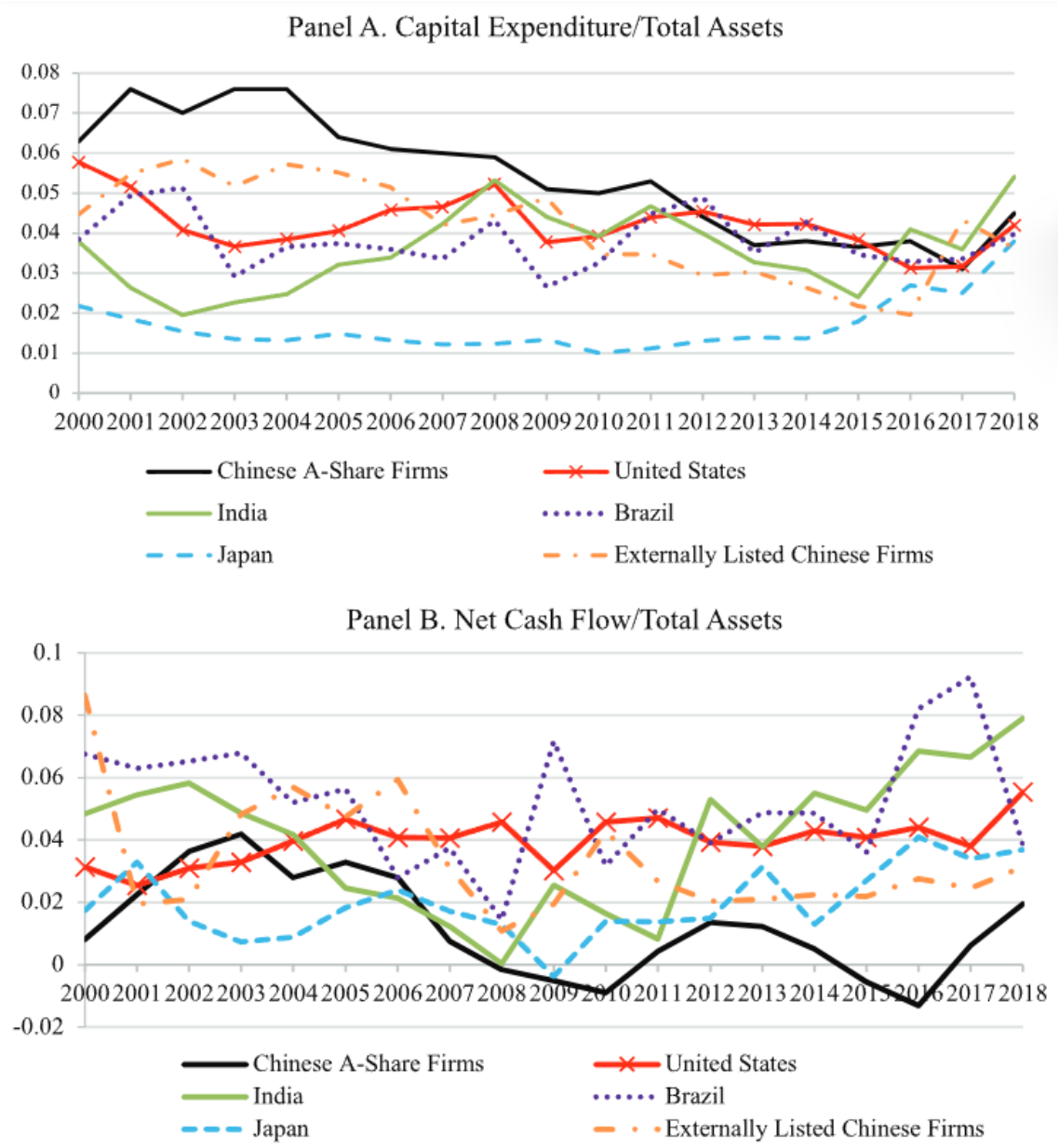

Figure 3: Investment and Net Cash Flows of A-Share Firms, Externally Listed Chinese Firms, and Firms from Other Major Countries (excerpt from Allen et al., 2024)

Chinese listed firms also exhibit a high investment rate and low investment returns. As shown in Figure 3, Allen et al. calculate the investment rate and net cash flow rate of Chinese listed firms compared to firms in other major countries. Panel A depicts the weighted-average investment rate, measured as Capital Expenditures divided by Total Assets, while Panel B shows the weighted-average net cash flow rate, calculated as (EBITDA - Change in Working Capital - Income Taxes - Capital Expenditures)/Total Assets. The data reveal that A-share firms have a higher investment rate and lower net cash flow rate than their international counterparts. Moreover, microdata indicates that over 80% of A-share listed companies have experienced negative cumulative net cash flow since their listing (Xie *et al.*, 2023).

Figure 3 also highlights a trend not previously emphasized by Allen: the investment rate, which started at 7% in 2000, has gradually declined to 4%, aligning with the global average. The net cash flow rate also shows a downward trend, with the gap between China and the global average widening. Notably, externally listed Chinese firms exhibit a similar trend in investment and net cash flow, although their performance is comparatively better than that of domestic firms. This suggests that domestic and externally listed firms share similar fundamentals.

