Understanding China: An Explanation for an Unusual Macroeconomy

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Abstract

China presents several macroeconomic patterns that are inconsistent with standard stylized facts about economic development and hence inconsistent with the standard growth model. We show that Chinese macroeconomic patterns are instead consistent with an objective of maximizing output (not profits) in non-competitive factor markets. In short, China appears to successfully follow the stated growth objectives in its five year plans. We consider the micro-institutional features that can sustain this behavior. Overall, China appears distant from free-market capitalism and, on important dimensions, increasingly distant with time.

1 Introduction

Since 1978, China has recorded one of the fastest GDP growth rates ever known and has now become the second largest economy in the world. This economic success has led to substantial interest in China's development model, both as a potential guide for other countries and as an increasing force shaping the world economy. At the same time, many observers question whether China's growth can be sustained and whether the Chinese economic system is converging towards a Western capitalist model.

In this paper, we first document that China is an outlier - and increasingly an outlier - on several core macroeconomic dimensions. These include not just its unusually high investment and savings rates, but also its unusually low and declining labor share of income. These features create strong tensions with the traditional macroeconomic growth model, where markets are competitive and factor shares approximately constant. Given this tension, we then consider an

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alternative model where (1) the Chinese state seeks to maximize output and (2) factors are paid below their marginal products.

Building from a micro-institutional description of labor market policy (the hukou system) and investment policy (the five-year plans and incentive systems used to promote them), we build a simple model of the Chinese macroeconomy. The model shows how the state can depress the labor share of income and create unusually high domestic savings and investment rates, in successful pursuit of its output objectives. We further use the model to explore recent dynamics in the Chinese economy, including the declining labor share and rising savings and investment rates. Lastly, we discuss, qualitatively, how this Chinese development model can lead to sustained trade surpluses as well as implications for Chinese growth in the years ahead.

In sum, this paper presents a perspective where China's extraordinary economic development hinges on state institutions that deviate sharply from a competitive-market environment and, judging from the macroeconomic aggregates, may be becoming increasingly distant.

2 China: An Unusual Macroeconomy

Chinese macroeconomic behavior appears unusual on several dimensions. To motivate this paper, we first document core macroeconomic facts about the Chinese economy and then highlight their conflict with a traditional growth model.

2.1 Stylized Facts

In tandem with its high GDP growth rate, China features an unusually low labor share of income coupled with elevated saving rates, investment rates, and capital-output ratios. These features are highly unusual not only in comparison to the world distribution, but also to other East Asian growth miracles.

2.1.1 Labor Share

Figure 1 presents labor share estimates for China together with a broad sample of 54 countries analyzed by Bernanke and Gurkaynak (2002).[1] In the cross-country sample, the mean labor share is 0.66, with 72% of the countries showing estimates in the 0.60-0.80 range. Related evidence from long time series in the United States and United Kingdom shows labor shares remain within a 0.60-0.75 range over the 1935-1985 period (Gollin 2002).

[1] The Bernanke and Gurkaynak estimates are measured in the 1980-1995 period and consider labor shares making adjustments for self-employment income, building on Gollin (2002). Bernanke and Gurkaynak construct as many as three different estimates for each country; plotted points are means across the available estimates for each country. Chinese labor shares, which are not included in Bernanke and Gurkaynak, are averages across four methods analyzed by Kraay (2012), discussed in the text. Income per-capita (PPP) is taken from the Penn World Tables.

By contrast, the Chinese labor share appears unusually low (Bai, Hsieh, Qian 2006; Lardy 2012). Kraay (2012) considers China's labor share based on four different sources: provincial data on employee compensation, flow of funds data, input-output tables, and household surveys. All four sources agree that the Chinese labor share was approximately .51 in 1993, putting China in the bottom 10% of the world sample. By 2007, the average labor share from these four sources was .43, giving China the lowest observed labor share seen in the data.[2]

In sum, China appears to have an unusually low labor share. While imputing labor shares can be challenging, especially in countries with poor data quality and/or large informal sectors, available data suggests that China has an unusually low labor share by international standards, and, if anything, now appears to be an extreme outlier by most measures.

2.1.2 Saving Rates

Figure 2 shows the China's domestic saving rate compared to a world sample of 175 countries. Saving rates for each country are taken from the World Development Indicators and averaged over the 2000-2010 period. Figure 3 presents the same data, but excludes oil exporters (where fuels account for at least 75% of exports).

China's saving rate, averaging 46.4%, appears unusually high, exceeding saving rates in 94% of other countries. Leaving out oil exporters, China's average saving rate exceeds all but two other countries – Luxembourg and Singapore. Figures 2 and 3 further show that China's savings rate is especially high given its income level. In a regression of average savings on log income per-capita and the share of fuels in exports, which predict saving rates with an R^2 of 0.6, China's saving rate appears 32 percentage points higher than expected.

Figure 4 presents China's domestic saving rate over time, comparing it to the antecedent "Asian Miracles" of Korea, Japan, and Singapore. Like other Asian miracles, growth in income per-capita is associated with rising saving rates. Strikingly however, when comparing saving rates at similar levels of per-capita income, China's saving rate far outpaces those in the other miracle countries, exceeding Korea's savings rate by approximately 10 percentage points and Singapore's by approximately 20 percentage points. Thus China appears unusual not only in its absolute level of savings (now peaking over 50%), but it appears especially unusually given its level of economic development, even in comparison to the history of other Asian miracles.

[2] Figure 1 also suggests that the Chinese labor has declined with time. This finding is less consistent across sources. Flow of funds data suggests the Chinese labor share in 2007 remains at approximately .51, while the other three sources put labor share around .40. Lardy (2012) discusses some challenges with the provincial aggregation in comparison to a flow-of-funds approach. Kraay (2012) considers these measures in addition to the input-output and household survey approaches.

