

Innovation, Growth, and Finance in Large Urban Agglomerations

Bin Wang

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The trends of rapid urbanization caused urban economists to develop theories of city systems since the mid-1970s. Basic statements in the theoretical literature of urban economics say that government policies such as tariffs, price controls and subsidies influence urbanization indirectly through their effect on sector composition. Furthermore, urbanization benefits from information and knowledge spillovers in agglomerations and thus encourages economic growth. China's distinctive features and outcomes of its urbanization and especially, Shanghai a case study in this thesis, impacts of the decisions of institutions and governance are determined. The results show, that according to the economic structure of a global metropolitan city, Shanghai is on the right way to reach this status. However, social inequality suffers enormously under rapid growth and urbanization. In addition, there are also lack of transparent, autonomous legal and financial system and hardly defined individual property rights. Another point is China's migration restriction, causing cities being statistically undersized, and therefore limiting productivity.

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1 Introduction

In 1975, the world counted 4.07 billion people. According to statistics of the United Nations it reached 6.46 billion in 2005. This increase is almost equivalent to the increase of world population saw in 1950. The fact that growth, since 1950 has mostly occurred in less developed countries¹, especially in the least developed countries² is also worth mentioning. The population gap between more developed³ and less developed countries rose from 1950 with 0.91 billion to 4.04 billion in 2005.

Due to the fast growth of world population, international development and world politics is faced with great challenges. Dividing the world population into urban and rural population we can almost perceive the impacts of population growth on world development. Especially the development of less developed countries. In 2005 there were 3.15 billion people living in urban areas with an average annual growth rate of 2% and 3.31 billion people living in rural areas with only growth rates of 0.4% . Less developed countries had 2.7% urban and 0.5% rural annual growth rates, whereas more developed countries only had 0.5% urban and even a negative rural growth rate of 0.4%. It is expected that in 2030 the world population will reach 8.19 billion with 4.91 billion people living in urban and 3.28 billion in rural areas. At that time less developed countries will accomodate 3.9 billion people in urban and 3.04 billion people in rural areas instead of 2.25 and 3 billion in 2005. In contrast, more developed regions, had only 0.89 billion people in urban and 0.31 billion in rural areas in 2005 and will increase their

¹Less developed countries comprise all regions of Africa, Asia (excluding Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.

²Least developed countries include 50 countries. 34 are in Africa, 10 in Asia, 1 in Latin America and 5 in Oceania.

³More developed countries comprise Europe, Northern America, Australia/New Zealand and Japan.

urban population to 1 billion while rural population will fall to 0.23 billion in 2030 [1].

The effects of this enormous growth are not only the population growth in already large agglomerations but also the increase of cities. In 2001 the number of cities with 5 million inhabitants or more was about 40 and will rise up to 58 in 2015. Furthermore, the number of cities with 10 million inhabitants or more, the so-called mega-cities is expected to reach 21 in 2015. Since the growth of urban population mostly occurs in less developed countries, it is not surprising that in 2001, 31 out of 40 cities with 5 million inhabitants or more and 48 out of 58 cities in 2015 are located in these less developed countries [2].

China the most populous country denoted an average annual urban growth rate of 3.1% and a rural decline of 0.9%. Hence, it is expected that China's urban population will increase from 0.53 billion in 2005 to 0.87 billion in 2030 while its rural population will decrease from 0.78 billion in 2005 to 0.57 billion in 2030. To demonstrate these figures in percentage 40.4% of China's population was living in cities in 2005 but in 2030 urban population will reach 60.3% [1]. Consequently, China's national and local authorities are facing serious challenges due to its urbanization and steady growth. Given the connection between urbanization and economic development, the related question is how they intersect with or define each other? How do governance and public policy affect urban and economic growth. Moreover, how can Institutions regulating land markets, property rights, local government autonomy, local financing and local public debt accumulation boost and restrain both urban and economic growth respectively. Beside all this, public infrastructure investments, the internal structure of cities and national government policies concerning migration policy, trade policy, income policy, national investment in communications and transport infrastructure are also important factors [6]. In addition to these national factors, how do foreign direct investments support city growth?

This thesis is separated into two parts. The first part will introduce theories of systems of cities on the prime literature in urban economics. The second part provides an empirical look on the issue⁴, determining some distinctive features of China's urbanization. Shanghai will be

⁴Note, that almost all data in chapter 3 are extracted from diverse Shanghai Statistical Yearbooks from 1996 to 2007, except for figure 3.17, 3.18, and 3.19.

the main city we will concentrate on.

2 Theories of Systems of Cities

Urbanization is an outcome of industrialization. People move from low-productivity rural agricultural activities to higher-productivity urban manufacturing and service activities. Driving forces for rural-urban migration¹ are, on the one hand, rural property structure, insufficient living conditions, poor infrastructure, missing employment and education in rural sectors, whereas on the other hand cities ensure better working conditions, higher earnings, rich supply of education and training and a wide range of consumption [7]. The rapid urbanization trends have caused urban economists to develop theories of city systems since the mid-1970s. Basic statements in the theoretical literature in urban economics say that government policies such as tariffs, price controls and subsidies influence urbanization indirectly through their effect on sector composition. Furthermore, urbanization benefits from information and knowledge spillovers in agglomerations and thus encourages economics growth [6].

For a first understanding, this chapter will introduce two basic models of urban economics, Alonso-Muth-Mills and Rosen-Roback. Thereafter we will have an mathematical continuation and deepening and as well as enlargement to these traditional equilibrium models on the basis of different works in the literature, such as Abdel-Rahman and Anas (2003) [8] and Henderson and Becker (2000) [9] to understand the links between cities, growth, urbanization and policies. The model shows the internal structure of a city highlighting the organization of land use around a Central Business District.

¹The increase of urban population does not originate from rural-urban migration only but also from natural population growth in cities and reestablishment of cities [7].

2.1 An Economic Approach

Glaeser [3] mentioned in his work three pillars of economics shaping the economic approach to cities. First, people respond to incentives. With this principle, we might explain the choice of locations. The second pillar is a no arbitrage equilibrium, which has again three key conditions: individuals, firms and builders must be indifferent across space, over hiring new workers, and about building or not building new units. This means all in all, that wages received by workers plus amenities minus costs of housing have to be equal everywhere. Furthermore, wages must be offset by differences in productivity. And housing prices cannot exceed by far those of total cost of construction. With this second pillar we are able to examine and predict individual decisions. Third, good policies increase utility levels of individual resulting in giving people more choices and more options.

In the following we will have a look on the spatial equilibrium for workers, employers and builders, which the economic approach relies on. Its feature predicts that something good in one location is offset by something bad. Afterwards, we will concern ourselves with Alonso-Muth-Mills model and Rosen-Roback model. Both of them inherit the spatial equilibrium concept. In the former high prices close to the center of a city are offset by short commutes. In the latter high income is offset by high prices and disamenities.

2.1.1 The spatial equilibrium

As mentioned before in arbitrage equilibrium - individuals are indifferent across location - the spatial equilibrium assumes a linear utility function, which is constant everywhere:

$$Income + Amenties - HousingCosts - TransportationCosts. \quad (2.1)$$

In the intra-urban Alonso-Muth-Mills model income of workers is constant, whereas the question is to find out whether high housing costs are offset by low transportation costs or low amenities. The inter-urban Rosen-Roback model looks whether high income is offset by high prices or low amenities.

2.1.1.1 The Alonso-Muth-Mills Model

The model of Alonso (1964), which was extended by Mills (1967) and Muth (1969) years after, assumed constancy of both income and amenities. This again implies housing costs and costs of transportation to be constant as well when looking at the utility function (2.1). So, housing costs decline if transport costs rise with distance to the center and vice versa. It has to be noted, that this is a very simple case, where all people in the city are working in the city center and commuting costs rise linearly with distance to the center ². Although empirical data corroborate this model in large part, however, economists found cases, in which housing costs drop with rising distance firstly but then flattens out.

First Permutation

Assume that people can go to work by either walking or driving. To go by feet involves no fixed costs, but cost of t_w times distance. To drive involves fixed costs, such as buying a car or bicycle, but has lower cost of t_d times distance. If an individual aims for an optimal use of time and income, then he should walk to his work until $t_w - t_d$ equals fixed cost. Whereas, he should invest in a car or bicycle, if the save of time is big enough to pay for it.

After this slight variant of having two kinds of commuting costs, housing costs now decline by t_w times distance in areas with proximity to the city center. Housing costs in areas that are further away decline by t_d . This implies the observed convex relationship between housing and transportation cost.

Second Permutation

This second variation expands the base model by allowing densities to respond to demand. We now can assume the following situations: land consumption is flexible. People will avoid consuming much land in areas that is expensive with proximity to the city. On the other hand, as land is expensive in the center, builders will build up and thus offer a greater supply. And by incorporating the incentive principle, higher density in the city can be achieved due to the

²See Appendix A [32].

greater willingness to pay for the valuable proximity. According to this second permutation it can be shown, that the closer to the city center the greater the density. As stated by Glaeser in his paper [3], for each unit of distance from Boston, density drops about 8%.

Miscellaneous extensions

There is one characteristic in Alonso-Muth-Mills model, that is no longer valid in our world anymore: the assumption of the world to be monocentric. But some economists extended the model by adding multiple centers, where employment is located. After doing so, they found that cities, whose employment is more decentralised have a lower decline of housing costs with rising distance.

The role of Alonso-Muth-Mills model lies in its ability to predict housing prices, density levels, and location of different group of people. In which area do rich or poor inhabitants prefer to live? According to which criterions do they choose where to live? For example, poverty rates in American cities are higher in city centers. The access to public transportation is able to explain this accumulation of the poor. At the same time, the rich desire to live on the urban edge, where they own more cheap land. But another reason is the preference of having lower commuting costs per mile.

2.1.1.2 The Rosen-Roback Model

The decisive difference between the two models Rosen-Roback and Alonso-Muth-Mills is, that the former assumes income and amenities to be different across land. A single metropolitan area however, is seen as a homogeneous entity, where people have same costs of housing and transportation and amenity levels. According to these assumptions, the Rosen-Roback model tries to understand prices across metropolitan areas ³. If we let the utility function (2.1) return to our mind, we will note that the spatial equilibrium demands either high income or high amenities or both if housing costs are high. Rosen found out that determining the price of amenities needs us to observe both wages and prices. Also empirical data could show, that people did swap income and housing costs for more amenities.

³See Appendix B [31].

Miscellaneous extensions

Some economists extended the Rosen-Roback model in terms of amenities. Their research focused on how far people are willing to pay for different types of government. Another interesting outcome is the natural amenity warmth. The American Chamber of Commerce Research Association (ACCRA) reported, that people in warm areas have lower income than those in colder areas [3][4]. As temperature in January rised by 10 degrees, peoples income also drops by 720 dollars. Futhermore, it confirmed that high income is offset by negative amenities, such as long commutes, which offset it. Commuting time increases by 1.5 minutes as income increases by 10,000 dollars.

2.1.2 Industry Agglomeration and Housing Supply

Until now, we only had a look at one side of a city's economy. We asked where people choose to live and what criterions persuade them to do so? But, obviously, things are not as easy as that. In this section, we will turn to the same questions as we did before to understand the decisions of employers and builders. By doing so, we will fully understand the distribution of people, prices and wages across land.

The Location of Firms

In general, economists use the no-arbitrage equilibrium assumption to understand location decisions of firms. The core assumption indicates that, where firms face higher costs, there must be something good offsetting it. The most obvious positive would be the fact, that high wage areas are more economically productive. This circumstance would affect firms to stay. By why are some places so productive and worth receiving high wages from firms? According to Glaeser [3], those places have either innate geographic advantages or man-made. Innate advantage could be valuable resources such as sea ports, whereas man-made could be high density of customers and suppliers. Through the advantages of proximity, firms save transport costs and therefore are more productive and give higher wages.

But fact is, transport costs for goods declined since the last century. Reasons therefore are,

first, proximity to locational advantages became more and more unimportant. And, second, wages in those areas decreased to the level of those of the rest of the country. As mentioned by Glaeser, while local advantages are not as valuable as in the past, wage and productivity do differ across land and those differences are getting as large as ever. According to which amenities do firms now choose to locate? It can be shown, that although the cost of transportation of goods declined, transport of people did not. Obviously, it is rather easy to explain this outcome. Note, that time plays an important role in moving people from A to B. And since, value of time rises with increasing wage, cost of transportation of people is high. It is a fact, that many cities, especially high wage metropolitan areas tend to specialize in face-to-face services, such as law, finance, accounting or consulting. Those kinds of business units are more productive in high density areas, where they are close to customers and also to each other. Aside from reducing transport costs of moving their staff to customers, proximity also increases the access to ideas of those firms.