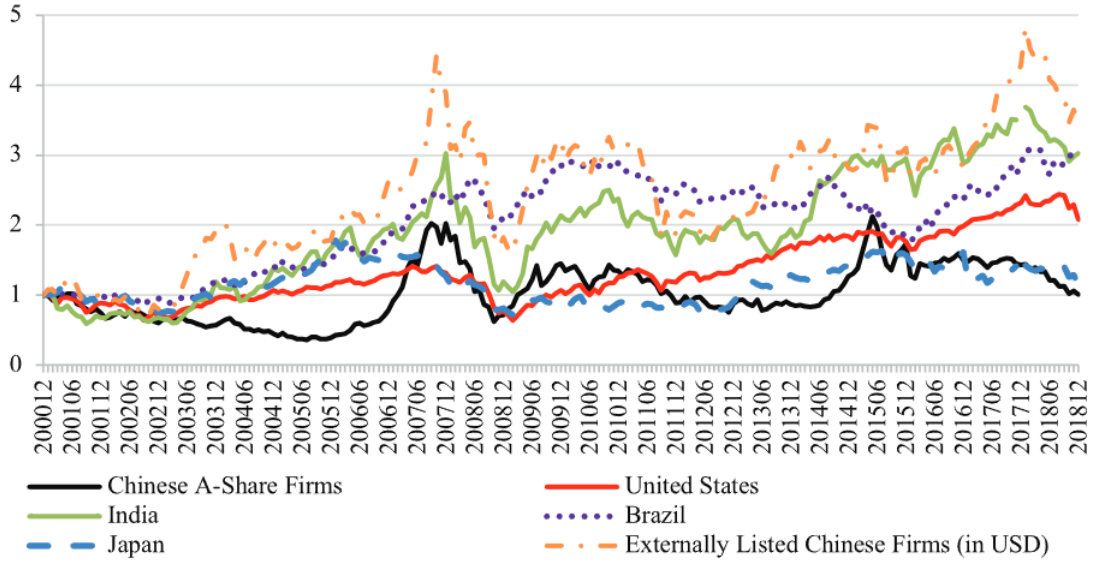

Figure 4: Buy-and-Hold Monthly Returns of Stocks Listed in Major Countries and Externally Listed Chinese Companies (excerpt from Allen et al., 2024)

Figure 4 displays the value-weighted buy-and-hold returns (BHRs) for stocks listed in China (A-share), the United States, India, Brazil, Japan, and for externally listed Chinese firms. BHRs are calculated by compounding the value-weighted monthly returns of all stocks listed in each market. An investment of RMB 1 in a value-weighted portfolio of Chinese A-share stocks in 2000 would have grown to RMB 1.01 by the end of 2018, which is notably lower than the BHRs in other large emerging markets like India and Brazil, where investments more than tripled in real terms. Interestingly, externally listed Chinese firms, despite sharing similar macroeconomic and institutional environments with their domestic counterparts (excluding the stock market), achieved a real BHR of approximately 344

3 Model

In this section, I present a deterministic, discrete-time growth model with a stock market where households can trade shares of corporations. The aim is to explain the key observations from the previous section. I introduce two types of distortions that incentivize corporations to invest beyond the socially optimal level: investment subsidies and repressed discount rates. I then examine the impact of these distortions on asset prices. While this model captures the dynamics of the investment rate and net cash flow rate, it does not fully replicate the observed asset prices.

3.1 Setting

The economy is consist of a household sector and a corporate sector. Household live infinitely and solve the below problem to maximize their life-time utility:

$$\max \quad \sum_{t=1}^{\infty} \beta^t u(c_t) \tag{1}$$

$$\text{s.t.} \quad \sum_{t=0}^{\infty} q_t^l \left[c_t + v_t(s_{t+1} - s_t)\right] \leq \sum_{t=0}^{\infty} q_t^f \left[w_t n_t + d_t s_t - \Psi\right] \tag{2}$$

For simplicity, household provide fix amount of labor each period and choose sequence of consumption to maximize life time utility subject to its budget constraint. The constraint means that the discounted value of expenditure must be less than or equal to the discounted value of income. I use p_t to denote the household's price of period t consumption. The expenditure of household are consumption c_t and purchases of stock,$v_t(s_{t+1} - s_t)$, where v_t is the price per share and s_t is the share household hold at the beginning of period t. The income of household consist of corporate distribution plus wages minus lump-sum tax. d_t denote dividend per share, w_t denote wage rate, and Ψ denote lump-sum tax.

Corporation owns capital and hire labor to produce output with a constant return-to-scale technology $y_t = f(k_t, n_t)$. Each period, the income of the corporation is the sales of product and the subsidy. The dividend to shareholder is the income minus the new investment, and the wage payment. The dividend is given by:

$$d_t = f(k_t, n_t) - (1 - \tau)x_t - w_t n_t \tag{3}$$

where x_t is the investment and τ is the subsidy to investment. Corporation choose capital and labour to maximize the "firm perspective" present value of distributions:

$$\max \quad \sum_{t=1}^{\infty} \eta^t p_t d_t \tag{4}$$

$$\text{s.t.} \quad k_{t+1} = (1 - \delta)k_t + x_t \tag{5}$$

One result of complex nature of China's corporate governance is the ambiguous ownership. Therefore I allow the discount rate of firm's can depart from that of shareholders and the degree of departure is denoted by η.

Market-clearing in this economy requires that the labour market clears; the equity market clears ($s_t = 1$); and the goods market clears:

$$c_t + x_t = f(k_t, n_t) \tag{6}$$

The first order condition are:

$$\frac{p_t}{p_{t+1}} = \frac{v_{t+1} + d_{t+1}}{v_t} \tag{7}$$

$$\frac{p_t}{p_{t+1}} = \eta(\frac{f_k}{1 - \tau} + 1 - \delta) \tag{8}$$

The first condition means that the stock return should equal to household's marginal rate of intertemporal substitution. The second condition means that, given marginal rate of intertemporal substitution, higher investment subsidy and more downward distorted discount rate ($\eta > 1$) could both lead to a decline in marginal product of capital. As it will turns out later, the second condition is the key to explain the dynamic of firms fundamentals, while the second become a chain that limit the model's explaining power on stock performance.

3.2 Discussion of the setting

Before solving the model, I discuss the microfoundations of these two sources of subsidy. Investment subsidies from the government are prevalent in China and are particularly concentrated among listed companies. From 2001 to 2010, the proportion of listed companies receiving government investment before listing increased from 54% to 97%. In China's decentralized political regime, local officials use discretionary powers to promote local economic development and secure promotions. One method is through subsidies to help local companies expand and go public, thereby boosting local employment and GDP growth, which are key indicators for promotion evaluations (Bu *et al.*, 2017). Other forms of implicit subsidy include selling industrial land at low prices (Xu *et al.*, 2017) and relaxing environmental regulations (N. Zhang *et al.*, 2020).