2.1.3 Investment Rates

Figure 5 shows China's average investment rate over 2000-2010, compared to a world sample. As with savings and the labor share, China appears to be an outlier. With an average investment rate of 39.8%, China in the first decade of this century outpaced all other countries save two – Bhutan and Equatorial Guinea. Figure 6 shows the evolution of China's investment rate compared to other Asian Miracles. In each case, economic development has been associated with high and rising investment rates. However, as with the saving rate, China's investment rate at a given level of per-capita income sharply exceed the historical precedent in these other high growth countries. In sum, China appears unusual in its high rate of investment (now peaking over 45%) both compared to the world sample and to antecedent and remarkable growth experiences of other Asian countries.

Finally, unusually high investment rates imply that China's capital-output ratio will also appear unusually high. Using the perpetual inventory method, capital-output ratios can be calculated under various assumptions about capital depreciation rates and the initial capital stock. Generally, China's capital-output ratio will be elevated conditional on its level of development, with an upward shift compared to other Asian Miracles similar to that seen in Figure 6.

2.2 The Standard Model

To see the challenges these facts impose on standard theory, consider that neo-classical growth theory commonly builds on two core assumptions. First, the aggregate production function is a Cobb-Douglas, $Y = K^{\alpha}(AL)^{1-\alpha}$. Second, factors are paid their marginal products. This second assumption corresponds to a setting where firms maximize profits and are price takers (markets are competitive)

$$\max_{K,L} K^{\alpha}(AL)^{1-\alpha} - RK - wL \tag{1}$$

where R is the rental price of capital and w is the wage.

In this environment, the capital and labor shares of income are constants. If labor is paid its marginal product, then the labor share of income is $wL/Y = 1 - \alpha$. This model is "standard" for several reasons, but most importantly for our purposes because, as reviewed above, estimates of labor shares tend toward 2/3 both (i) over time within countries and (ii) across countries at a point in time. This tendency constitutes one of the major stylized facts of macroeconomics.[3]

[3] A Cobb-Douglas production function, following Uzawa's steady-state growth theorem, also has the empirically appealing feature of allowing capital-augmenting technical progress in tandem with non-trending interest rates, both of which appear important features of economic growth. Nonetheless, the Cobb-Douglas description is still open to debate. Theoretically, constant labor shares can be consistent with non-unit elasticity of substitution between capital and labor, if capital- and labor-augmenting technical change proceed in the right way (see, e.g., Antras 2004). Relaxing the Cobb-Douglas assumption may be fruitful for understanding the Chinese economy, but this approach is not pursued in this paper.

Given that China does not satisfy this macroeconomic regularity, one is left with three possible conclusions: (i) the Chinese data are not correctly measured; (ii) China's production function diverges substantially from the norm, and/or (iii) factors are not paid their marginal products. If one assumes that the data is sufficiently accurate to take the stylized facts above as broadly correct and that China's production function does not differ from the rest of the world, where Cobb-Douglas remains a reasonable stylization, then the last option remains. Namely, factor allocation in China departs from a competitive markets model.

This paper investigates this possibility.

3 China: An Alternative Approach

Our approach departs from the standard profit-maximizing, competitive-markets paradigm, represented in (1), on two dimensions. We assume instead that

1. The state attempts to maximize output
2. Factor allocation need not be based on competitive markets

The theory draws on explicit Chinese state policies, as discussed below. At a high level, we can connect this approach to the observed macroeconomic results as follows. We consider a program where China maximizes output

$$\max_{K,L} K^{\alpha} (AL)^{1-\alpha} \tag{2}$$

subject to constraints on (1) labor participation and (2) the capital accumulation process. Namely, capital accumulates as $\dot{K} = I - \delta K$. Investment is limited by savings, $I \leq S$, and state or corporate savings are limited by factor payments to labor $S \leq Y - w(\theta)L$, so that development depends in a classic Marxist sense on the "surplus value of labor".[4] Here, a policy parameter θ helps determine wages, rather than a pure marginal products condition. Given the objective of maximizing output, the investment decision is simply to maximize investment rates from available savings. We thus have a simple endogenous savings and investment model where[5]

$$\frac{I}{Y} = 1 - \frac{w(\theta)L}{Y}$$

This set-up thus provides a straightforward approach for linking an unusually low labor share, unusually high domestic saving rate, and unusually high investment rate.

Example 1 *In a model with no TFP growth, capital accumulation reaches a steady-state where $\Delta K_t = 0$; i.e., where depreciation prevents further capital*

[4] Domestic investment is limited by domestic savings due to China's capital controls.

[5] For simplicity, we are assuming the all labor income is consumed. This assumption could be relaxed; for example, with an exogenous household saving rate, s, aggregate savings would be $S \leq Y - (1-s)w(\theta)L$.

accumulation. In this steady-state, $I = \delta K$ and the capital-output ratio is $\frac{K}{Y} = \frac{1}{\delta}\left(1 - \frac{w(\theta)L}{Y}\right)$. By comparison to the competitive markets model, where $K/Y = \alpha/R$, the candidate Chinese model results in a larger capital-output ratio and larger output through two mechanisms: (1) The labor share of income is suppressed ($wL/Y < 1-\alpha$) , providing greater aggregate savings; (2) The rental price of capital exceeds the depreciation rate ($R > \delta$). The first is inevitable if the wage is below its marginal product. The second is inevitable with a positive real interest rate, since in competitive markets $R = r + \delta$.

Hence, at a high level, we have a candidate approach for understanding unusual features of the Chinese macroeconomy. The next section provides a specific view on how the Chinese economy can implement this broad development approach, connecting to explicit state policies.