Economists call this outcome human capital spillovers - people learn from each other by interacting with each other. Glaeser mentioned, that people living in more educated areas earn more. High wages again reflect high productivity in this area due to smart people producing more ideas. Apart from productivity, economists argued, that there is also a connection between human capital and city growth. In other words, cities with more intelligent people will also succeed and grow.

Housing Supply

Empirical data on housing supply could show, that there exists a relationship between the change in percentage of the number of people living in a city and that of the number of homes. In view of this matter of fact, we should ask what kind of factors determine the supply of housing.

Again we choose housing market to obey the no arbitrage equilibrium condition. According to this equilibrium selling price of housing must not be higher than the total cost of supplying one. If so, then a new home will be built. Thus, builder will keep on building units until total cost of building a new one equals housing costs. Although, the housing market does not work

as easy as assumed and have imperfections, the equilibrium condition still is the best tool for understanding housing supply.

According to empirical data, locations do not only differ in their housing demand, but also in their supply. And differences in supply could arise, from variation in the cost of construction, such as labor, or disparity in geographical endowment, like the lack of land. Glaeser mentioned an interesting hypothesis in this work [3]. He argued, that regulations in land use are the main reasons, which explain differences in housing supply. In his opinion, price and costs differences are therefore caused by regulations on building new units. So if this assumption is correct, then housing market regulations will also have large effects on urban growth.

2.1.3 Transport Costs

After this short introduction of foundational model of urban economics, the remarkable role of transportation emerges. In this section, we will see into the changes and outcomes of the decline of transport costs, which is based on the work of Glaeser [4] and [5].

Consider the classic monocentric model Alonso-Muth-Mills Model, employment happens in the city center or central business district (CBD). Workers walk by foot to their work or take public transportations. Produced outputs are shipped or transported to customers. Historically, transport costs were high since rail ways and roads were expensive, and former cities were located on waterways. But transport costs also divided cities in hierarchy, where the larger cities on the coast were depots for goods and smaller ones in the hinterland provided basic services. However, as time comes, transport costs declined and "infrastructure-heavy transport", such as by rail or ship, changed to "infrastructure-light transport" by cars and trucks. However, transport costs in moving people remained expensive. According to Glaeser, 18% of total household expenditure is spent on buying a vehicle, its expense, notwithstanding the time costs of moving people. As mentioned above time costs rise as wages rise.

At a time, when natural resources accounted for a large share of the economy, a large part of labor worked in the agricultural sector. The biggest cities were located near ocean ports or rail depots and acted as transport hubs. However, with the decline of transport costs, things changed. The part of labor working in agricultural sector declined, whereas those working

in services increased. Aside of using more flexible transport methods, like cars and trucks, public transportations for human beings also became increasingly important. The result are naturally created agglomerations. The former biggest cities began to weaken. Instead of natural resources other natural amenities, such as warmth and government policies [3] got more relevant. So people are leaving those big cities and now live in smaller metropolitan areas and monocentric cities cleared the way for polycentric regions.

In conclusion there are some significant implications resulting from the declining transport costs, according to Glaeser:

- Natural resources no longer play an important role to people.
- Instead, natural advantages, such as warmth or government policies are becoming more important.
- Consequently, several metropolitan regions arise.
- Living in high-density area, public transportation is becoming increasingly irrelevant.
- Service is tied to high-density areas, contrary to manufacturing.
- The reason for this outcome is, that service needs proximity to its customer while manufacturing does not.
- Density and education go hand in hand.
- But as congestion goes beyond some threshold level, productivity will decline.

All in all we can see, that cities are changing both their location and functions. The inner situation is changing as well: due to greater mobilization, cities began to sprawl.

2.2 Internal Structure of Cities

Consider a monocentric and circular city, where production ignores land and occurs at the Central Business District (CBD). Furthermore, labor is the only input in the production process, whereas human capital is supplied by the consumers living in the city. Surrounding the

CBD in a circle are residence, where every consumer has a fixed lot size of one unit of land and a unit amount of time for labor and commuting. The cost of commuting a unit distance for a round-trip is t . If consumer's residence is located r units of distance from the CBD, then his human capital is $H(r) = 1 - tr$, whereas t is an exogenous constant and H is the aggregate labor. Let N denote the number of consumer living in the city, which has a radius of \bar{r} . The maximum radius for a city can be achieved by setting $H(r)$ to zero, since a consumer residing beyond $\bar{r} = \frac{1}{t}$ would spend all his time on commuting to CBD. And since the lot size equals one,

$$\bar{r} = \sqrt{\frac{N}{\pi}}. \quad (2.2)$$

Therefore, the maximum population in that city is $N_{max} = \frac{\pi}{t^2}$. Aggregate labor is obtained by integrating over the residential area

$$H = \int_0^{\bar{r}} 2\pi r H(r) dr = N(1 - kN^{\frac{1}{2}}), \quad (2.3)$$

where $k \equiv \frac{2t}{3\sqrt{\pi}}$.

An equilibrium in residential markets requires all residents to have no relocation costs - independent of where they live in the city - and to spend the same amount on rent plus commuting costs. Since everyone has the same amount disposable income to spend on consumption, residents have the same level of utility: $V(\mathbf{p}, I)$ is the indirect utility, where \mathbf{p} is the market price vector of goods in the city and I is the disposable income of residents. Disposable income is income less commuting costs and the rent of a residents' lot. Since the level of utility is invariant in the whole city like mentioned before, all people face the same \mathbf{p} . Therefore, the disposable income is also the same for everyone. And since the disposable income is the same, rent must be invariant with location. It is assumed that rents at the city edge are normalized to zero and each unit time, which is spend on commuting to the CBD and back is valued at the wage rate w . Hence, commuting cost is $C(r) = wtr$ and rent at radius r is $R(r) = t(\bar{r} - r)w$, where $0 \leq r \leq \bar{r}$. Altogether, aggregate location cost (ALC) is

$$ALC(N) = N(R(r) + C(r)) = \frac{wtN^{\frac{3}{2}}}{\sqrt{\pi}}.^4 \quad (2.4)$$

⁴ $R(r) + C(r) = wt\bar{r} = \frac{wtN^{\frac{1}{2}}}{\sqrt{\pi}}$, where \bar{r} is given by (2.1)

Note that $ALC(N)$ is not dependent of r but is increasing with population N .

In the equilibrium model, land development companies or the local government collect rent and then redistribute the average rent to the inhabitants. Thus the aggregate land rent (ALR) is

$$ALR(N) = \int_0^{\bar{r}} 2\pi r R(r) dr = \frac{wtN^{\frac{3}{2}}}{3\sqrt{\pi}}. \quad (2.5)$$

As well $ALR(N)$ is an increasing function of N but $ALC(N)$ is rising three times faster. However, the disposable income is

$$I(N) = w + \frac{ALR(N)}{N} - \frac{ALC(N)}{N} = (1 - kN^{\frac{1}{2}})w. \quad (2.6)$$

The disposable income is decreasing with rising city's population N . Why is that? With increasing N city size will increase as well, which causes residents to spend more time on commuting to the CBD, that in turn effects falls in disposable income. That means, the more residents move to the city, the lower the utility. These conditions limiting each city's size are so-called *centrifugal forces*. But it also requires each city to experience *centripetal forces* of attraction, otherwise cities would not exist.

2.3 Optimal City Size

This section will address three economies of scale model showing *centripetal* conditions, which generate benefits in urban agglomerations. The first model and condition rely on a public good, that is funded by all residents in the city. That means, the more inhabitants a city have the lower is the average cost of this public good. The content of the second model is about demand for a broad variety of products of consumers and intermediate products of producers respectively. Both concentrate in a city for generating a large market, so a broad variety of output and input can be provided. The last model relies on productivity increase, that occurs if there is concentration of labor in the same industry - the black-box model of Marshallian externalities.

The characteristic of these three models is that the utility level increases if new residents move into the city until it reaches an optimal city size. Optimal city size means that centripetal

and centrifugal conditions are in balance. That again means a size beyond the optimal city size will reduce utility with each new immigrant. In all three models there will be the indirect utility of the form $V(\mathbf{p}, Q, I(N))$. \mathbf{p} is the market price of public goods and Q is the quantity. $I(N) = (1 - kN^{\frac{1}{2}})w$ is the disposable income and w is the urban wage.

2.3.1 Local public good

It is assumed that a city competitively produces a private good x under constant returns with labor as the only input in the production process. The market price is p_x , whereas no trade costs are assumed. Hence $w = p_x$. The direct utility function is supposed to be $U = x^\alpha y^\beta f(Q)$, where $\alpha + \beta = 1$. x is the quantity of consumed domestic private good and y is that of imported foreign product. $f(Q) = Q^\mu$, where Q is the aggregate expenditure on x and μ is the elasticity of utility with respect to public expenditure. That means, residents have to pay a lump sum tax T , to finance this public good. So, $Q = TN$ and indirect utility after taxing is now $V(\mathbf{p}, Q, I(N) - T)$. Now, we assume the tax, given N , is utility maximizing: $T^* = \frac{\mu}{1+\mu} I(N)$. Consequently, after-tax utility changes to $V(\mathbf{p}, NT^*, I(N) - T^*)$ and the optimal city size would be maximizing it with respect to N . As given in Abdel-Rahman and Anas (2003) [8]:

$$N^* = \frac{9\mu^2}{9\mu^2 + 6\mu + 1} N_{max}, \quad (2.7)$$

where $N_{max} = \frac{4}{9k^2}$. As the unit commuting cost k falls N^* increases and the same holds if μ increases. If $\mu = 0$ then no cities exist, $N^* = 0$, whereas if $\mu \rightarrow \infty$ centripetal force cause maximally sized cities, $N^* \rightarrow N_{max}$.

2.3.2 Product variety

Consumers benefit from a larger domestic market because more products are available then. This, in turn, will turn up their utility level which leads them to concentrate in a city. Whereas higher utility provides the basis of an even larger market. In this model we assume, that m number of products can be consumed in the city, whereas each of these m products is produced in different firms. Total producing cost of z_i units in firm i is $w = (f + cz_i)$. f is a fixed labor

input and c is a marginal labor input per unit. Furthermore, in this model every firm is perfectly competitive in the labor market and pays the same wage, which is numeraire. In the output market all firms are monopolistically competitive (Chamberlin Equilibrium). As shown in Abdel-Rahman and Anas (2003) [8], we take

$$U = \left(x_0, \sum_{i=1}^m x_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

as the utility function of the consumers, where x_0 is a numeraire good and σ is the price elasticity of consumer's demand for each product. A part of their disposable income is spent on x_0 . The imperfect monopolistic competition of firms in the output market and the Cournot-Nash markup condition leads to an distorted income allocation between the numeraire good and the m varieties. In absence of the numeraire good, the utility function is $V(\mathbf{p}, m(N), I(N))$, where $m(N) = \frac{N(1-kN^{\frac{1}{2}})}{f\sigma}$ is the number of products in equilibrium. After evaluating this utility function, shown in [8], we can see that with increasing city size, disposable income decreases and the number of products increases. But if $\sigma \rightarrow \infty$ variety becomes irrelevant and one firm's product are viewed as perfect substitutes for the products of other firms. Furthermore, N^* is the city size, where only a single variety will exist, since no benefit will be gained from a large market. But as $\sigma \rightarrow 1$ then $N^* \rightarrow N_{max}$.

Another circumstance is that fix cost limits the number of firms in equilibrium and prices are above marginal costs. Now, there is the idea of taxing the consumer, just as taxing them for using public goods, in order to subsidize the firms. After all, it could be shown, that efficient allocation can also be achieved without taxing consumer, due to the absence of the numeraire good. The efficient number of varieties is given by the market for a given N by laissez-faire.