In addition to external subsidies, there is evidence that listed firms, particularly State-Owned Enterprises (SOEs), have internal incentives to over-invest at the expense of shareholder profits. SOEs face the dual pressures of profit maximization and fulfilling social responsibilities, such as maintaining employment and providing social goods. Consequently, they have incentives to expand and over-invest (Harrison *et al.*, 2019; Fan *et al.*, 2007).

4 Implication

In this section, I present the qualitative implications of the model. First, I solve for the steady-state capital and valuation. Then, I treat the steady state as the terminal condition for a dynamic optimization problem and use a shooting algorithm to solve the model's transition path. For clarity, I analyze the effects of investment subsidies and repressed interest rates separately. A rigorous quantitative analysis and calibration are not undertaken at this stage but represent a promising direction for future research.

Analyzing the transition dynamics is crucial for understanding China's economic issues. China's key macroeconomic variables exhibit pronounced trends and are far from stabilizing around a steady-state value, as is typical in more developed economies like the United States. While macroeconomic analysis for developed countries often focuses on fluctuations around a steady state using log-linearization methods, analyses of developing economies like China benefit from transitional dynamics approaches. This perspective is shared by much of the research on China's and East Asia's economic growth miracles.

4.1 Steady State

First consider the case of investment subsidy. I denote the interest rate in steady state as $i = \frac{1}{\beta} - 1$. Using condition (6), (7) and (8), I solved the capital-output ratio, investment-output ratio, dividend-capital ratio and valuation-capital ratio in steady state:

$$\begin{aligned}
\frac{\dot{k}}{\bar{y}} &= \frac{\alpha}{(1-\tau)(i+\delta)} \\
\frac{\bar{x}}{\bar{y}} &= \frac{\delta\alpha}{(1-\tau)(i+\delta)} \\
\frac{\dot{d}}{\bar{k}} &= (1-\tau)i \\
\frac{\bar{v}}{\bar{k}} &= (1-\tau)
\end{aligned}$$

In the steady state, $\bar{y}$, $\bar{k}$, $\bar{x}$, $\bar{d}$, and $\bar{v}$ represent total output, capital, investment, dividends, and asset prices, respectively. After implementing an investment subsidy, both the capital-output ratio and the investment-output ratio increase in the steady state. This is because the investment subsidy lowers the cost of investment, leading to a greater allocation of resources to capital accumulation. This high investment-output ratio aligns with China's macroeconomic situation (where investment accounts for more than 40% of total output), as well as the investment patterns observed at the micro level in listed companies (Figure 3).

On the other hand, the investment subsidy also leads to a decrease in the dividend-to-capital ratio. In the macro model, dividends correspond to net cash flow (revenue minus fixed capital expenditures) at the micro level, rather than net profit (revenue minus fixed capital depreciation). This is because fixed capital depreciation, as an accounting operation, does not fully reflect a company's investment activities. If we view it from the perspective of net cash flow, the net cash flow-to-asset ratio of Chinese listed companies is indeed lower than the global average, which is consistent with the model's conclusions.

In summary, by incorporating the investment subsidy into the model, this paper can better characterize the so-called overinvestment phenomenon, where the capital share is high, but the return on capital is relatively low.

The focus of this paper is on the impact of overinvestment on asset prices. Therefore, the steady-state values of capital and asset prices are calculated for different values of the investment subsidy. The parameter settings in this paper refer to existing RBC literature in the Chinese context. The household's discount factor is set as β, the capital depreciation rate as δ, and the output elasticity of factors as α.

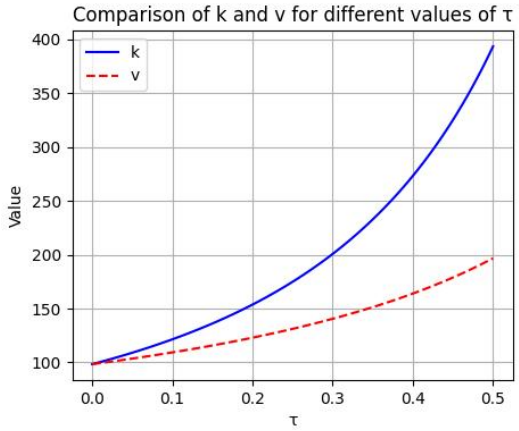

Figure 5: Steady State Capital and Value under Investment Subsidy

As shown in Figure 3.1, as the investment subsidy increases, the steady-state capital stock rises, but the ratio of asset prices to asset book values decreases. This is because the investment subsidy causes firms to deviate from optimal investment, leading to a decrease in the rate of return per unit of assets. In response, investors lower the valuation of firms to ensure that the return on stocks is equal to the intertemporal marginal utility ratio. However, from an overall perspective, the effect of capital expansion outweighs the effect of asset depreciation. As the investment subsidy increases, asset prices still show an upward trend.

Next, we consider the case of repressed discount rate. Consistent with the previous sections, the interest rate in the steady state is denoted by $r = \frac{1}{\beta} - 1$, and the "suppressed interest rate" is defined as $\tilde{r} = \frac{1}{\eta\beta}$, where $1 < \eta < \frac{1}{\beta}$. It is easy to derive that $r < \tilde{r}$. In the steady state, the capital-output ratio, investment-output ratio, dividend-asset ratio, and asset price are given as follows:

$$\begin{aligned}
\frac{\dot{k}}{\bar{y}} &= \frac{\alpha}{(i* + \delta)} \\
\frac{\bar{x}}{\bar{y}} &= \frac{\delta\alpha}{(i* + \delta)} \\
\frac{\dot{d}}{\bar{k}} &= i* \\
\frac{\bar{v}}{\bar{k}} &= \frac{i*}{i}
\end{aligned}$$

By introducing a distortion factor, this model essentially "forces" the economy into a steady state where the equilibrium interest rate is lower and the subjective discount factor is larger. The equilibrium state of this model is equivalent to that of an economy with no distortions but with a larger subjective discount factor β. The corporate sector effectively "forces" the household sector to become more patient by suppressing the returns on their investments, leading to higher investment and capital stock. This is consistent with the basic idea of financial repression models. In response, households lower their valuation of assets, ensuring that the investment return equals the steady-state interest rate r, rather than the "suppressed interest rate" $\tilde{r}$.