3.1 The Chinese System

We ground our theoretical approach in micro-institutional features of the Chinese system. In particular, we start with the labor market, emphasizing how the hukou system suppresses the wages of migrant workers. We then consider explicit state objectives, as emphasized in a succession of five-year plans, to maximize output growth.

3.1.1 Labor Markets

The mobility of Chinese workers is limited by the hukou system, which dates from the 1950s and creates a rural-urban divide among the workforce. In earlier periods, the hukou system featured outright prohibitions on migration, severe restrictions that were eventually relaxed, giving rise to the migrant labor phenomenon. Still, city governments employ numerous mechanisms to limit inward migration, including (1) quotas on the number of migrants that employers can hire, (2) fees levied on firms employing migrants (which have been estimated to reach 44% of the average monthly wage), (3) expensive licensing measures for the migrants themselves, including migrant identity cards, temporary resident cares, and employment registration cards, and (4) recruitment fees paid to government agencies (Knight et al. 1999). Much research has emphasized resulting wage discrimination, where migrants earn far less than registered urban workers, even within the same occupation (e.g. Meng and Zhang 2001, Lu and Song 2006). Figure 7 shows the evolution of wages for registered urban, migrant, and registered rural workers over time.

Equilibrium unemployment search models provide a natural way to investigate the implications of the hukou system. Rural workers are viewed as the "unemployed", with the hukou system limiting matching opportunities for higher-productivity jobs in cities, creating surplus migrant labor supply for urban vacancies. Consequently, migrant wages can fall far below their marginal product and fail to rise much above their outside option - the rural wage. With migrant wages below their marginal products, the labor share of income falls.

This feature in turn provides large domestic savings, via firms' operating surplus, which in turn can support very high investment rates.

3.1.2 Output Targets

The second piece of our analysis governs the use of savings in the economy, including the excess rents created by suppressing labor. China's five-year plans, at a high level, provide guidance for state objectives, providing explicit growth targets to cities and regions. That national GDP growth has consistently met these targets over the last several decades is suggestive that these targets are implemented through effective micro-institutional measures.

In China's one-party system, the Communist Party selects officials at all levels to serve a five-year term. The incentives for local officials are described in Vogel (2011, pp. 699-700): "Deng pulled back on the governing structure that tried to penetrate everywhere. Instead of setting tight rules that local areas had to follow, he established a system in which governing teams, selected by the next higher level, were given considerable independence as long as they managed to bring rapid growth. . . . In Deng's era and in the decades after Deng, those judgments [on local government performance] were based overwhelmingly on how much the team contributed to China's overall economic growth." So, prospects for local officials to be promoted in the next round depended almost completely on investment and growth.

To meet output goals, major institutional foundations include (1) state ownership of all land; and (2) a repressed financial system. Only the state could alienate land out of agriculture into industrial and commercial use, which was necessary as urbanization proceeded. The repressed financial system included ceilings on deposit interest rates, which have frequently been negative in real terms; dominance by four big state-owned commercial banks; underdevelopment of stock and bond markets; and a closed capital account. The state's unusual power in land and capital markets meant that local governments could rapidly develop infrastructure (e.g., roads, ports, and power). Local government also had levers to encourage industrial firms to invest by providing access to land, reliable infrastructure, and low-cost financing.

Ultimately, one can model the decentralization of the five-year plan output goals in two ways, which are not mutually exclusive. First, with promotion incentives based on meeting output targets, the managers of firms can be viewed as seeking to maximize output directly. That is, the incentive system decentralizes output maximization to the firm manager level. This approach may be especially consonant with public investments and state-owned enterprises. Second, the output maximization objective can be achieved indirectly by the state setting very low interest rates. Here, managers of firms may still seek to maximize profits, but they effectively act to maximize output given their subsidized borrowing costs. This approach may be especially consonant with China's centralized control of the financial system. For simplicity, we will take the former approach in the model below.

3.1.3 Applications

These pieces provide candidate explanations for the unusual behavior of the Chinese macroeconomy.

- Outliers

The hukou system links policy to stylized fact #1, an unusually low labor share of income, while expands the pool of domestic savings, stylized fact #2. The implementation of the five-year-plans, with their growth objectives, links policy to stylized fact #3 – unusually high rates of investment.

This story may also inform recent dynamics

- Dynamics

When labor productivity growth in cities rises faster than rural areas (e.g. because of exogenous reforms or because investment is targeted to cities), migrant wages, which hinge on the rural outside option, fall further relative to their marginal products. In consequence, the labor share falls further and domestic savings rise further, allowing further increases in the domestic investment rate. The increased domestic investment rate allows the state to meet sustained, high growth targets, despite diminishing returns.

The following, preliminary analysis considers that labor market and output maximization pieces of the model.

4 The Model

We use an equilibrium search model in the style of Pissarides (2000) to characterize the labor market. We focus on migrant labor – rural-registered workers seeking higher-paying jobs in cities, who are engaged in a search process. The central mechanism emphasizes that urban vacancies for rural-registered workers are scarce so that migrant workers have weak bargaining power over wages when offered jobs. Vacancies are scarce because the hukou system limits the employment of rural workers in cities, keeping would-be migrants in oversupply. Effectively, urban firms have a collective form of monopsony power over migrants, even though there are many urban firms who themselves are not collusive.

Consider three types of workers:
u = urban workers (urban registered)
a = rural workers (rural registered)
m = migrant workers (rural registered)
Let there be L workers in China, where

$$L_m + L_u + L_a = L$$

Let wages be denoted w_j, where $j \in \{u, a, m\}$ is the type of worker. For simplicity, rural workers earn a competitive wage, w_a, when staying in the rural

sector, while urban (registered) workers earn a competitive wage, w_u, in the urban sector.