2.3.3 Labor productivity

Assume that labor is the only input for firms to produce a numeraire good under constant returns technology. Additionally, it can be assumed, that the more labor is employed, the more productive the labor becomes (Marshallian external effect). Production function of firm is $y_i = A(H)h_i$, which can be also written as $Y = A(H)H$ due to constant returns. H is the aggregate labor and h_i is the labor in firm i . $A(H)$, where $A'(H) > 0$ is the external

scale effect and the marginal and average product of labor and H is given by equation (2.3). Now we assume that the external scale effect increases with the total amount of labor's time at work, $A(H) = H^a$ where $a > 0$. Furthermore, we assume that labor market is competitive and wage $w = A(H) = H^a = N^a(1 - kN^{\frac{1}{2}})^a$. Indirect utility function is $\tilde{V}(\mathbf{p}, N, I(N)) \equiv V(\mathbf{p}, I(N)) = v(\mathbf{p})N^a(1 - kN^{\frac{1}{2}})^{a+1}$ and city size is given by equation (2.7), whereas a replaces μ . If $a = 0$, no external returns to scale exist and $N^* = 0$. If $a \rightarrow \infty$, then $N^* \rightarrow N_{max}$.

Market failure arises because firms do not have incentives for rewarding positive externality in production. As social marginal product is $A'(H)H + A(H) > A(H)$, where $A(H)$ is private marginal product. And the gap between social and private marginal products is $A'(H)H$. We just assume that labor is paid its social marginal product from any source, then wage $w = A'(H)H + A(H) = (1 + a)H^a$. In the end market failure does not affect city size N^* .

3 Features of China's Urbanization

In the 1990s, with the beginning of Deng Xiaoping's journey to the south, China experienced an accelerated reform progress with the aim of establishing a socialist market economy [11]. At the 14th National Communist Party Congress the Central Government and the State Council not only declared to deepen the reform program *Gai ge kai fang* since 1978 but also decided to build Shanghai into a "modern international metropolis" and "international center for economy, finance and trade" [12]. The idea was to open and develop the old industrial base Pudong. This economic development zone was created to further the structural readjustment of industries and to provide the city with commercial and industrial space supported by good physical infrastructure [10]. On the basis of the population growth of Shanghai (Table 3.1), it cannot be overlooked that urbanization is a key factor of China's economic transformation ¹ [13].

In this chapter we will have a close look at some distinctive features and outcomes of China's urbanization discussed in the literature. According to it we will take Shanghai as a special case study.

	<i>Population (millions)</i>					
	<i>1960</i>	<i>1970</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>	<i>2005</i>
Shanghai	8.8	11.2	11.7	13.3	12.9	14.5

Table 3.1: Population of Shanghai 1960-2005

¹Note that China's annual rate of growth during 1994 - 2004 was at 3 - 4%, which is below the 5 - 6% rate of the developing countries Brazil, Columbia, Korea, and Indonesia.

<i>Year</i>	<i>Total Households in 10000</i>	<i>Population in 10000</i>	<i>Male</i>	<i>Female</i>	<i>Agriculture</i>	<i>Non-agriculture</i>	<i>Life Expectancy</i>	<i>Life Expectancy</i>
							<i>Male</i>	<i>Female</i>
1978	291.69	1098.28	542.70	555.58	453.05	645.23	70.69	74.78
1979	296.71	1132.14	560.40	571.74	444.76	687.38	70.64	75.48
1980	303.87	1146.52	569.30	577.22	444.09	702.43	71.25	75.36
1981	314.56	1162.84	578.76	584.08	447.76	715.08	71.28	75.47
1982	321.71	1180.51	588.82	591.69	449.20	731.31	71.77	76.25
1983	330.60	1194.01	596.67	597.34	448.15	745.86	71.15	75.26
1984	340.78	1204.78	602.59	602.19	444.03	760.75	71.73	76.17
1985	351.72	1216.69	609.70	606.99	440.32	776.37	72.14	76.37
1986	364.92	1232.33	618.88	613.45	429.77	802.56	72.54	76.85
1987	380.19	1249.51	628.78	620.73	427.20	822.31	72.32	76.60
1988	394.95	1262.42	635.82	626.60	423.49	838.93	72.50	76.77
1989	406.82	1276.45	643.51	632.94	420.61	855.84	72.85	77.12
1990	415.28	1283.35	647.13	636.22	418.89	864.46	73.16	77.74
1991	425.84	1287.20	649.03	638.17	417.32	869.88	73.58	77.95
1992	431.67	1289.37	649.97	639.40	413.82	875.55	74.04	77.91
1993	438.69	1294.74	652.92	641.82	401.28	893.46	74.04	77.91
1994	444.38	1298.81	655.14	643.67	388.32	910.49	74.29	78.23
1995	450.76	1301.37	656.48	644.89	379.67	921.70	74.11	77.97
1996	457.49	1304.43	657.86	646.57	372.29	932.14	74.07	78.21
1997	461.40	1305.46	657.93	647.53	362.43	943.03	75.18	79.21
1998	465.72	1306.58	658.22	648.36	352.93	953.65	75.06	79.02
1999	470.11	1313.12	661.19	651.93	343.49	969.63	76.38	80.53
2000	475.73	1321.63	665.51	656.12	335.47	986.16	76.71	80.81
2001	478.92	1327.14	668.32	658.82	328.07	999.07	77.47	81.83
2002	481.77	1334.23	672.05	662.18	315.42	1018.81	77.36	81.63
2003	486.06	1341.77	675.47	666.30	300.38	1041.39	77.78	81.81
2004	490.58	1352.39	680.38	672.01	254.79	1097.60	78.08	82.48
2005	496.69	1360.26	683.51	676.75	211.32	1148.94	77.89	82.36
2006	499.54	1368.08	686.66	681.42	194.78	1173.30	78.64	83.29

Table 3.2: General Population Statistics of Shanghai

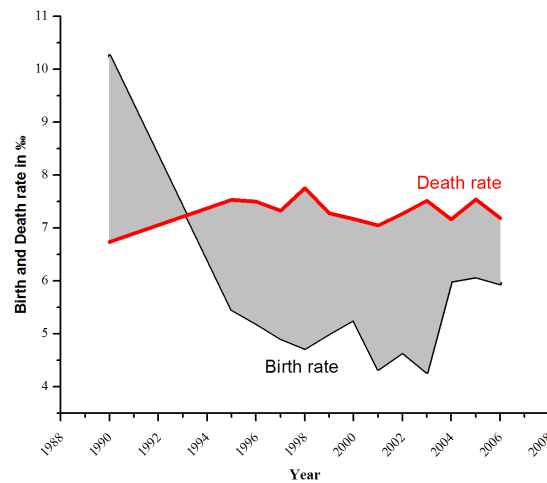


Figure 3.1: Birth and Death Rate of Shanghai

At the beginning we will start with a short introduction of our case study city Shanghai. The city with a land area of 6340.5 square kilometres lies in the Yangtze River Delta, on the east-coast of China. Due to its special administrative status, Shanghai's municipal government has the same status as a provincial government. Shanghai consists of 18 districts and 1 county with 106 towns, 3 townships, 104 urban subdistricts, 3413 neighbourhood committees and 1862 village committees. The city also has three islands Chongming, Changxing and Hengsha. Table 3.2 provides some general statistics about population of that metropolitan area. People working in agricultural sector declined for more than one half, whereas employment in non-agricultural sector increased from 58.7% to 85.8%. In 2006, 11.3% of total population were aged 17 or below, 24% were 18-34, 44.6% were 35-59, and 20.1% were 60 and above. Figure 3.1 shows the decline of birth rate from 10.25% in 1990 to 5.95% in 2006, whereas the red line shows the almost stable death rate, which is actually increasing. According to migration in figure 3.2, the rate of inflow almost did not change in the years 1990 (9.52 per mill) - 2006 (9.43 per mill). In between, the highest inflow rate reached 11.58 per mill in year 2002. By contrast, outflow rate decreased from 8.38 per mill in 1990 to 2.57 per mill in 2006. Especially impressive, is the rise of investments. Since 1990, total capital source increased up to twentytwofold until 2006. And FDI increased almost fourfold within 11 years.

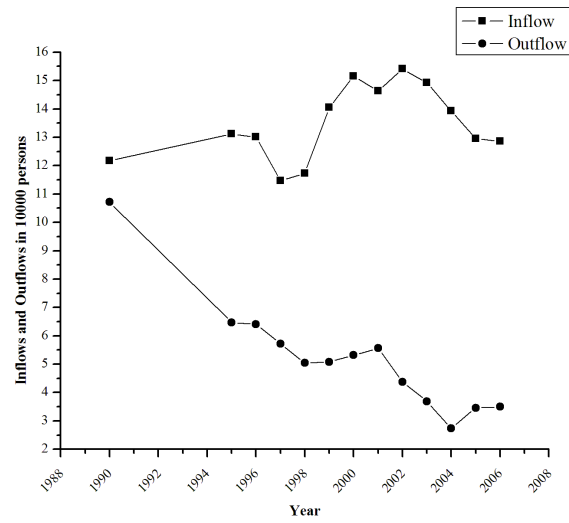


Figure 3.2: Migration Inflow and Outflow of Shanghai

	1990	1995	2000	2002	2005	2006
Total Capital Sources	261.46	1903.5	2061.66	2847.6	5108.34	5746.69
.Balance at End of Previous Year	28.85	237.33	241.05	427.46	860.75	794.67
..Sub-total Capital Source	232.61	1666.17	1820.61	2420.14	4247.59	4952.02
..Domestic Loans	62.52	278.13	379.21	563.64	955.29	1162.17
..Bonds		1.21	4.85	10.03	2.00	
..Foreign Investment	35.46	169.88	161.83	215.12	235.61	271.20
...FDI		58.21	73.71	118.28	181.47	210.46
..Self-financed Capital	94.13	919.26	905.46	1042.01	1976.72	2265.02
...by Government	32.12	100.95	72.63	74.50	108.91	102.39
...by Enterprises and Institutions	57.13	776.48	509.93	739.77	1682.97	1964.70
..Other Capital	26.11	269.36	320.96	560.08	1031.55	1179.30
.Investment Due to pay		54.77	310.42	306.14	651.89	785.85

100 million yuan

Table 3.3: Capital Sources of Investment in Shanghai

3.1 Inequality - Urban-rural income gap

Since the *open door* policy in 1978, China has been a fast growing economy. Among the annual growth of real GDP per capita about 10% since the beginning of the reform, per capita income has increased significantly, and poverty rate declined from 64% to 10% in 2004 [13] [15]. The latter is not surprising due to the fact that every household virtually has benefited significantly through the enormous economic growth. Anyway, urbanization and the existing policy structure limit social harmony in China. The household registration *hukou* and other policies, which will be discussed later in migration policy, preserved strict restrictions on rural-urban migration. Aside the rapid economic growth, income inequality as well as inequality of health and education have increased.

According to most estimates the urban-rural income gap in China is large and has increased over time. It has also been concern of the government and recent major policies. But talking about China's urban and rural income, factors underlying the gap need to be explored to obtain the true magnitude of the inequality [16]. Recent research by the United Nations University calculated the urban-rural income gap by including the following components:

- spatial differences in the cost of living,
- housing-related income²
- consumption of public services in education, health care, and local infrastructure³
- including unregistered migrants⁴

Recalculation under these considerations found out that the urban-rural income gap is reduced. Including housing-related income increases the inequality, but given the spatial price differences of living the gap is reduced in turn. Including migrants, whose income is between that of urban and rural residents, causes a further decrease in inequality. Nevertheless, China's

²rental value of owner-occupied housing and subsidies on publicly-owned rental housing

³consumption here is likely higher in urban than in rural area

⁴their income is between that of registered urban and rural residents; Including them is important because migration restrictions have been loosened

urban-rural income ratio is still large, although the contribution of the urban-rural income gap to China's overall inequality is reduced⁵ [16].

All in all, both urban and rural income rose slowly until the economic reform began in 1978. Before the central planning era, the ratios for income and consumption were over 3, which narrowed throughout the years of the rural reform⁶. But with the beginning of the urban reform, urban income rose as well. So, the urban-rural ratios increased and are now higher than they have been during the economic reform [17].

⁵In 2002 the urban-rural gap contributes about one quarter of overall inequality, as compared to estimates of 50% or more in most studies.

⁶Communes were disbanded and household production was allowed.

3.1.1 Urban-rural income data of Shanghai

Using new household survey data from the *Shanghai Statistical Yearbook 2007*, we try to retrace the urban-rural income inequality of Shanghai.