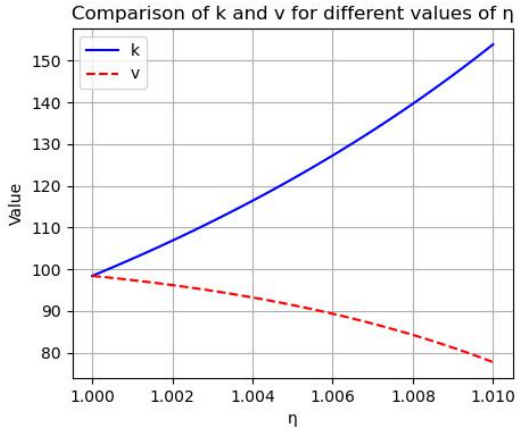

Figure 6: Steady State Capital and Value under Repressed Discount Rate

From the perspective of asset prices, as the distortion in the household sector's discount factor increases, the steady-state capital stock rises, but asset prices decline. This indicates that the negative effect of resource misallocation on asset prices outweighs the impact of the increased capital stock. This forms a sharp contrast to the case of investment subsidies discussed earlier.

It should be noted that the above logic holds within a certain range of parameter values. Specific calculations show that when the household sector's discount factor is very high or the depreciation rate is very low, a slight expansionary impulse might lead to a slight increase in asset prices. However, when the expansionary impulse is strong, asset prices always decline.

4.2 Transition Path

This section I use the shooting algorithm to solve the transition path of the model. Given any initial k_0, for any consumption at the first period c_0, one can use the resource constraint and the first order constraint to solve a feasible sequence of $\{c_t, k_t\}$:

$$
\begin{aligned}
k_1 &= f(k_0) + (1-\delta)k_0 - c_0 \\
c_1 &= u'^{-1}\left(\frac{u'(c_0))}{\beta(f_k(k_1)+1-\delta)}\right) \\
k_2 &= f(k_1) + (1-\delta)k_1 - c_1 \\
c_2 &= u'^{-1}\left(\frac{u'(c_1))}{\beta(f_k(k_2)+1-\delta)}\right) \\
&\ldots\ldots
\end{aligned}
$$

Since the initial consumption is arbitrarily chosen, this path may not converge to the steady state. By search through all possible initial consumption choices using bisection method, the path that converges to the steady state can be identified. This path represents the solution to the problem.

Consistent with the previous sections, the values of the exogenous parameters are $\alpha = 0.5$, $\beta = 0.98$, and $\delta = 0.05$. Let the initial capital stock be set at one-half of the steady-state capital stock. The time horizon is set to 300 periods to ensure that the transition path converges to the steady state.

First, consider the transition under an investment subsidy. The dynamics of investment and dividends align well with empirical data. Initially, with insufficient capital, investment levels increase gradually along the transition path. However, as the capital stock catches up to its steady-state level, the investment ratio (investment/capital) gradually declines and converges to the depreciation rate, δ. The introduction of an investment subsidy ($\tau = 0.2$) results in a noticeable increase in both investment levels and the investment ratio compared to the baseline scenario ($\tau = 0$). The early divergence between the two paths highlights how firms quickly respond to the subsidy by ramping up capital accumulation. Over time, while the steady-state level of capital is higher with the subsidy, both investment ratios converge toward the depreciation rate. This pattern aligns with the predictions from Section 3, where we observe that the temporary boost to investment ultimately fades as firms reach their optimal capital stock. The subsidy encourages

firms to speed up their capital accumulation in the early stages, but once they reach a higher steady-state capital, the investment returns normalize.

As the capital stock gradually increases, dividends also rise over time. However, the capital grows faster, resulting in a declining dividend ratio (dividends/capital). Under the investment subsidy, dividends start lower than in the baseline but exceed the benchmark level in the long run. The dividend ratio, however, remains lower throughout the entire transition path, as firms prioritize reinvesting the extra profits generated by the subsidy into future growth rather than paying them out immediately. This is reflected in the declining dividend ratio observed in the figure. Such patterns of lower initial cash flows, followed by long-term growth, are consistent with the empirical behavior of Chinese firms, as illustrated in Figure 3.