Migrant wages are determined through bargaining. Let the share of migrant employment in urban firms be limited by policy as

$$L_m/L_u \leq \theta$$

This "hukou" policy parameter, θ, creates limited vacancies for rural workers in the city, which is the key to the wage behavior. It is taken as a simple way of modeling the various restrictions imposed on migrants.

4.1 Matching

Job vacancies are filled when firms and migrant workers meet. If vacancies are scarce, then migrant workers find it hard to match. This scarcity worsens the outside option of the migrant worker, and their wage paid falls as a result.

For simplicity, let employment be forever – there is no job destruction.[6] The "unemployed" are the mass of rural workers, L_a. The mass of urban vacancies for rural workers is V. Let the matching function be $M(L_a, V)$, which is constant returns to scale. Define the ratio of vacancies to rural workers as $z = V/L_a$. The rate at which rural workers find urban jobs is

$$b(z) = \frac{M(L_a, V)}{L_a} = M(1, z)$$

and the rate at which vacancies are filled is

$$c(z) = \frac{M(L_a, V)}{V} = b\left(z\right)/z$$

4.2 Value Functions

The Bellman equations for rural workers and the firms that employ them are

$$\begin{aligned} rV_m &= w_m && (3)\\ rV_a &= w_a + b\left(V_m - V_a\right) && (4)\\ rV_F &= v_m - w_m && (5)\\ rV_V &= c\left(V_F - V_V\right) && (6) \end{aligned}$$

where V_m is the net present value of being employed as a migrant worker, V_a is the NPV of rural employment, V_F is the firms' NPV from filling a job with a migrant, and V_V is the NPV of a vacancy. The flow value v_m is the marginal value-added of a migrant worker for the urban firm. In equilibrium, this will be the same as the registered urban wage, w_u.

[6] Job destruction could easily be introduced.

4.3 The Migrant Wage

The rural wage, w_a, and the value-added of the migrant worker, v_m, are known. They come from the production functions and optimization behavior in agricultural firms and urban firms, which we leave aside for now.

Using a standard (NBS) bargaining concept, we'll assume that the wage w_m is determined such that firm and worker have the same net gain against their outside option

$$V_m - V_a = V_F - V_V$$

From (3) and (4) we have

$$V_m - V_a = \frac{w_m - w_a}{b + r}$$

From (5) and (6) we have

$$V_F - V_V = \frac{v_m - w_m}{c + r}$$

Putting these together, we can determine w_m as

$$w_m = \frac{(c + r)\, w_a + (b + r)\, v_m}{b + c + 2r}$$

The wage paid is thus a weighted average of the worker's outside option wage, w_a, and the migrant's value-added in urban work, v_m. We can rewrite this (by adding and subtracting w_a) as

$$w_m = w_a + \frac{b + r}{b + c + 2r}(v_m - w_a) \tag{7}$$

so that the migrant's capacity to extract her additional value-added through urban work will depend on whether vacancies are more or less scarce compared to the rural population (via the b and c terms). Under a broad class of matching functions, scarce vacancies ($z = V/L_a$ is small) mean that c rises without bound and b falls toward 0. Thus lots of rural labor compared to urban vacancies will cause the wage to fall to the outside option, the rural wage. This outcome is the main point of this labor market model. It follows naturally to the extent that Chinese policy successfully limits urban vacancies for rural workers.

Solving for b and c endogenously requires various assumptions about the matching function, etc. The Appendix considers how these endogenous matching rates can be calculated from the matching function and baseline parameters of the model.

4.4 Firms and Investment Behavior

We let the urban and rural sectors have Cobb-Douglas production functions, with the objective to maximize output subject to price-taking behavior for workers; i.e. to maximize the surplus value of labor.

4.4.1 Rural Sector

Let rural sector firms solve the problem

$$\begin{aligned} & \max_{K_a, L_a} K_a^{\alpha} \left(A_a L_a\right)^{1-\alpha} - w_a L_a \\ \dot{K}_a &= I - \delta K_a \end{aligned}$$

where time subscripts are suppressed.

As above, the investment problem is solved where $I_a = Y_a - w_a L_a$ leading to the steady-state capital stock of

$$K_a = \left(Y_a - w_a L_a\right) / \delta$$

and we are continuing to assume the stationary problem with no TFP growth, for simplicity. This program thus produces an elevated capital-output ratio

$$\frac{K_a}{Y_a} = \frac{\alpha}{\delta}$$

in the rural sector, while the labor share is

$$\frac{w_a L_a}{Y_a} = 1 - \alpha$$

Note that the key feature of this program is that investment is maximized conditional on savings (where savings are equivalent to the "surplus value of labor"). The particular approach used here decentralizes the output maximization objective to the firm, where they are all identical, own their own capital stock, and reinvest their retained earnings. Alternatively, one could achieve the same outcome in a program where firms maximize profits but the state sets the rental price of capital, R, such that investment will reach this same rate, exhausting the surplus value of labor.[7,8] Thus, even with firms undertaking profit maximization, the state can achieve an overall output maximization objective through control of the capital market.[9]

4.4.2 Urban Sector

Let urban sector firms solve the problem

$$\begin{aligned} & \max_{K_u, L_u, L_m} K_u^{\alpha} (A_u \left[L_u + L_m\right])^{1-\alpha} - w_u L_u - w_m L_m \\ L_m &\leq \theta L_u \\ \dot{K}_u &= I_u - \delta K_u \end{aligned}$$

[7] In particular, setting $R = 0$ for each firm will deliver the same objective function as featured in the text.

[8] Here, through a capital markets approach, one can also draw in household savings into the pool of domestic savings.