Figure 3.3 shows average per capita disposable income of urban and rural households in Shanghai over the years 1980-2006. Here we see clearly the urban-rural divide, that increased as urban reforms accelerated after 1985, since urban income grew rapidly. According to the data in the Yearbook the ratio of urban-rural income in 1990 was at 1.31, reaching 2.24 in 2006.

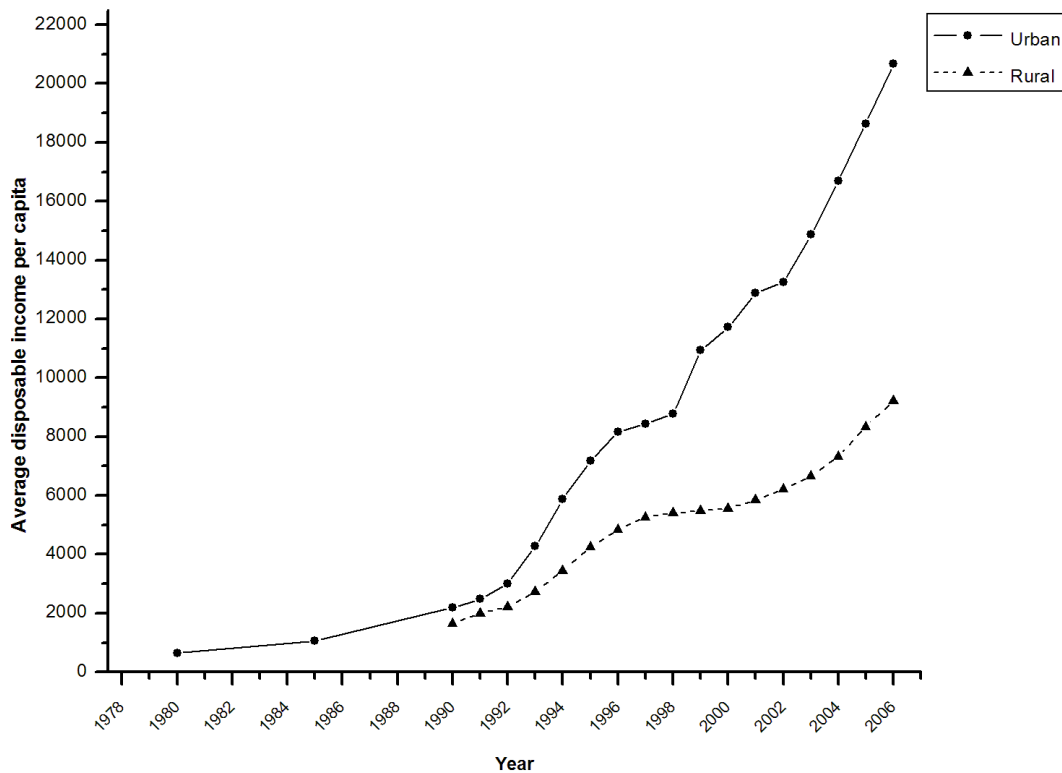


Figure 3.3: Urban and rural per capita disposable income Shanghai 1980-2006

	<i>Total Average Urban</i>	<i>Total Average Rural</i>
Average per Capita Disposable Income(yuan)	20668	9213
<i>Salaries, Wage</i>	13962	6892
<i>Household Business Income</i>	959	766
<i>Property Income(Rent, Interest)</i>	300	556
<i>Transferred Income(Pension)</i>	5447	999

Table 3.4: Basic Statistics of Urban and Rural Household Income 2006 (Shanghai)

Table 3.4 demonstrates components of income for urban and rural area of Shanghai in 2006. An interesting outcome is that the property income of rural area is higher than that of the urban area. The explanation therefore is the privatization of urban housing in the late 1990s in China. Before it, most urban households lived in public housing and received rental housing subsidies. Instead of the housing subsidy, which was reduced after 1995, houses in urban area were sold at low prices, that would have been formed if there was a housing market. [18] shows that in 2002 in urban China, the ratio of market price to purchase price averaged over 7 to 1. Net value of housing was 64% of total wealth and account 67% for inequality of net wealth per capita. Figure 3.4 shows components of per capita disposable income of urban Shanghai. A full property income comparison between urban and rural is not given, due to the incomplete data in rural areas. The absence of these data, can be shown in Figure 3.5, as property income and transferred income of rural households are combined into one income criterion.

Another important result, shown in table 3.4, is that property income and transferred income take a large fraction of per capita income, especially in urban areas (27.8%) in 2006. Non-labour income reaches only 16.9% in rural Shanghai in the same year. Figure 3.4 and 3.5 show a considerable difference in the development of the non-labour income in urban and rural area. As stated by the United Nations University, non-labour income accounts more than 40% of absolute urban-rural income gap.

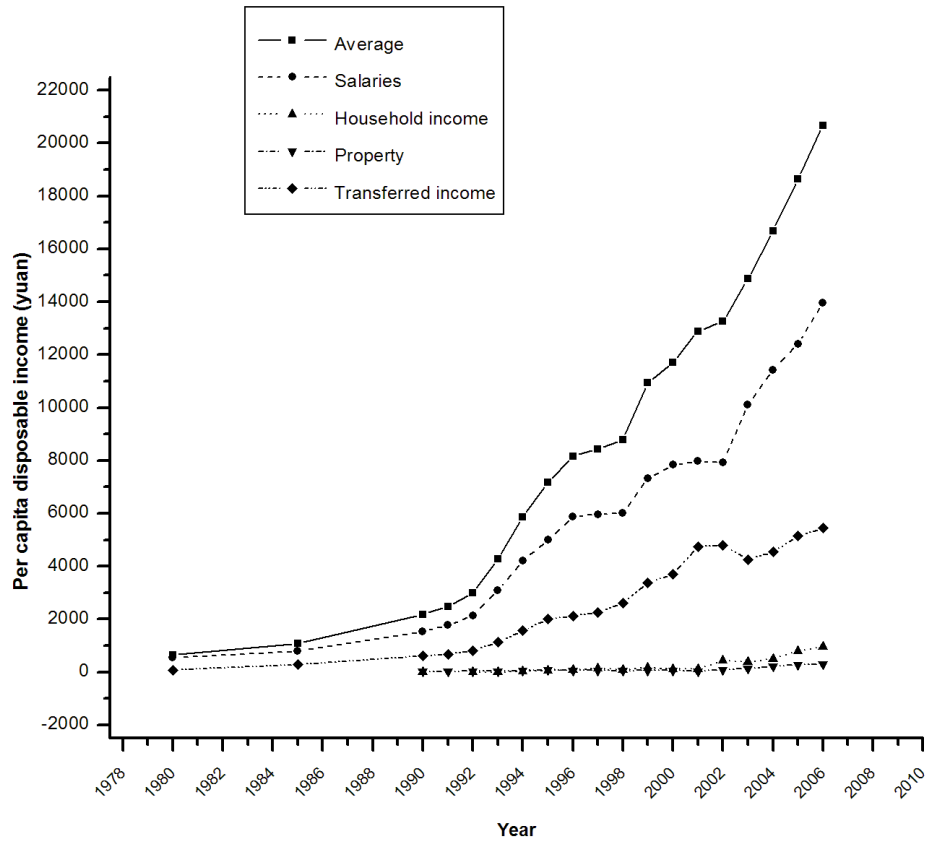


Figure 3.4: Per Capita Disposable Income Of Urban Households (Shanghai)

3.1.2 Urban-rural consumption data of Shanghai

Table 3.3 and 3.4 demonstrate per capita expenditures of urban and rural households. The main components are expenditures in residence and consumption in public services like education, medical services and local infrastructure. *Other* consumptions are food, clothing, household facilities and other services. Apart from food (37.8%) rural households spend the most on housing (20.7%) and education (11.5%) in 2006, whereas urban households spent more on education (16.5%) and local infrastructure (15.8%) but less on housing (9.7%). Urban-rural consumption ratio was 1.53 in 1990 and reached 1.84 in 2006.

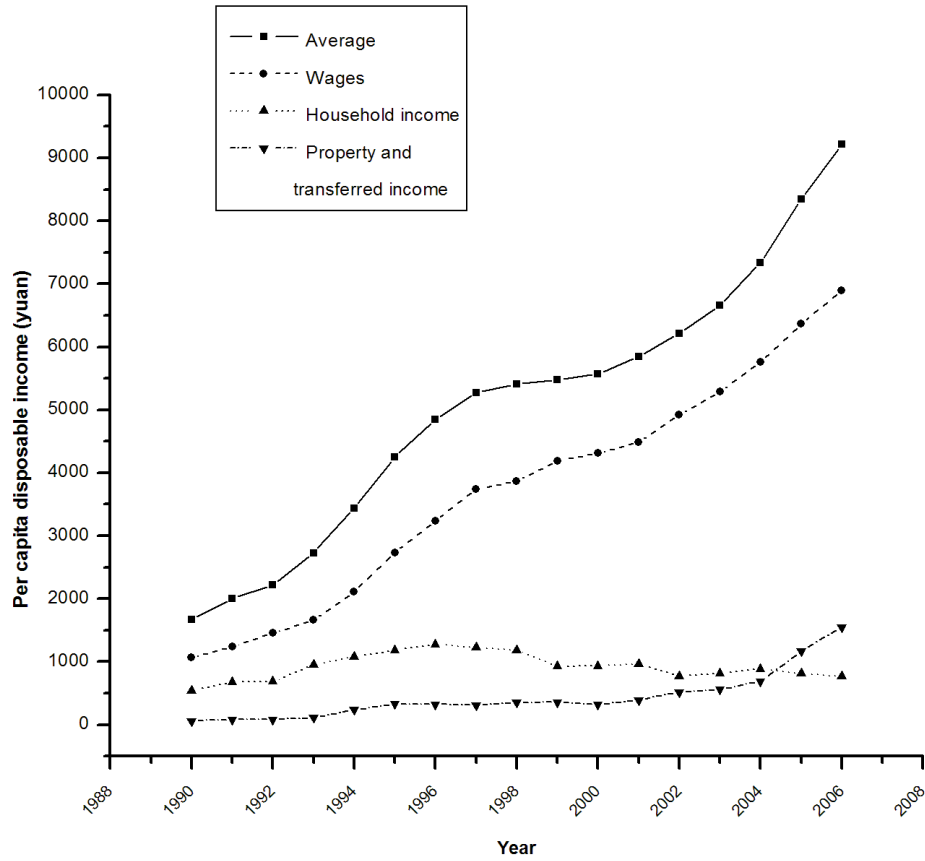


Figure 3.5: Per Capita Disposable Income of Rural Households (Shanghai)

3.1.3 Conclusion

Several findings emerged. [16] shows, that urban-rural income gap is not reduced when incomes are corrected for migrants and spatial price differences. It also shows, that in other countries migration is not likely to get rid of the income gap - it rather increases inequality within urban areas. The most important explanation is education. Differences in education levels account for 25%-30% of the income gap. Large differences in education do not only exist between urban and rural areas but also among provinces. Apart from education, a variety of factors play a role in spatial differences. The biggest factor is non-labour income representing almost half the gap. Other factors consist of access to community networks and support systems, farm labour requirements, job discrimination, incomplete information about

living conditions and employment opportunities, higher costs of living in cities, and access to schooling and other public services.

Generally, urban-rural income gap is much larger in western China than in the eastern or central regions. But to reduce inequality policies also should focus on income differentials within urban or within rural areas. Spatial differences in urban incomes and real wages have increased, although incomes have been standardised, while rural incomes are dependent on regional disparities in natural sources and economic opportunities [16] [17].