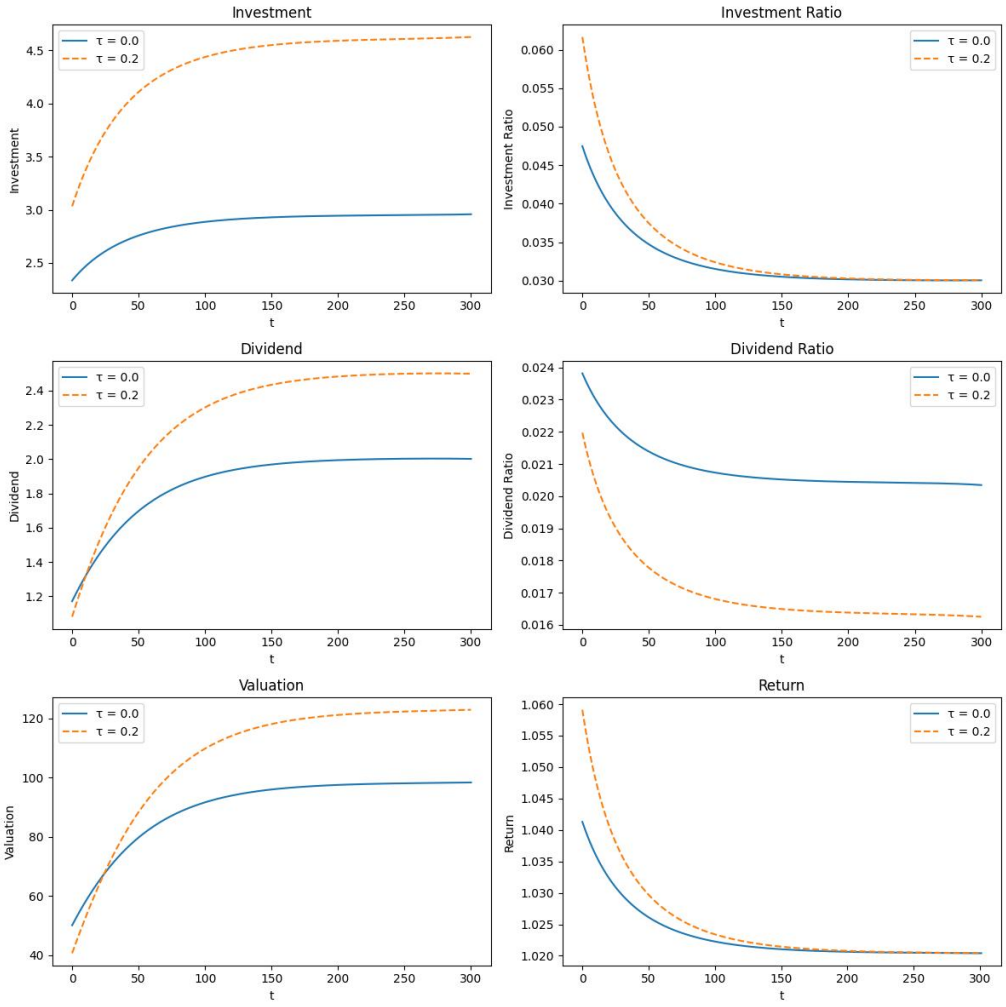

Figure 7: Transition Dynamic under Investment Subsidy

However, when examining market value and returns, the model's predictions diverge from empirical observations. According to the model, the stock valuation should grow rapidly during the transition as firms increase their investments. While the investment subsidy might reduce valuation growth in relative terms (compared to a scenario with no subsidy), the absolute value of the firm should still rise along the transition. In terms of stock returns, the model suggests that returns will be high during the transition phase, eventually converging to the steady-state interest rate as capital levels stabilize. Yet, these predictions do not align with real-world data from the Chinese A-share market, where the stock index has stagnated around 3000 for nearly a decade, and returns have remained low, even in comparison with developed countries that have already reached their steady states.

Next, consider the transition path when the discount rate of the corporation is repressed. The dynamics of the investment and dividend ratios under a lower discount rate ($\eta = 1.01$) are similar to those observed in the investment subsidy case. A lower discount rate incentivizes firms to increase current investment, as future returns are discounted less, making long-term investments more appealing. However, the effect of a lower discount rate on investment levels is more gradual,

with paths diverging over a longer time horizon compared to the immediate effects of the investment subsidy.

The dividend path is a little different. A lower discount rate ($\eta = 1.01$) lead to a permanently lower dividend level, while investment subsidy lead to higher dividend. This implies a lower discount rate is sacrificing the share holder to obtain expansion.

In terms of stock value, The repressed discount rate will lead to a lower absolute value of stock, which seems more align with the experience of A-share market. However, the model still predicts high stock returns during the transition path, which contradicts the low returns observed in reality.

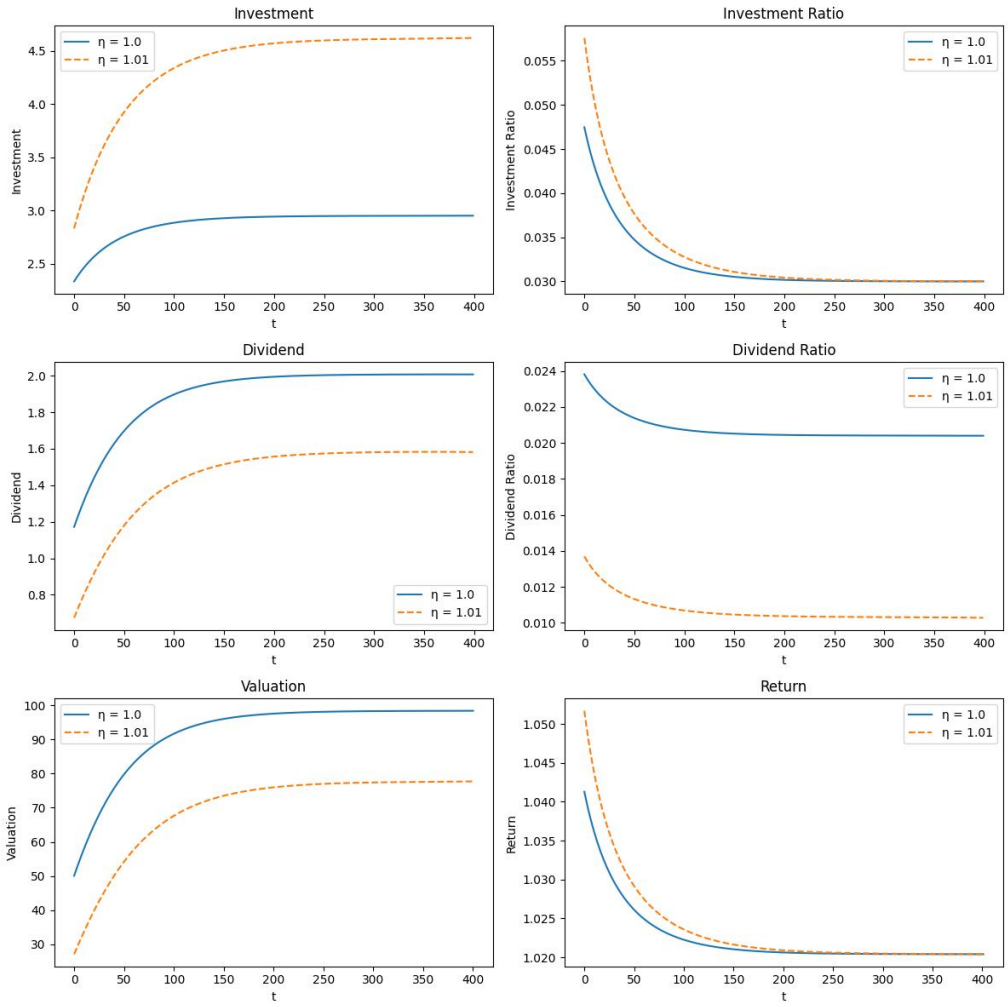

Figure 8: Transition Dynamic under Repressed Discount Rate

5 Discussion of Stock Return and Valuation

The previous section highlighted the inconsistency between the model's predictions and actual stock market data, particularly regarding market valuation and return. The model predicts a low price-to-book (PB) ratio, a rising market value, and a converging stock return, yet none of these features are observed in the A-share market data. In this section, I present indirect evidence suggesting that there may be some degree of overvaluation in the Chinese stock market.