[9] The slight difference will be that, in the current model, the urban and rural sectors will invest based on their own retained earnings, resulting in different capital-output ratios. Otherwise, if the state sets a common (low) R, the same capital-output ratios would result in both urban and rural settings. An additional alternative is directed lending, where the state privileges certain firms (e.g. state-owned versus private, or urban versus rural), in which case greater heterogeneity would be introduced.

where firms are price takers on w_u, but not on w_m. Note the assumption that rural and urban output are perfect substitutes (i.e. have the same price); this assumption could of course be relaxed.

Output is maximized when $I_u = Y_u - w_u L_u - w_m L_m$. Registered urban workers earn a competitive wage (the firm is a price taker) while the migrant wage is determined via the matching model above. In equilibrium, the registered urban wage is the marginal product

$$w_u = (1-\alpha) Y_u / (L_u + L_m) \tag{8}$$

while the migrant wage falls between the urban marginal product and the (lower) rural wage. Therefore, the urban firm will hire as many rural workers as possible, so that

$$L_m = \theta L_u$$

Hence the urban labor share will be

$$\frac{w_u L_u + w_m L_m}{Y_u} = 1 - \alpha - \frac{(w_u - w_m)\,\theta L_u}{Y_u}$$

and the capital-output ratio will be

$$\frac{K_u}{Y_u} = \frac{1}{\delta}\left(\alpha + \frac{(w_u - w_m)\,\theta L_u}{Y_u}\right)$$

4.5 Macroeconomic Aggregates

We begin with the labor share. In the above model, the labor share in China falls due to the urban sector, and China's overall labor share is the GDP-weighted average of the urban and rural labor shares.[10] The decline in the observed labor share in China will then be

$$\Delta labor_share = -\frac{(w_u - w_m)\,\theta L_u}{Y_u}\frac{Y_u}{Y}$$

That is, it depends purely on the wage discount for migrant workers (these are the only workers who are paid below their marginal product). Using (8), we can rewrite this as

$$\Delta labor_share = -\frac{\theta}{1+\theta}(1-\alpha)\left(1 - \frac{w_m}{w_u}\right)\frac{Y_u}{Y} \tag{9}$$

which can be estimated from observed quantities.

The aggregate investment rate in this model, where all non-labor payments are invested, is the GDP-weighted average of the urban and rural investment

[10] This feature proposes an additional test for the theory, although data quality will be an issue: using provincial data, can the rural labor share be shown to exceed the urban labor share?

rates. Therefore, this is just the capital share, α, plus the extra surplus from migrant workers in cities

$$\frac{I}{Y} = \alpha - \Delta labor_share$$

which is also the savings rate. (Recall that we could easily shift up savings and investment by allowing some portion of labor payments to be saved by households.)

The aggregate capital-output ratio is

$$\frac{K}{Y} = \frac{\alpha - \Delta labor_share}{\delta}$$

4.6 Calibration Example

There are approximately 160 million migrant labors in China today (Chan 2012). Extrapolating from Xu (2000), the urban labor force is probably around 300 million. This suggests that $\theta \in [1/2, 1]$ may be reasonable. Meanwhile, we might take the wage discount as $w_m/w_u \approx 1/2$, drawing on the figure above. With a 50-50 urban-rural population split (Chan 2012) and an approximate 5x urban-rural productivity advantage (as in figure above) we might further choose $Y_u/Y \approx 4/5$. Assuming $\alpha = 1/3$ as is standard, the decline in the labor share would then be

θ	w_m/w_u	Y_u/Y	$\Delta labor_share$
1/3	1/2	4/5	-6.7%
1/2	1/2	4/5	-8.8%
1/2	1/3	4/5	-11.9%
1	1/2	4/5	-13.3%
1	1/3	4/5	-17.8%

where the decline in the labor share in our simple model is equivalently the increase in the investment and savings rate beyond 1/3. So this model can give us I/Y and $S/Y \in [.4, .5]$ quite easily.[11,12]

4.7 Dynamics

[To be added]

[11] Chinese aggregates feature $S > I$ and hence a current account surplus. In the above model, aggregate savings is the surplus value of labor. With the labor share falling to 50%, the savings rate rises to 50%. More generally, we could add in household savings rates, raising S, and government taxes and consumption from the surplus value of labor, lowering S. Moreover, decisions by the government to buy Treasuries will create $S > I$.

[12] It may be the case that θ is lower then in the calculations above. More generally, it may be difficult to calibrate the model, given reasonable parameters, to the observed decline in the labor share. In that case, one fix would be to introduce wage supression in the urban and/or rural sector as well, given state control of property rights and state-owned entreprises, which disproportionately employ workers with hukou.

Dynamics can be added by considering relative shocks to urban and rural sector productivity. The effects seem straightforward: a relative positive shock to urban productivity will cause w_m/w_u to fall and Y_u/Y to rise. These will drive down the labor share while increasing savings rate (the surplus value of labor), investment rate, and capital-output ratio. These effects seem consistent with observed behavior.

5 Discussion

[To be added]

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6 Appendix

The above analysis takes wage data and labor allocations as primitives in analyzing the labor share. More generally, one can derive the migrant wage and its consequences by considering the underlying matching technology. This appendix considers how matching rates can be derived from a specific matching function.

In a normal matching model, vacancies can be created for free and hence the equilibrium value of a vacancy must be zero, which is used to determine the vacancy and unemployment rates. However, in this China model, vacancies for migrants are constrained by state policy. Hence vacancies are scarce and have positive value; one can solve for vacancy and unemployment rates directly as a function of state policy.[13]

In particular, assume that the vacancy rate is created according to our hukou policy, where the government allows vacancies based on the rule that $L_m/L_u \leq \theta$. If the state allows vacancies such that the equilibrium rate of migrant employment hits its employment constraint, then L_m is known directly as

$$L_m = \theta L_u$$

where L_u is also a policy parameter. The level of agricultural employment is therefore

$$L_a = L - (1+\theta) L_u$$

and employment matches are such that $\dot{L}_m = M(L_a, V)$ or, letting the growth rate of population be n,

$$n\theta L_u = M(L - (1+\theta) L_u, V) \tag{10}$$

which gives us an implicit function for the mass of vacancies.