<i>Year</i>	<i>Total Consumption Expenditures</i>	<i>Residence</i>	<i>Traffic and Communications</i>	<i>Education, Culture</i>	<i>Medicines and Medical Services</i>
1990	1262	272	6	59	33
1991	1540	324	15	85	35
1992	1967	451	31	121	45
1993	2200	357	65	220	50
1994	2715	454	79	222	75
1995	3368	761	159	256	73
1996	3868	816	200	347	108
1997	4228	921	240	414	174
1998	4207	876	226	463	170
1999	3867	681	197	474	160
2000	4138	724	279	559	209
2001	4753	890	340	673	265
2002	5311	1392	462	661	280
2003	5670	1437	587	676	333
2004	6329	1446	720	806	425
2005	7265	1323	739	936	562
2006	8006	1658	780	920	549

Table 3.5: Per Capita Consumption Expenditures of Rural Households in Yuan (Shanghai 1990-2006)

<i>Year</i>	<i>Total Consumption Expenditures</i>	<i>Residence</i>	<i>Traffic and Communications</i>	<i>Education, Culture</i>	<i>Medicines and Medical Services</i>
1980	553	26	20	49	7
1985	992	43	30	91	5
1990	1937	90	58	231	11
1995	5868	401	321	508	113
1996	6763	416	496	827	148
1997	6820	605	397	828	197
1998	6866	674	406	893	261
1999	8248	842	583	1094	347
2000	8868	794	759	1287	501
2001	9336	796	958	1422	558
2002	10464	1189	1115	1668	734
2003	11040	1280	1259	1834	603
2004	12631	1327	1703	2195	762
2005	13773	1412	1984	2273	797
2006	14762	1436	2333	2432	763

Table 3.6: Per Capita Consumption Expenditures of Urban Households in Yuan (Shanghai 1980-2006)

3.2 Economic structure of cities

In the past, Chinese economic planning preferred the production of manufactured products in most cities and inefficient, high-price, state-owned enterprises (SOE). Today, China concentrate more on establishing large cities, which focus on high-tech industries and on business and financial services [13]. More than 150 high- and new-tech industrial development zones (HNIDZ) have been launched all over China after deepening the science and technology reforms and putting the high-tech supporting Torch Program into action since 1988. At the same time 49 economic and technological development zones (ETDZ) could be founded [19]. Although many unprofitable productions have been disposed, many cities still support SOE despite inefficient production and little comparative advantage.

3.2.1 State-led policy directions

Talking about economic reforms in China, the reform of state owned enterprises has always been the highest priority among China's policymakers. The SOEs are inefficient and neither able to compete against the growing domestic nor international competition. And their financial support through state-owned banks threatens macroeconomic stability. Unfortunately, it seems to be an *unfinished agenda* till today. Beside the state-owned industrialization, there were also township and village industrialization and the industrialization of privately and individually owned enterprises (joint ventures and foreign-funded enterprises) [20]. According to [19], after the 16th Congress of Chinese Communist Party in 2002, China promoted a new kind of industrialization *xinxing gongyehua daolu*, which should concentrate on upgrading technologies, improving economic efficiencies, lowering resource consumption, reducing environmental pollution, and fully develop human resources. Furthermore, in the Tenth Five-year National Social and Economic Development Plan, the national industrial competitiveness should be improved through informatization, which means developing high-tech industries, such as computer software, integrated circuits, and pharmaceuticals. The government also targets the development of a knowledge-based economy and investments in infrastructure of innovation, such as establishing and improving intellectual property laws, preferential treatment for research and development investment in the public and private sectors, attracting and helping talent to start businesses, and providing special assistance in selected technological fields, such as software, integrated circuit and bio-tech industry.

3.2.2 Economic structure of Shanghai

Before the *open door* policy, Shanghai demonstrated itself as the industrial base for the national economy. But in the early 1980s, the Chinese Government transformed the city into a financial and commercial center, established the new Pudong Financial District and a modern stock exchange market.

With the waves of industrialization and the entry into the WTO, economic structure in Shanghai have considerably changed. It faces great challenges to sustain growth while chang-

ing to an open and market oriented economy. Outcomes of change are a declining state-owned sector and shifts of manufacturing enterprises to suburbs. With these, and a fast growing urban population without sufficient infrastructure, also stresses the city. Also the development of the service sector has to be furthered by upgrading the industries in order to become a regional hub in the global economy and to compete with the hinterland [19]. It can be seen that the Chinese government is aware of the urgent need for innovation to sustain urban growth and retain competitive advantages.

Production structure

After industrial restructuring, Shanghai focused more on the development of high-tech products and 6 manufacturing subsectors, such as automobiles, telecommunications, power station equipment, steel, petrochemicals, and bio-medicine, which are attracting foreign investors. As shown in table 3.7, the largest gains in gross output value are in electronic information products, such as integrated circuits and computers, petrochemical, and equipment complex [10].

The Ministry of Electronics Industry selected Shanghai and three other cities as the national production bases. After nine years, in 1995 the Ministry of Science and Technology set up 19 National Torch Software Development Bases including the Shanghai Software Park. Also the biotech and pharmaceutical industry has one of its bases in Shanghai [19]. Beside this, the tertiary sector gains more and more share of the municipal GDP. As shown in figure 3.6 and 3.7, the tertiary sector could reach an increase of 32% in GDP since the reform area. The secondary sector decreased by almost 29% and the primary sector now only account for 0.9%. In figure 3.8 the GDP development of the three industries shows that, while the primary sector lags far behind and is almost unchangeable, secondary and tertiary sectors experienced an enormous increase since the late 90s.

<i>Manufacturing Sectors</i>	<i>Number of Enterprises (unit)</i>	<i>Year-end Employees (10000 persons)</i>	<i>Gross Output Value of Industry (100 million yuan)</i>	<i>Value Added of Industry (100 million yuan)</i>
Total	4900	105.51	9954.28	2229.64
<i>Electronic Information Product</i>	1481	41.57	3989.48	738.76
<i>Automobile</i>	379	11.08	1026.48	263.67
<i>Petrochemical and Fine Chemical</i>	889	12.46	1783.99	299.79
<i>Fine Steel</i>	159	5.32	1339.84	379.29
<i>Equipment Complex</i>	1628	27.76	1532.63	452.16
<i>Bio-medicine</i>	364	7.32	281.85	95.97

Table 3.7: Indicators of Six Key Industries Above the set Scale (Shanghai 2005)

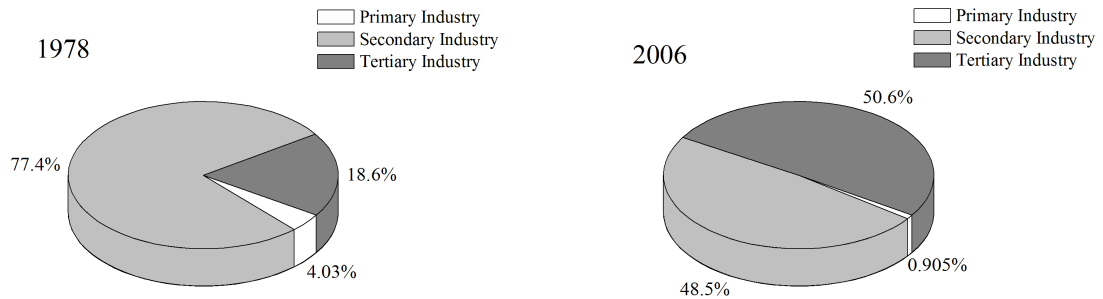


Figure 3.6: Composition of Shanghai GDP Figure 3.7: Composition of Shanghai GDP

1978

2006

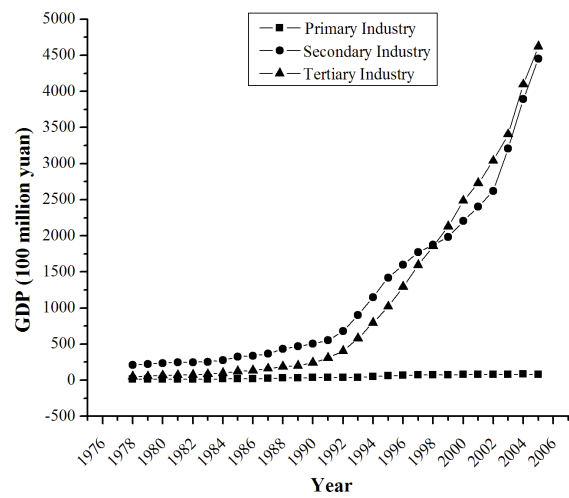


Figure 3.8: Shanghai GDP 1978 - 2005

Since 1978 the number of SOE's dropped (the number of state-owned industrial enterprises is at 386 in 2005), their share in local GDP decreased from 86.2% to 47.9%, the share of the non-public-owned enterprises increased from nearly 1% to 44.1%. Collective-owned sector made the "least" changes, its share dropped from 12.8% to 7.95%. While state-owned and non-public-owned enterprises are running shoulder to shoulder, collective-owned enterprises have been left behind, see figure 3.11.

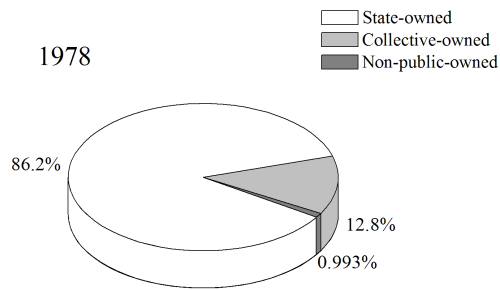


Figure 3.9: Shanghai GDP by Distribution
1978

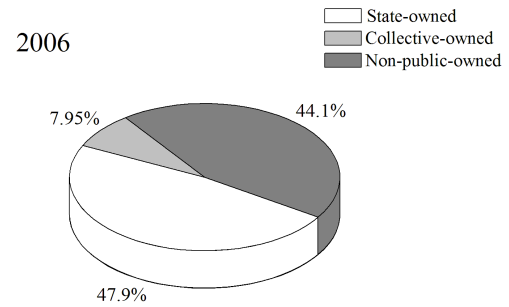


Figure 3.10: Shanghai GDP by Distribution
2006

Figures 3.12 and 3.13 clearly show that only real estate and *others* gain more share of the tertiary sector's GDP than the rest. The *others* are information transmission, computer service, software industries, leasehold, and business in services. Retail, wholesale, hoteling and catering did not change their position since 1990. However, transportation, warehousing, post, and finance lost almost half of their share in GDP.

Pudong

In the 1990s, the Central Government and the State Council build up Pudong on the eastern side of the city. This new area leaves behind the traditional economy with suburban agriculture, and manufacturing industry and transformed to a modern economy with finance and trade service industries and high-tech industries. Shanghai's rapid economic development is closely related with Pudong's developing. The annual growth rate from 1990 to 2000 for Shanghai's GDP was 12.3%. The growth rate for the tertiary sector was 14%, which was at that time the highest in China. The percentage of high-tech and new-tech industries, such as computer, bio-pharmacy and new material industry increased from 5% in 1992 to 18.2% in 1999 [12].

Pudong's opening and developing provides Shanghai with commercial, industrial space, and good physical infrastructure. Many development zones have been established there since

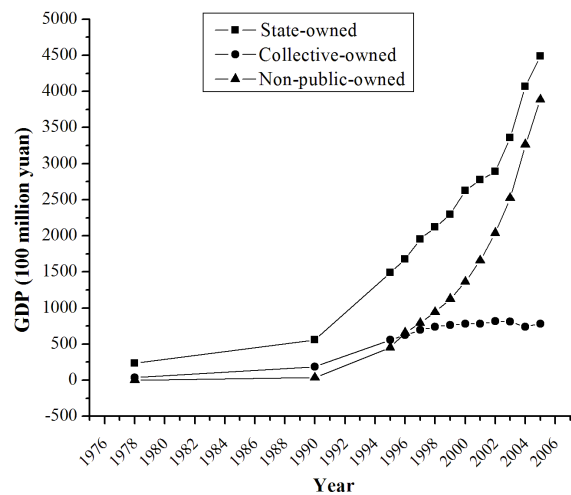


Figure 3.11: Shanghai GDP by Distribution 1978 - 2006

the early 1990s. In Lujiazui Financial and Trade Zone, headquarters of domestic and foreign financial organization, factor markets, corporation groups and transnational corporations can be found. Jinqiao Modern Industrial Park could make 77.1% of total production value through high and new technology. Furthermore, by the end of 1998, 320 domestic and foreign investment projects could be accomplished. In Waigaoqiao Free Trade Zone, domestic and international markets for railway materials and supplies, post and telecommunications, textile accessories have been founded. In year 2005 it covered 202 enterprises. Zhangjiang High-tech Park contains innovation enterprises, such as a software park with modern bio-pharmacy and microelectronic information oriented production.