A natural comparison group for A-share firms is externally listed Chinese firms. As discussed earlier, although externally listed Chinese companies often outperform their domestic counterparts, their investment rates and net cash flow trends exhibit similar patterns. This is more clearly shown in **??**, where both groups of firms demonstrate declining investment and net cash flow ratios, suggesting that they may be on similar transition paths.

The apparent performance gap between these two group of firm may cast doubt on this view, but it is possible that the apparent gap in performance between A-share firms and externally listed Chinese firms is driven by outliers. For instance, highly successful Chinese internet companies like Alibaba, Tencent, and Baidu went public in the United States, leaving no comparable firms in

the domestic market. Allen's empirical analysis, which matched externally listed Chinese firms with domestic listed firms by industry, size, and a set of firm characteristics, found no significant differences in investment and net cash flow. However, he noted that the largest 30% of domestic firms indeed underperform their external counterparts in terms of investment and cash flow rates[1]. Overall, the analysis suggests that domestic and externally listed firms share similar fundamentals.

Average OCF and NCF in Real Terms by Period

	Externally Listed Chinese Firms			A-share Firms			Difference	
Period	OCF in Real Terms	NCF in Real Terms	N	OCF in Real Terms	NCF in Real Terms	N	Difference in OCF	Difference in NCF
2000-04	0.104	0.069	2,161	0.084	0.008	6,033	0.020***	0.061***
2005-07	0.080	0.054	2,521	0.078	-0.014	4,336	0.002*	0.068***
2008-12	0.053	0.042	6,024	0.017	-0.021	10,273	0.036***	0.063***
2013-18	0.036	0.028	9,577	0.012	-0.009	18,174	0.024***	0.037***
Total	0.050	0.039	20,283	0.016	-0.011	38,816	0.034***	0.050***

Figure 9: Comparison of Operating Cash Flows and Net Cash Flows of A-Share and Externally Listed Chinese Firms(excerpt from Allen et al., 2024)

Despite the similarity in operating performance, their stock performance diverges significantly. Externally listed Chinese firms have been among the most rewarding portfolios globally over the past 20 years, whereas domestic A-share firms have consistently delivered low returns. Figure 11 presents the market-to-book ratios for major global capital markets. Interestingly, externally listed Chinese firms exhibit a low PB ratio, aligning more closely with the model's predictions of low valuation and high returns. In contrast, A-share firms show valuations comparable to U.S. firms, despite significantly lower returns.

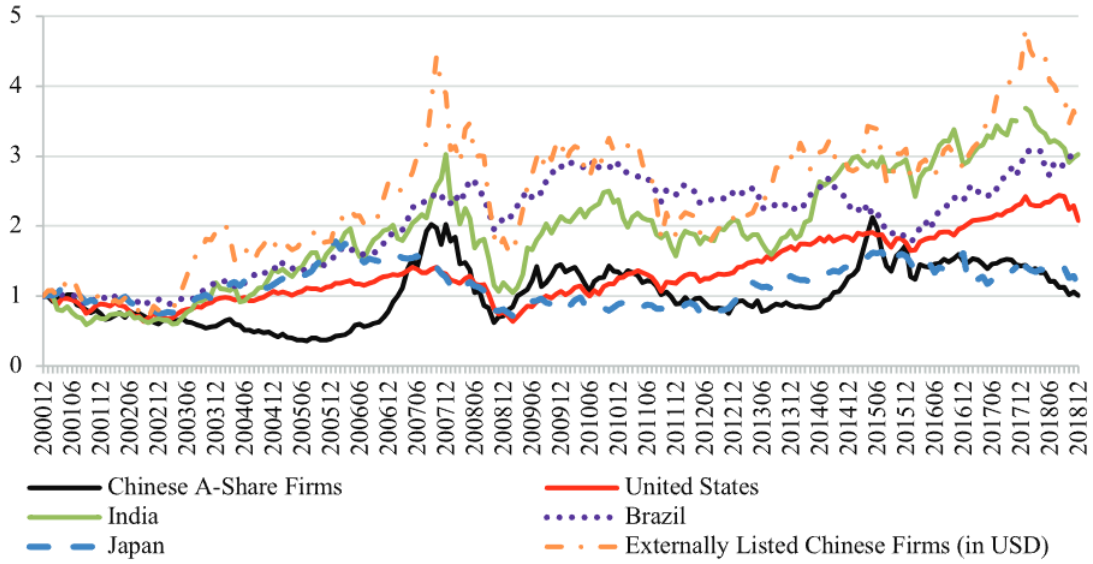

Figure 10: Buy-and-Hold Monthly Returns of Stocks Listed in Major Countries and Externally Listed Chinese Companies (excerpt from Allen et al., 2024)

[1]Allen divided the sample into three size-based groups and conducted a matching analysis. He found that, mpared to their external counterparts, large domestic firms exhibit significantly higher investment and lower net cash flow, while smaller firms show lower investment. The difference for medium-sized firms is not statistically significant. Allen interprets this as large domestic firms driving the poor performance of the Chinese stock market, but I view it as evidence that domestic and externally listed firms share more similarities than differences.