Example 2 *Let the matching function be* $M(L_a, V) = \kappa L_a^{1/2} V^{1/2}$. *From (10) we have* $n\theta L_u = \kappa \left(L - (1+\theta) L_u\right)^{1/2} V^{1/2}$ *and can then write, with some manipulation, a normalized version using the urban labor share as*

$$V = \left(\frac{n\theta}{\kappa}\right)^2 \frac{s_u}{1 - (1+\theta) s_u} L_u$$

[13] The value of a vacancy is (from (5), (6), and (7))

$$V_V = \frac{c}{r}\left(\frac{v_m - w_a}{b + c + 2r}\right)$$

which depends on the two endogenous parameters b and c, representing the match rates. When vacancies become very scarce compared to rural workers, then $\lim_{V/L_a \to 0} V_V = \frac{v_m - w_a}{r}$; the value of a vacancy, which is filled instantly, becomes the NPV of the margin between the migrant worker's value added and their rural wage.

The number of vacancies are then determined from exogenous parameters – some of which are policy parameters in China, including θ, s_u (hukou parameters) and even n (the one-child policy). The matching rates are

$$\begin{aligned} b &= \frac{n\theta s_u}{1-(1+\theta)\,s_u} \\ c &= \kappa^2/b \end{aligned}$$

which allows explicit calculation of the migrant wage in (7).