Conclusion

As Henderson mentioned in his paper [13], business-service and the financial sector are the natural economic base of the largest cities. Figure 3.13 shows, that business-services is rising but finance and insurance decline. According to the author the latter is still under strict government control, while the former is freed from it. However, the lack of transparent, autonomous legal and financial system could constrain China's largest cities being global cities comparable to Tokyo, London or New York. Also Wang and Tong [19] are sure that the efficiency of

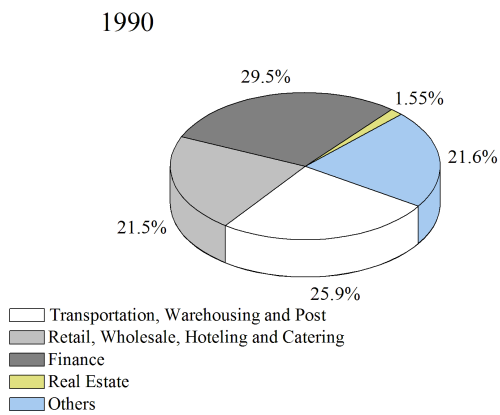


Figure 3.12: Shanghai GDP Composition of Tertiary Industry 1990

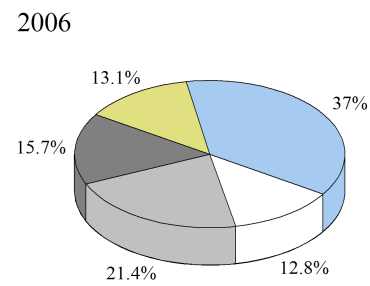


Figure 3.13: Shanghai GDP Composition of Tertiary Industry 2006

innovative industry in Shanghai is anything but strong. They call for better living conditions and attractive business environments. Anyway, in the next section *The Role of Institutions and Governance* we will see that there are many factors playing together.

3.3 The Role of Institutions and Governance

3.3.1 Land markets and property rights

Before the Central Committee came together for its 11th meeting in 1978, any allocation was centrally planned and all properties were owned by public. Actually, with the beginning of the reform area, the transformation of China's property rights systems lead to decentralization of the public ownership, inflow of foreign direct investment (FDI) and emergence of private businesses. Foreign-owned enterprises and sino-foreign joint-venture firms experienced additional protection by the legal system and management of domestic SOEs became decentralized. In addition to these actions, the private sector gained increasing attention and protection by the government. With new established regulations and laws protecting private property rights, interests in private business raised, and lead to a rapid development of the private sector all over China.

However, as Zhang shows in his paper [24], the difference between the well protected investor property rights and - quite contrary to it - the individual property rights have to be mentioned here, especially the loosely defined worker's rights and land property rights of farmers. This combination of circumstances is a major drive of China's economic growth. Land in cities belong to the state, while collectives own land in rural and suburban areas. In Chinese law there is no private land ownership, whereas farmers are only able to hold agricultural leaseholds, which is separated from the ownership right. The length of these contracts can last up to 50 and 70 years. Long-run leaseholds are saleable, rentable and can be used as collateral. Although, the state is not able to confiscate the land within the contract term, it is able to do so by reclassifying the land for public use. In this case, we have to bring up here some ambiguous meaning of law. First, the definition of public interest is not clear. Second, it is also not clear how to compensate the damage caused by the confiscation of land. And third, the law does not specify the relationship between collectives and peasants.

As mentioned by Coase, if property rights are well defined and transaction costs are costless, then efficient outcome can be achieved through bargaining. However, due to the fact that bargaining involves costs in real and China has an unique feature in its property right systems,

an efficient outcome does not arise easily. Actually, as pointed out by Zhang, in China negotiation costs for land procurement are much lower than in countries with well-defined property rights. Developers and the local government often confiscate the land by dint of loopholes in law and purporting to develop the land in public interest but then use it for other, i.e. commercial, purposes. Thus, the rapid growth of development zones - 20 development zones currently exist in Shanghai - and real estate became possible, which fuel the rapid economic growth.

But this is not the only incentive for local government to grab land. First, land is also an important source of local revenues. The more developed, industrialized and urbanized a region, the higher is the price for land. This again enhance the incentives for the local government to rely more on land for local revenues. Second, land is also used to acquire loans to finance infrastructure development. A plot of land, that is labeled as public interest and has been confiscated by developers and local government, does not only make a good job for commercial purposes but also generate credit from state banks as collateral. Naturally, land banking is a major reason for the rapid growth in infrastructure investment.

Conclusion

Zhang's conclusion shows that in the short run, the hardly defined individual property rights may push the economic growth due to minimal transaction costs of acquiring land, which is a must for business investment. But in the long run, it may have profound and negative economic and social consequences.

According to Henderson [13], following actions in terms of improvement should be taken to avoid those consequences: First, developers and the local government have to spend the true cost of acquiring rural land. This action asks for the right compensation of damage caused by the confiscation of land, which is rather tricky, since the market value of land appreciates with nearby urban infrastructure improvements. Another problem is that compensations are handled through the village head, who may not represent the interest of the person concerned. So, second, all rural residents should act as shareholders, who has the right to approve land sale or not. Third, farmers, whose land has been acquired should receive urban *hukou*. With these actions local government will be able to face the full opportunity cost of land reallo-

cation. Fourth, leaseholds of urban land should be sold through competitive and transparent auctioning and not by assignment through negotiation. And developers should face true costs through preparation of necessary infrastructure. With this system Shanghai showed, that city factories were able to finance redevelopment by selling their land through bidding [10]. Fifth, land development should be governed by zoning laws to ensure that land-use decisions are not completely controlled by individual developers. According to Yusuf and Wu [10], the benefit of Shanghai's city officials from selling land rights and attracting foreign investment made the high vacancy rates in Shanghai's real estate, especially office and luxury housing markets, expand. Despite of actions taken by the central government, new constructions in housing were difficult to ease. To prevent an increasing degree of market speculation, the Shanghai Municipal Housing and Land Administration deprived the right of land leasing of all district and county government and is in possession of the sole authority of land leasing. Thus, increased leasing for commercial purposes, villas and office buildings could be stopped. As shown in table 3.8, investments in office buildings decreased from 17.53% in 1995 to 8.19% in 2005 and investment in commercial could be hold almost stable while general total investment increased. Nevertheless, land markets and other actions only work properly if property rights are completely and clearly defined [25].

Beside the individual property rights, intellectual property rights, which affect innovation also need to be well protected and practiced. According to [19], innovation is rather important to knowledge-based economy, and knowledge is important to economic growth. Although the written law in China is well developed, the protection of intellectual property is not rather pleasing. Another author in [23] compared China's underdevelopment with the one of Japan in the 1960s and argued, that China has the same capability to maintain a high economic growth. The "right strategy" for reaching this goal is to focus on labor-intensive industries and the labor-intensive segments of the capital and technological intensive industries, which are China's comparative advantages, due to it's cheap and abundant labor force. On the other side, the author also mentioned in his research, that the value added of manufacturing industry in China is much lower (26% in 2000) than that of Japan (43.6% in the same year). The reason is, that China's industries mainly borrow foreign technology and do not have their own

<i>Year</i>	<i>Total Investment</i>	<i>Residence</i>	<i>Office Building</i>	<i>Commercial Building</i>	<i>Others</i>
1995	466.2	280.38	81.74	32.39	71.69
2000	566.17	408.82	57.47	51.51	48.38
2004	1175.46	900.67	83.24	78.93	112.62
2005	1246.86	920.84	102.18	102.61	121.23

(100 million yuan)

Table 3.8: Investment and Operation in Real Estate in Shanghai

intellectual property rights. This "right strategy", then, should be extended by focusing on the intellectual property rights. "This is because technological innovation is the most important determinant of economic growth."

3.3.2 Migration policy

Apart from birth control, migration plays an important role in Chinese demographic policy. Since 1949, planned resettlements in north, northeast and west of China, where areas are rather sparsely populated, have been implemented because of economic and strategic reasons. As well the temporary and permanent settlements of urban residents into rural areas were important measures at that time. The policy compromised amongst others land development, agricultural modernisation, relief of cities and the combat of unemployment. Furthermore, abolishment of rural-urban discrepancy, division of labor and classes should be achieved through forced resettlements.

First action took place in the 50's. Millions of urban youth, cadre, and intellectuals had to follow the migration *xiexiang* from 1962 till 1979, and those were bared from moving back to the cities. The reason was the protection of living standard and interior stability of urban areas. The abolition of a free labor market, resource allocation and registration requirements lead to an increasing restriction of freedom of movement. In addition to this, resettlements of rural citizen from urban to rural area were carried out. As shown in figure 3.14, all these actions lead to the stagnation of urbanization in the 60's and 70's in China [27]. However, with the beginning of the reform era, resettlement actions were abolished and migration restrictions became relaxed.

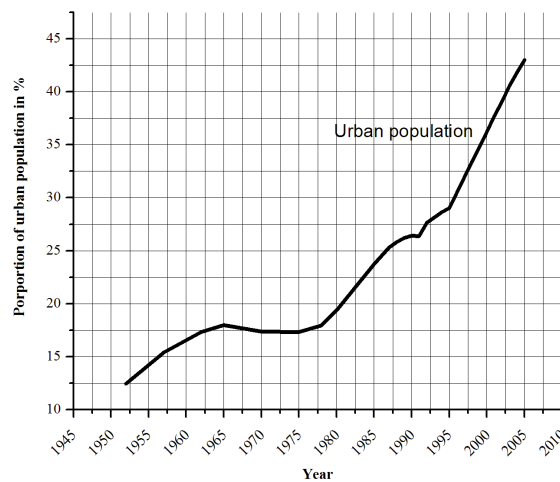


Figure 3.14: Porportion of urban population in China 1952-2005

An introduction

With the household registration *hukou* China is able to restrict internal migration between urban and rural areas, within the rural sector, between big and small cities, and between regions. Citizen with city *hukou* enjoy local access to permanent jobs, regular housing, public schooling, and public health care, whereas rural citizen are entitled have a land for farming, township housing, job opportunities in rural industrial enterprises, and access to local health and schooling facilities. Furthermore, rural residents have - to a certain extent - participation in local enterprises. However, they do not achieve profits directly, but all go to the local public budget, which distribute the profit in-kind, i.e. finance township housing and infrastructure.

Aside this household registration, people are able to change their citizenship - under certain conditions. The first condition is education. After receiving a college graduation, the rural youth will find a job in the urban area and automatically receive urban *hukou*. Another opportunity is to be hired as a permanent worker by factories. Sometimes, the state permit family reunification or even legal migration from land to nearby small cities. This kind of permanent migration requires other conditions, namely abandoning ownership claims without compensation to agricultural land as mentioned before and to profits of local rural industries. Apart from legal changes in *hukou*, people can migrate illegally and work in informal sector as street

hawker, shoeblack or garbage man [26]. Compared to permanent changes in household registration rural residents can move into cities as temporary workers or as workers with long-term permit (contract worker) in industry or services.

Before taking the opportunity of moving into the city temporarily, migrants need a permit from the city, which imposes hurdles to getting it: Cities offer jobs for which migrants are not qualified. After leaving their rural home, migrants still have to pay taxes for their home village, on their former land, and for services they do not consume anymore. After moving into the city, they have to face fees such as for licence to work outside their township, for city management and construction, for crime fighting, for temporary residence, for being a migrant, and for family planning. Being a "foreign" worker, one have almost no or very costly approach to health care, schooling facilities and regular housing.

It has to be noted that these restrictions on migration were loosened in the late 1990's especially in parts of southeast of China and have been relaxed since 2000 more generally. Yet the basic provisions remain even until today. The motivation for the implementation of migration

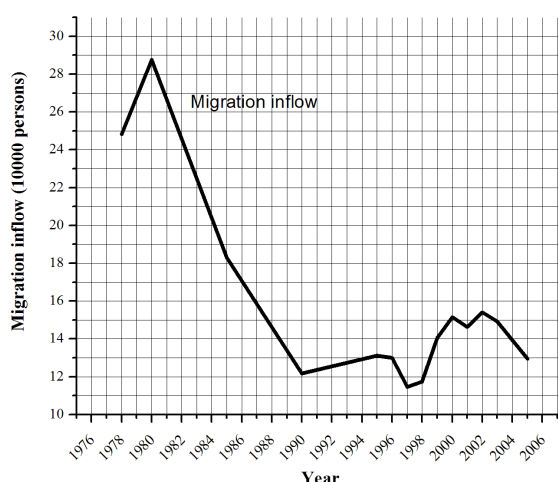


Figure 3.15: Shanghai's migration inflow 1978-2005

restrictions is because of the strong restriction of urbanization in China before 1982. Urbanization was seen as capitalism and Western moral pollution. The policy "leave the land but not the village" announced in the Sixth Five Year Plan (1981-1985) shall ensure the development

of rural industry and the Central Committee constrained the growth of large cities, but allowing growth of small cities through transferring *hukou*. But these actions and restrictions have limited the competitiveness of the rural industry. In addition to this, there is the strict spatial hierarchy causing productivity differentials across cities. Only the largest coastal cities have access to new technologies and FDI, whereas small and hinterland cities have to cope with transferred technologies of those large cities [14].