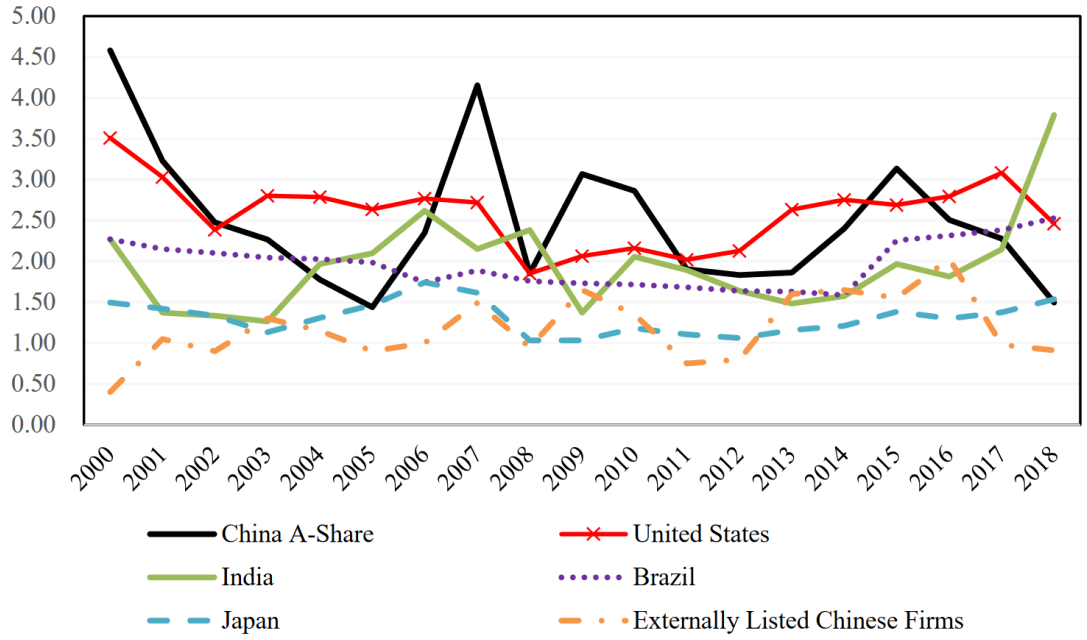

Figure 11: Market-to-Book Ratio of Stocks Listed in Major Countries and Externally Listed Chinese Companies (excerpt from Allen et al., 2024)

I interpret these as evidence that A share market is somehow overvalued. Given the future cash flow, a lower discount rate will lead to a higher valuation and lower return. In section 3 I shows that, if the discount rate of shareholder is β, while the discount rate of firm is $\eta\beta$, the PB ratio will be lower than 1. The steady state return will be $\frac{1}{\beta}$. On the transition path, the return will be even higher. That is what we observe of externally listed firms. However, if both the shareholder's and the firm's discount rates are repressed by η, then the PB ratio will revert to 1, while returns would decrease by a factor of η. This scenario aligns with the behavior of the A-share market. In summary, this evidence suggests that the low discount rate and possible overvaluation by shareholders could explain the low stock returns in China.

So why would investors overvalue these stocks? A common narrative is that China's financial market remains immature. Retail investors, who are often seen as irrational and overly optimistic, dominate the market. Many retail investors lack financial expertise and tend to engage in speculative trading rather than basing their decisions on fundamental analysis. This irrational behavior could contribute to the mispricing observed in China's stock market.

While this explanation may account for certain features of China's stock market, such as high trading volumes and volatility, it does not fully explain the long-term overvaluation. First, for stock returns to underperform over such an extended period, investors would need to maintain over-optimism for over two decades. Second, and more importantly, if retail investor over-optimism were the primary driver of low returns, these retail investors would need to have significant control over the market. However, data shows that on average, corporations hold 64% of the market value, institutions hold 11%, and households hold the remaining 25%(An *et al.*, 2022). In contrast, in the U.S., institutions hold approximately 70-80% of the market value, households directly own 20-25%, and corporations hold less than 5%. Thus, in China, corporations, not retail investors, dominate the stock market.

The dominance of corporations points to an alternative explanation. In a seminal paper on production-based asset pricing, Cochrane (1991) highlighted the link between stock returns and the firm's discount rate. Essentially, the stock return and the firm's investment return must be equal because both represent claims on the same cash flows. By the law of one price, if the returns were different, arbitrage opportunities would exist. This insight provides a potential explanation for the low returns in the A-share market: a group of corporations with low discount rates dominates both physical capital investment and stock investment. Consequently, the returns on both physical capital and stock are compressed.

That said, these are still hypotheses. Determining whether retail investors or corporations are responsible for the low stock returns in China will require further empirical analysis.

6 Conclusion and Future Research Directions

6.1 Conclusion

This project develops a macroeconomic model aimed at capturing several critical features of the Chinese stock market, such as the high but converging investment rates, declining net cash flows, and persistently low stock returns. By constructing a simple growth model that incorporates distortions toward over-investment, I have been able to replicate the observed patterns of investment and net cash flow. However, the model's prediction of higher stock returns during the transition period does not align with empirical data, which shows persistently low returns in China's stock market.

The model's inability to account for the low returns suggests that factors outside of the simple growth framework may be at play. In particular, I present indirect evidence that overvaluation in the Chinese stock market could contribute to these low returns. This overvaluation might stem from both structural issues within the financial market and potential behavioral factors among market participants.

6.2 Future Research Directions

As mentioned before, there are two direction for future work. One key area for further exploration is the incorporation of irrational factors into the model. A stochastic framework that accounts for speculative trading, bubbles, and other non-rational behaviors could provide deeper insights into the volatility and market dynamics of the A-share market. Several indicators suggest that traders in this market do not behave entirely rationally. For example, the market exhibits high price volatility and trading volumes, as well as unresolved anomalies such as the persistent AB share premium(Mei *et al.*, 2009) and AH share premium(R. Zhang and T. Zhang, 2020). These phenomena indicate that irrational factors could be driving some of the discrepancies between model predictions and observed data. By incorporating these elements, future work could offer a more nuanced understanding of the role of speculation in shaping stock prices.