Figure 1: Labor Shares, China versus Rest of World

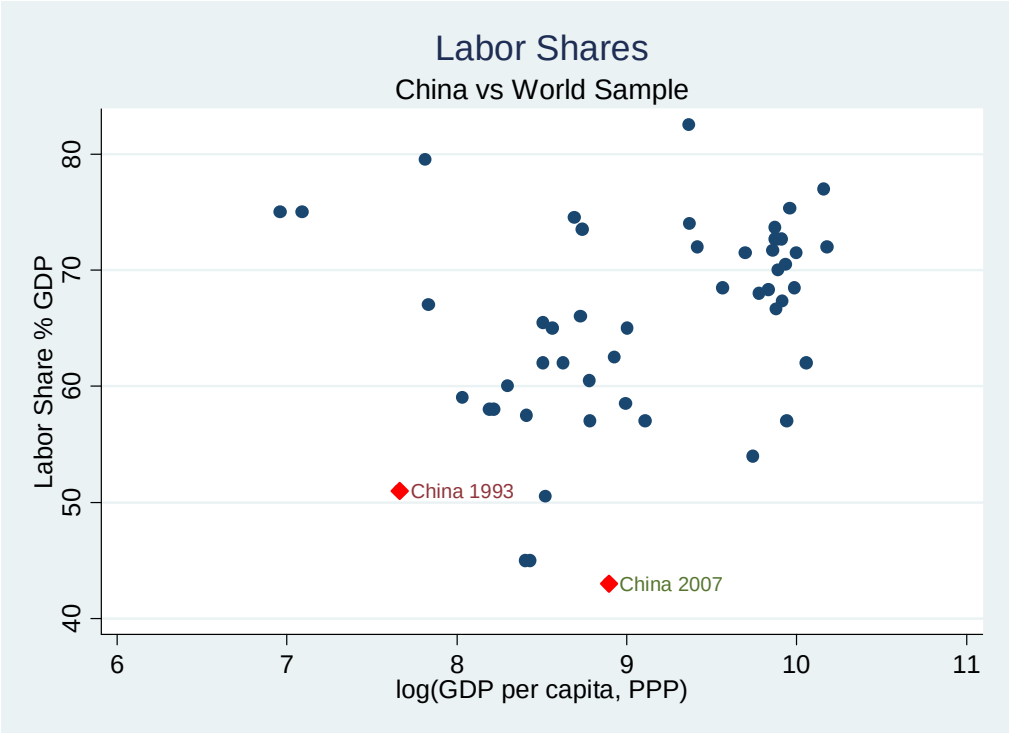


Figure 2: Savings Rates, China versus Rest of World

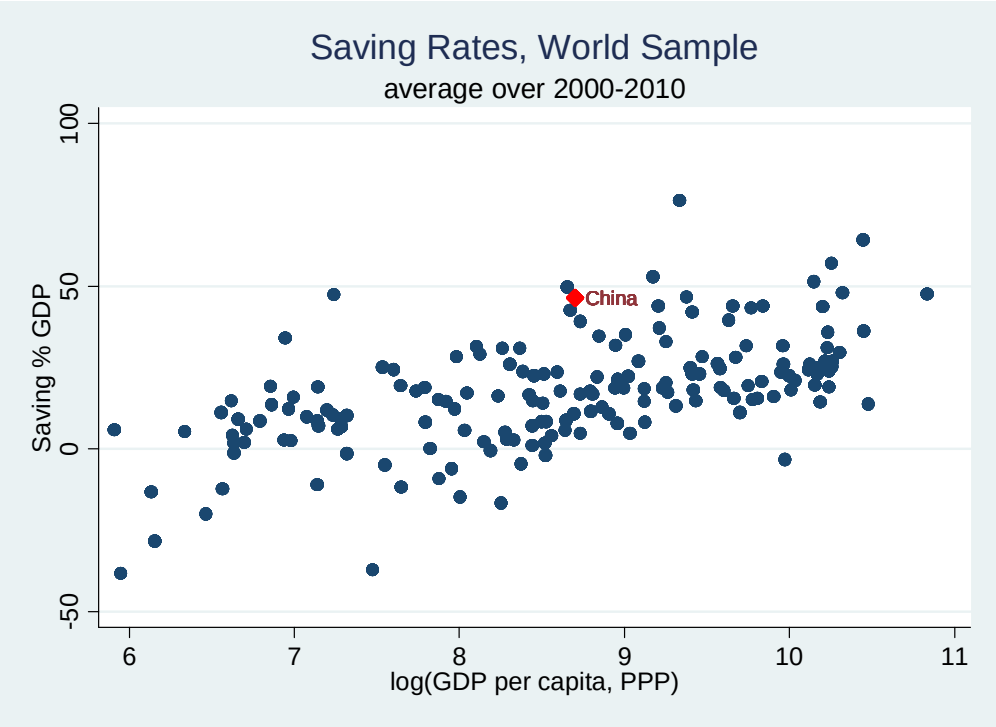


Figure 3: Savings Rates, China versus Rest of World Excluding Oil States and States with Less than 1 Million Inhabitants