Reasons for greater migration

As mentioned in [14] by Au and Henderson, the main function of migration restriction is to gain a surplus of labor in the rural sector. But in the recent years after instable growth, the question came up whether permitting more migration into urban area could encourage economic growth. Another important political issue is to equalize rural-urban income inequality. One aspect discussed in the paper is using greater migration to reduce inequality. The second aspect is to gain huge productivity just from the internal reorganization of the urban and rural sector with using unexploited economies of scale from spatial agglomeration of resources.

Effect on urban and rural productivity

The existence of scale economies in cities are the base of local agglomerations. As mentioned by the authors, scale externalities are based on local information spillovers and intra-industry specialization and allocation rules reflect their internalization. Apart from benefits of agglomeration and city size, commuting costs - discussed before in chapter two - limit them. As population or employment rises, commuting cost per person also increases. That means the more city size increases the more time will be spent on commuting, which means more loss on working time. Effective labor, which is a fraction of total city population and labor force respectively, declines with population. However, effective labor increases with city size at the beginning, but if we incorporate commuting costs situation changes again - causing an inverted U-shaped function of value-added per worker. That means, there exists a city size which maximizes value-added per worker. However, the main statement of the papers shows, that 56% of China's cities are statistically undersized, which indicates that migration

restriction limit city size and causes welfare losses [28]. Other factors, such as education and FDI also affect productivity positively. FDI is relevant to technology transfer or knowledge spillovers. Thus, cities receiving FDI have advantage. This explains the reason and supports the fact, that China only allowed FDI investment to certain cities.

The rural sector consists of agriculture and rural industry called town and village enterprises (TVE's). Due to the migration restriction and in spite of the policy "leave the land but not the village", a surplus of labor remains in the rural agricultural sector. Apart from this, TVE's have to face policies, which restrict their development. The restrictions contain capital constraints and forced factor immobility inside the rural sector. Capital allocations are under strong control, where investment target urban industry mainly through quantity controls and discriminatory taxation. In short, the rural industry is deprived of its local scale externalities. TVE's cannot be bought, sold and shares are not able to be transferred among individuals. Furthermore, as mentioned before in property rights, workers leaving their village, lose their land and local services. Other factors, such as education affects productivity enormously positive in overall rural sector but the productivity of TVE's are not directly affected by it.

Conclusion

In summary, Au and Henderson showed that migration restrictions across cities, between rural and urban areas, restrictions on rural to rural migration caused enormous under agglomeration, resulting in large productivity losses. However, city size is also limited by diseconomies in commuting, urban spatial structure, and the spatial extent of a city or town's market. That means, there exists a city size, where value-added per worker is maximized and this optimal size will vary with city industrial composition. Apart from productivity losses caused by the restrictions, Hertel and Zhai mentioned in their paper [29], that through migration restrictions 30% of total rural-urban wage gap is caused by direct costs, such as transportation, housing and obtaining necessary certificates, whereas the majority fraction of the income gap is due to social costs.

3.3.3 Fiscal System

Before the economic reforms in 1978, China's fiscal regime was dominated by the planned economy. Sub-national governments were fully dependent on the central government, which collected all taxes and revenues and reallocated them to provinces. It also decided which revenues to use on which public goods. But apart from equal allocation of fiscal resources all over the land, this kind of planned fiscal regime did not provide any incentives for growth and collecting local revenues. However, with the national economic reform, fiscal decentralization began.

An introduction

The first change in fiscal regime began with the fiscal contracting system in 1980. The idea was to give the sub national governments more autonomy to manage their own profits and expenditures, while their finance is subject to a budget constraint. With this kind of fiscal deregulation the regional economy and revenues should be encouraged to develop. Consequence of this action were the decline of the central government share of fiscal revenues from 34.8% in 1985 to 22% in 1992 [30] and fiscal inequality between regions began to grow.

The second change started with the tax assignment system reform in 1994. This intergovernmental fiscal reform aimed the simplification of the tax system, and raise the ratio of the overall fiscal revenue-to-GDP and the share of total fiscal revenues by the central government. Furthermore, it should achieve a more transparent central-local revenue sharing.

After these two main chapter in fiscal reform, further changes only happened more gradually. These include the change in revenue from Stamp taxes between the central and local governments from "fifty-fifty" to 97%-3%. Tax rate of the finance and insurance industry has been raised from 5% to 8%. In year 2002, income tax-revenue-sharing, except for a fistfull special industrie, was introduced. The sharing rate, which started with 50% for the central government, then increased to 60% one year after in 2003. And in 2004, the central government put an end to the agriculture tax system for 5 years.

Impact on urban finance

Despite increasing urban infrastructure investment, as shown in figure 3.16 it is believed, that these investments lag behind the rate of industrialization and urbanization.

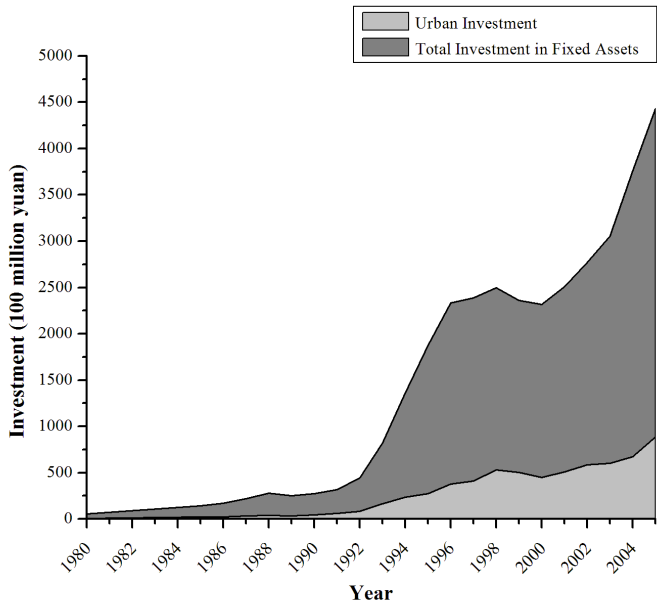


Figure 3.16: Total and Urban Infrastructure Investment in Shanghai

As already mentioned before, urbanization is a key factor of China’s economic transformation acting as the primary domestic growth strategy. However, it is a fact, that China’s urbanization goes faster than it has invested. As mentioned by Su and Zhao in [30], China’s degree of urbanization today is that of Japan in 1950. The author showed, that in the Ninth Five-Year Plan, Shanghai invested 12.5% of total investment to urban infrastructure and 5.9% of regional GDP. Table 3.9 shows urban infrastructure investment ratios of Shanghai in the following years.

Furthermore, it is estimated, that about 20-30% of urban infrastructure costs planned in the Tenth Five-Year Plan was financed from budget resources, whereas the rest was financed by domestic loans, foreign and multilateral loans, revenue from asset earnings and asset sales, and various forms of market-based financing. According to Su and Zhao, we will have a short discussion about the following three infrastructure financing options: direct budget investment

<i>Year</i>	<i>Ratio to Total Fixed Asset Inv. (Shanghai)</i>	<i>Ratio to GDP (Shanghai)</i>
1990	20.79%	6.04%
2000	24.06%	9.43%
2004	21.8%	8.33%
2005	25%	9.67%

Table 3.9: Urban Infrastructure Investment Ratios (Shanghai)

from fiscal resources, borrowing, and market-based financing.

Direct budget expenditures on urban infrastructure means that investment is paid from fiscal resources. Officially, revenue from the urban maintenance and construction tax is used for infrastructure investment, but it can also be financed from the local budget. However, since insufficient intergovernmental tax-sharing and transfer system and the fact, that provincial governments do not return revenues to the local governments, the local level are facing dwindling budget for construction. As a result, a decline in share of urban infrastructure investment financed by budget from 50% in 1991 to 29% in 2001 can be shown, see figure 3.17.

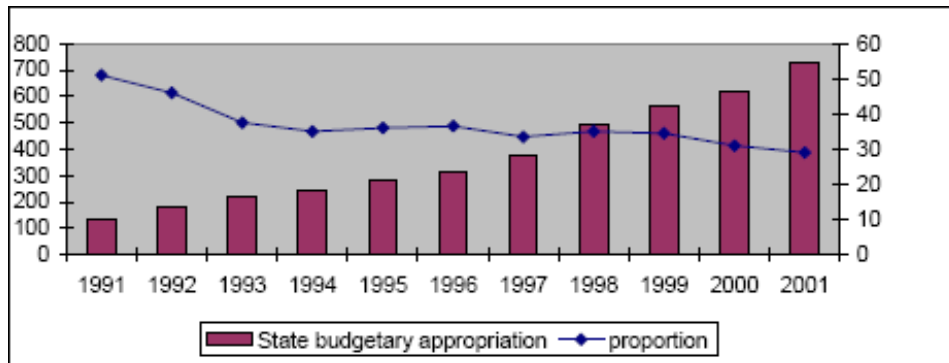


Figure 3.17: Share of Urban Infrastructure Investment Financed from the Budget (China) [30]

Financing urban infrastructure investments also happen through off-budget fees, such as arbitrary fees on construction permits and authorizations for domestic and international business operations. However, the central government limited these fees in 1996 and 2001 through periodic initiatives, causing reduction in share of urban infrastructure investment financed by

fees in the last-mentioned years (figure 3.18).

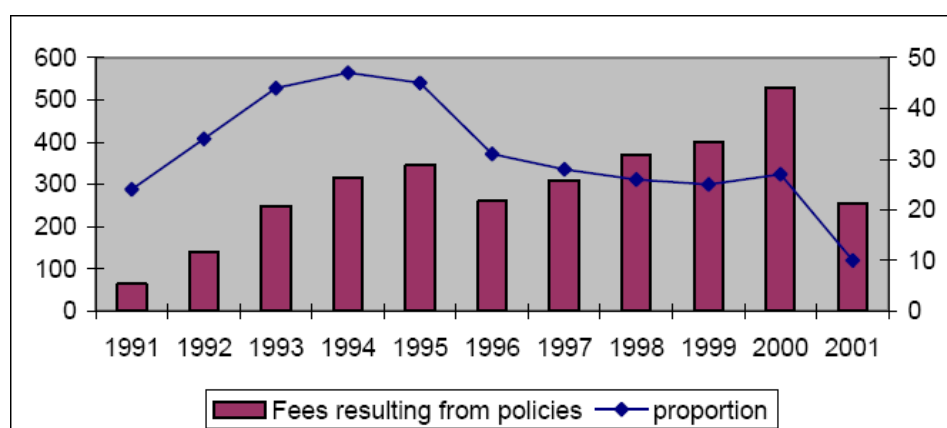


Figure 3.18: Share of Urban Infrastructure Investment Financed by Fees and Charges (China) [30]

Domestic bank lending reached 2.4% of total urban infrastructure investment in 1986, then it declined till 1994 through the fiscal reform. Afterthat the share began to rise enormously, see figure 3.19. In 2001 total debt in banking-sector for urban infrastructure was 23 fold of the last decade, caused by infrastructure and outstanding loans of 60% of the cities in China. Further actions, such as infrastructure bonds, launched by the central government, are also available for urban infrastructure investments. Within six years till 2004, 2000 projects, especially in poor regions, could be finished. Note, that those used funds from national debt completed ongoing construction but did not finance new one.