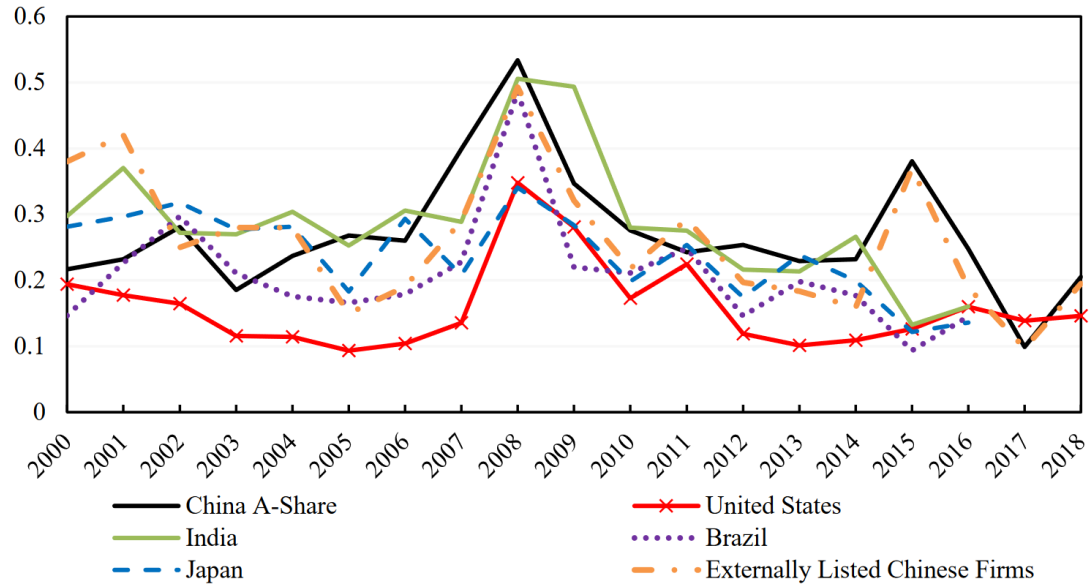

Figure 12: Volatility of Stocks Listed in Major Countries and Externally Listed Chinese Companies(excerpt from Allen et al., 2024)

Another crucial direction is to examine the interaction between equity and loan financing in China's corporate sector. Listed firms are not representative of the broader corporate landscape, especially when it comes to financial access and capital structure. Since 2008, listed firms have seen a rise in debt financing, while the overall corporate sector's debt revenues have continued to decline, widening the gap between the two groups. This divergence underscores the importance of considering heterogeneity in capital structure across different types of firms, such as state-owned enterprises (SOEs) versus non-SOEs, or listed versus unlisted firms.

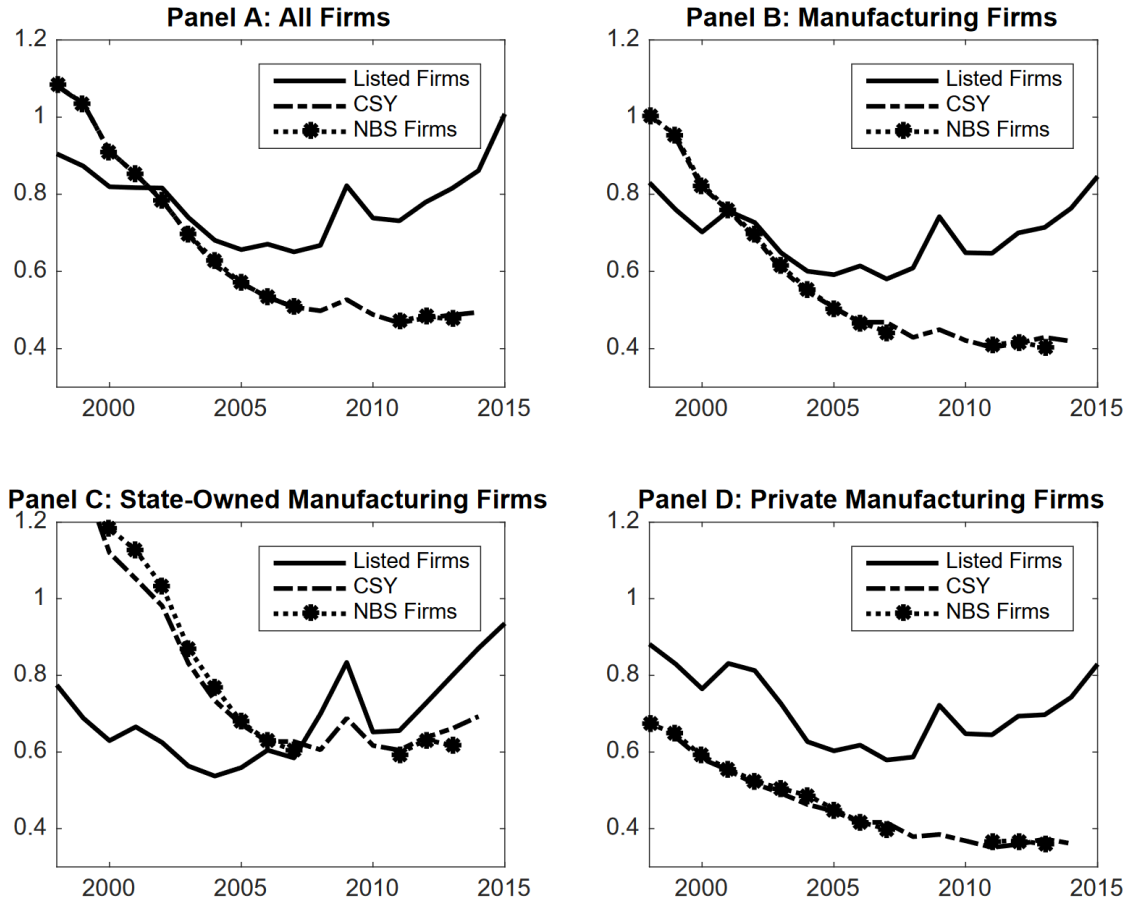

Figure 13: Debt Revenue Ratio of Listed Firms and All Industrial Firms Above Scale (excerpt from Bai et al., 2016)

Summarizing empirical facts about these differences and introducing capital structure heterogeneity into the model could strengthen the connection between stock market behavior and the broader economy. This approach would not only help capture the unique financing environment in China but also shed light on the potential impact of financial access disparities on firm performance and market outcomes. Understanding the differential access to capital markets—whether through equity or loan channels—could also reveal deeper insights into the broader issues of corporate governance, investment strategies, and market inefficiencies in China's rapidly evolving financial landscape.

In conclusion, further development of a model that incorporates irrational trading behavior, combined with an analysis of financing structures, will be essential for a more comprehensive understanding of the Chinese stock market. Such research could contribute to the ongoing debate about the efficiency of financial markets in emerging economies and the role of policy in mitigating distortions caused by market frictions and investor behavior.

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