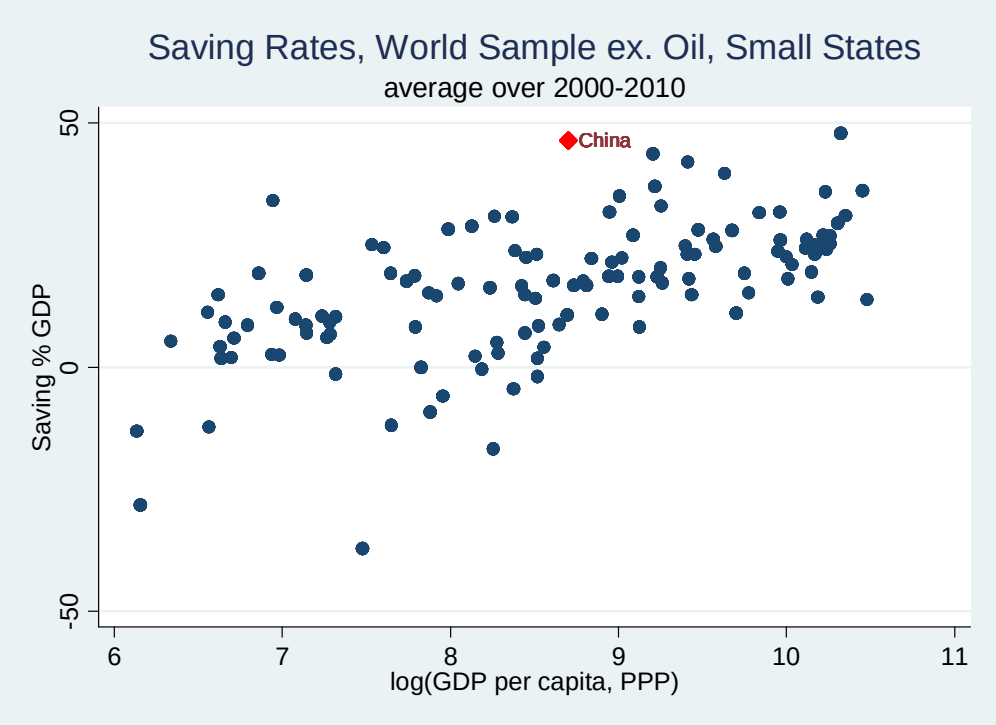


Figure 4: Savings Rates, China versus Other Asian Miracles

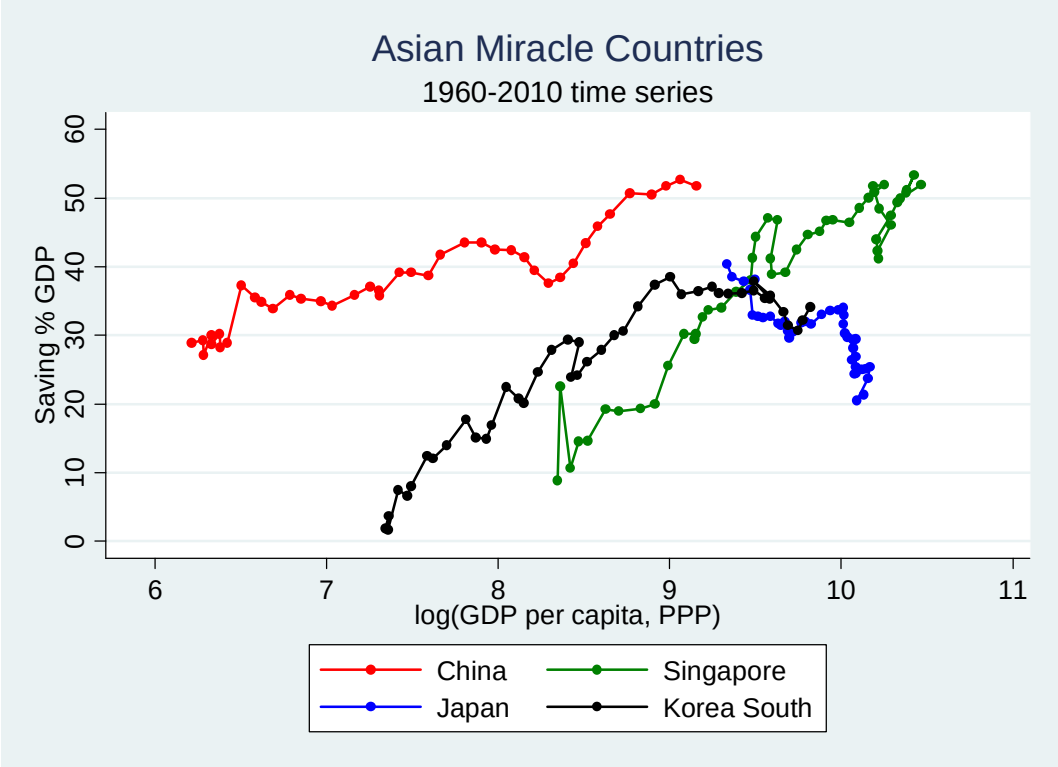


Figure 5: Investment Rates, China versus Rest of World

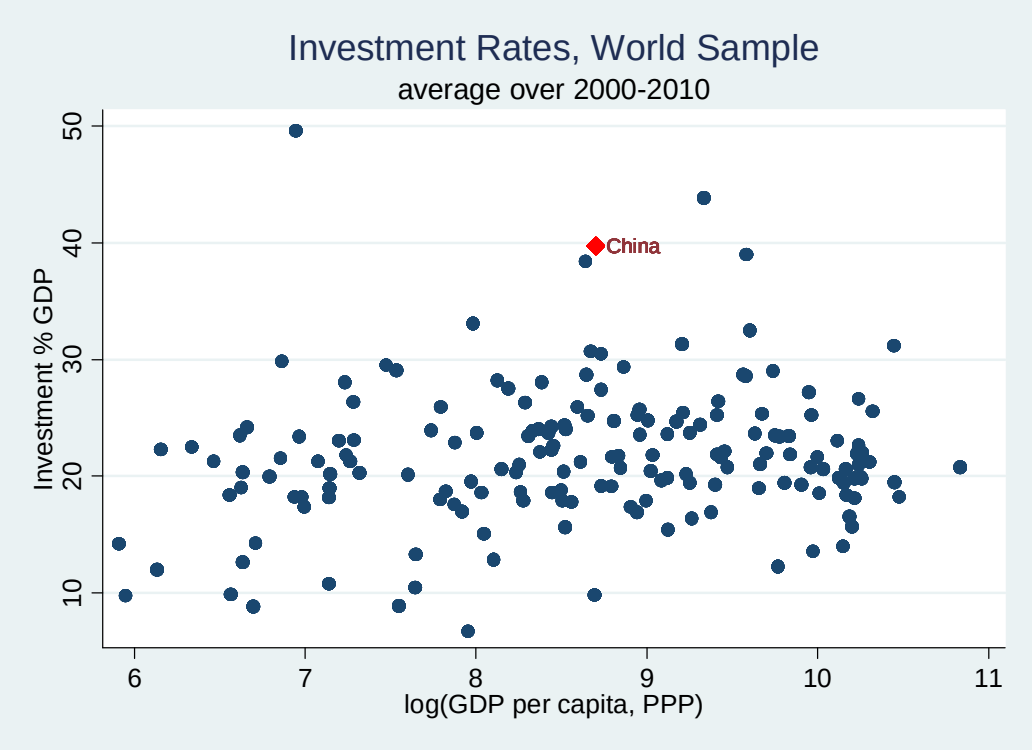


Figure 6: Investment Rates, China versus Other Asian Miracles

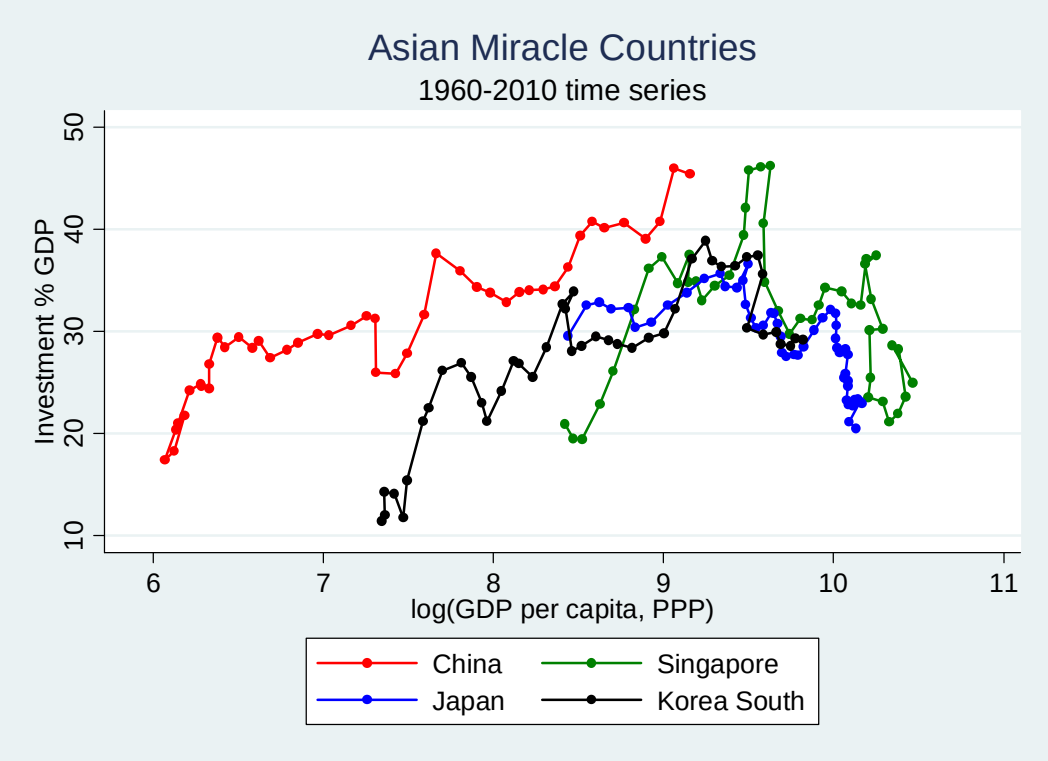


Figure 7: Urban, Rural, and Migrant Wages