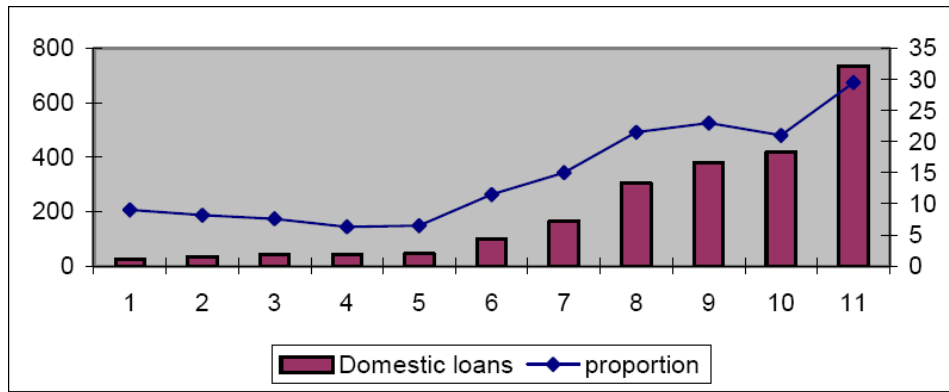


Figure 3.19: Share of Urban Infrastructure Investment Financed by Loans (China) [30]

However, problems come with debt financing. One problem is that, urban infrastructure loans of commercial banks, who provide a bulk of infrastructure loans, are too short in time. So sub-national government roll over loans in stead of repay them. It has to be noted, that local commercial banks had the target to finance infrastructure, due to the planned banking system and the political relationship to local government.

Another problem is, that local government pretend to use funds for environmental or social projects. Furthermore, it also puts on funds as loans and the inability to repay. Finally, the local government not only receive funds for its economic project but also need not to repay. So the central government limited on-lending from national bonds. Additionally, all proposed bonds have to be approved by the State Development and Reform Commission. The result is, that economically strong local government, i.e. Shanghai, does not easily get bond approvals.

Another infrastructure financing option is market-based financing. The idea is using private or social sector to invest construction. The first step toward it, was using land leasing, which means the local government sold its leasing rights to private developers. Indeed, selling land could finance all infrastructure investment and has been the main source for large cities. However, supply of land declined soon. The second step, was attracting the private sector to finance urban infrastructure. Measures of attractions are preferential tax treatment and rights to use network capacity, such as wastewater collection and treatment for their projects. Due to this marketization, problems such as how to organise urban infrastructure sector and how to pay for its services, arised. The monopoly SOE Urban Development and Investment Com-

pany (UDIC), which exists in every city in China, manages all types of infrastructure. The main reason for establishing those companies is to take away liability management and responsibility for asset from municipal government. They manage profitable and non-profitable infrastructure without differentiating how to operate or finance them. However, the change into a market-oriented economy, also needs UDIC to constraint its responsibility. Profitable and quasi-profitable infrastructure should be operated on its own by service charges or other financial means, whereas non-profitable infrastructure should be upgraded by UDICs. Shanghai's UDIC separated an institution for the development of water and wastewater assets.

In terms of infrastructure revenue streams, land has been the most dependable revenue, whereas infrastructure service tariffs, such as for water, wastewater treatment, and garbage collections and disposal fees are difficult to implement. Despite an issued circular on urban tariffs in 2002, cities did not succeed in cost-recovery pricing for basic services. Another circular in 2004, caused cities to seek alternative revenue from private developers and larger commercial activities, i.e. drainage assessment from those who discharged into the Suzhou River in Shanghai.

Urban finance in Shanghai

Shanghai's UDIC was established in 1992 to manage funds for urban construction and the Municipal Service Department is responsible for planning, investment, operations, and maintenance with independent cost-accounting system. This state-owned company managed to raise funds for about 76%-90% of Shanghai's total urban infrastructure revenue.

Since the 1990s, Shanghai achieved improvements especially in infrastructure services, such as road construction, park extension, and wastewater treatment. Figure 3.20, shows the growth of urban infrastructure investments in power generation, transportation post and telecommunication, and facilities for public use, such as public utilities and civil constructions. Investment in urban infrastructure is one-tenth of total fixed asset investment. Shanghai also charges fees on some infrastructure services, such as bus, gas supplies, water, wastewater discharge, and municipal sanitation services. Greater managerial autonomy for public utility agencies, such as for sewerage, could reach independent management and financing. With

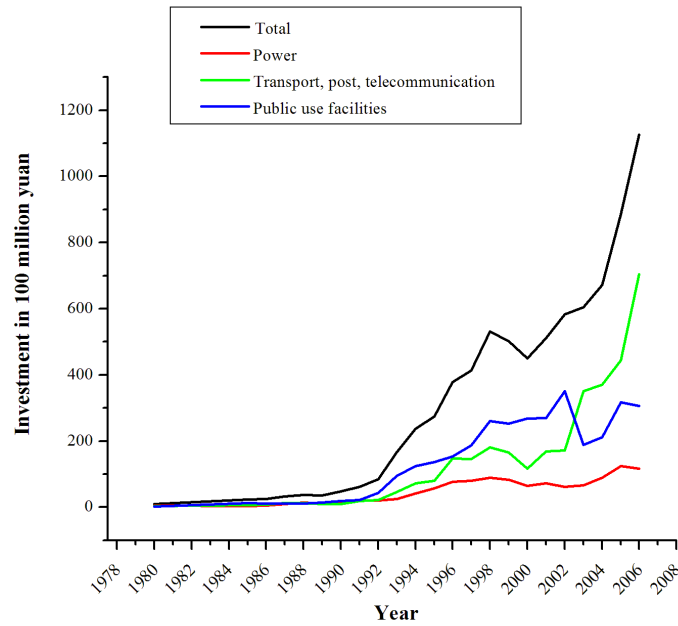


Figure 3.20: Composition of Urban Infrastructure Investment in Shanghai

help of land leasing a large volume of FDI (table 3.3) could find its way into real estate, including commercial and apartment buildings. FDI has been especially important for the subway system. Also redevelopment of former industry land of SOEs into commercial purposes helps raising funds [10].

Conclusion

Urban infrastructure capital stock cannot keep pace with the rate of industrialization and urbanization. Fiscal capacity constraints force government to make greater use of borrowing, causing risk for intergovernmental finance. However, urban infrastructure is still not able to sustain China's economic growth.

According to Su and Zhao, the first problem is the vertical fiscal imbalance. Except for the biggest cities, local level only have limited access to fiscal resources. So it is necessary to enlarge transfers to reduce differences in fiscal capacity, specify standards for infrastructure construction, and define governments's responsibilities in infrastructure provision and finance at each level. Second, decisions over local taxes still is in the hand of the central government.

However, fiscal autonomy of local government should be strengthened, so they have their own revenue according to their development level. Third, according to limited on-lending from national bonds, cities with strong economies, fiscal revenues, and management experience should be able to issue bonds for infrastructure constructions. The fourth problem is the manipulation of land markets by the local government. Rules in terms of acquisition and disposition of land should be deepened. Last but not least, for private capital to gain ground in infrastructure investment requires urban infrastructure to be profitable.

4 Conclusion

Basic statements in the theoretical literature of urban economics say, that government policies such as tariffs, price controls and subsidies influence urbanization indirectly through their effect on sector composition. Furthermore, urbanization benefits from information and knowledge spillovers in agglomerations and thus encourages economic growth. So human capital plays a distinctive role in city growth and high wages reflect high productivity. Cities with more intelligent people also succeed and grow more. Another important outcome is the specialization of metropolitan areas in services. According to the fact, that services are tied to high-density areas and manufacturing is tied to low-density areas, Shanghai is on the right way to be a global city. China addresses itself more and more on establishing large cities, which focus more on high-tech industries and on business and financial services. In Shanghai a decline of the state-owned sector and the shift of manufacturing enterprises to suburbs could be registered.

Unfortunately, there are social consequences that have to be borne by the city. With the beginning of the urban reform in China, the urban-rural ratios increased and are now higher than they had been during the economic reform - the growth in rural income could not keep pace with the rapid increase of the urban income.

Not only urbanization but also the existing policy structure is limiting social harmony in China, and very likely also economic growth in the long run. Hardly defined individual property rights may push the economic growth due to minimal transaction costs of acquiring land. But at long sight, it may have profound and negative economic and social consequences. In terms of the household registration *hukou* in migration policy, the literature could show, that 56% of China's cities are statistically undersized, which indicates that migration restriction

limits city size and causes welfare losses - resulting in large productivity losses. By contrast, family planning policy seemed to have an positive effect on growth. As in a recent work of Li and Zhang [22], they addressed their topic on China's one-child policy. An hypothesis that has been subject since Malthus' book *An Essay on the Principle of Population* has been causing controversies already for hundered of years: at given limited resources, population growth hinder economic growth. Despite numerous debate and empirical studies there is still no definitive causal effect about the two variables. By taking China's one-child policy and using a data set of 28 provinces in China the authors could find out, that the population control "indeed have helped the growth of the Chinese economy".

Despite the concentration on business and finance services, the latter is still under strict government control, while the former is freed from it. However, the lack of transparent, autonomous legal and financial system could constrain China's largest cities being global cities. Another weak point is the disability of the urban infrastructure to sustain China's economic growth. The problem lies in the vertical fiscal imbalance. There has to be defined responsibilities in infrastructure provision and finance at each level of the government.

However, growth is an accumulation of many factors, and the above determination is far from exhaustive.

Appendix A

Assume that only three activities take place in a city: production of goods, intracity transportation, and housing.

The production function is Cobb-Douglas:

$$X_1 = A_1 L_1^{\alpha_1} N_1^{\beta_1} K_1^{\gamma_1} \quad (.1)$$

where $\alpha_1 + \beta_1 + \gamma_1 = 1$. X_1 is total output of goods. L_1 , N_1 and K_1 are total inputs of land, labor and capital. Then

$$X_1 = \int_{city} X_1(u) du \quad (.2)$$

where $X_1(u)du$ is the amount of goods produced in the ring of width du centered on a circle u miles from the city center.

Intracity transportation links the CDB with suburbs. An efficient transportation system require the choice of a different coefficients in different parts of a city. One coefficient is the ratio between land and transportation:

$$L_2(u) = bX_2(u) \quad (.3)$$

where $X_2(u)du$ is the number of miles of transportaion within a ring of width du and u miles from the city center. $L_2(u)du$ is the land input in transportation in this ring.

Assume the production function "housing":

$$X_3(u) = A_3 L_3(u)^{\alpha_3} N_3(u)^{\beta_3} K_3(u)^{\gamma_3} \quad (.4)$$

where $\alpha_3 + \beta_3 + \gamma_3 = 1$.

Appendix B

Assume amenities s to vary continuously across land. Residents of each city consume and produce a composite consumption commodity X . The price of X is assumed to be numeraire. Both capital and labor are completely mobil across cities. Thus there are no costs of changing residences. Intercity commuting costs are prohibited, whereas intracity commuting are ignored. Land is fixed among cities, however it is mobile between uses within a city. Wage and rent differences are a function of s , by an given equilibrium distribution of firms and workers across cities.

Workers

Assume workers to be identical in taste and skills, and each of them supplies a single unit of labor. The problem is to choose quantities of the composite commodity consumed x and the residential land consumed l^c , to satisfy a budget constraint:

$$\max U(x, l^c; s), w + I = x + l^c r. \quad (.5)$$

where w and r are the wage and rental payments, and I is nonlabor income, which is independent of location. V is the indirect utility function and the market equilibrium condition for workers is given by

$$V(w, r; s) = k. \quad (.6)$$

Wages and rents must equalize utility in all locations. Otherwise workers would have an incentive to move.

Firms

The constant-returns-to-scale production function for producing X is $X = f(l^p, N; s)$, where l^p is land used in production and N is the total number of workers in the city. The problem here is to minimize production costs. Hence, equilibrium condition for firms is:

$$C(w, r; s) = 1. \quad (.7)$$

Unit cost must equal product price. Otherwise firms would have an incentive to move. Unit cost function is increasing in both factor prices, $C_w = N/X$ and $C_r = l^p/X$.

Equilibrium

It can be shown that in high amenity locations, wages should be lower while the change in rents is uncertain. If s is unproductive, firms prefer locations with low s , whereas workers prefer locations with high s . High rents discourage firms and workers from locating in the area, thus worker equilibrium requires high rents in location with high s to choke off immigration. Firm equilibrium requires low rents to induce firm location. While a low wage discourages workers and attracts firms. If s is productive, the rents rise while change in wages is uncertain. If land is not part of production, then wage is determined by the cost function and rent take over the entire amenity valuation.

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