DP2016-03

A Simple Model of the Chinese Hukou System and Some Ongoing Reforms

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Revised January 13, 2017

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This version: January 11, 2017

Abstract: We model the Chinese *Hukou* (household registration) system, from the Mao era when it was strictly enforced to the early reform era (Deng Xiaoping era) when peasants were allowed to migrate to cities for work only. We document some stylized characteristics of *Hukou* control*,* and based on which build a rigorous model of the dual labor market generated by it. The model can explain the *urban-rural divide*, especially in the early transition period, and the fact that rural migrant workers not only made important contributions to China's export boom, but also reversed the Chinese trade pattern—from exporting primary products to manufactured goods, because they are the labor force in "the manufacturing hub of the world". Reform recovers some of the deadweight losses from Mao's strict *Hukou* control, but the gains from reform are unevenly distributed. We also apply the model to examine the impacts of various policies and some ongoing reforms such as special economic zones, export-tax refund, urbanization, privatization, one-child policy, etc.

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"Living conditions that to me looked close to prison life: 10 or 15 workers in one room, 50 people sharing a single bathroom, days and nights ruled by the factory clock. Everyone they knew lived in similar circumstances, and it was still better than the dormitories and homes of rural China." (from **The Voice of China's Workers** by Leslie T. Chang, author of *Factory Girls— From Village to City in a Changing China*)

1. Introduction

They make shoes, socks, shirts, handbags, electronic appliances, smart phones, smart pads and computers that are sold worldwide; they build highways, railroads, trains, ports, ships, cars and skyscrapers, and etc. and so on; in a word, they are the labor force in "the Manufacturing Hub of the World". They, are the migrant workers in China. In 2013, the official figure for them was 260 million (China Daily web, March 6, 2013), bigger than the combined total population of England, France, Germany and Italy! More astoundingly, about 100 million children are left behind them in the countryside in early 2016, usually to relatives (e.g., grandparents). [1] A recent survey paper on China's family planning policy by Wang, Zhao and Zhao (2016) shows that the rural-urban migration has reversed the population aging pattern in China: while coastal cities had lower fertility rates and stricter family planning policy implementation, the population aging rates are lower there than in inner provinces. Tombe and Zhu (2015) estimate that the reduction of internal migration costs accounts for about 20 percent of China's GDP growth during 2000~2005, in contrast to only about 7 percent contributed by external trade liberalization.

It is no coincidence that the Chinese share of world merchandise exports increased from 1.2 percent in 1983 to 11.4 percent in 2012, replacing Japan as the trading hub of Asia. In 2012, China became the world No.1 in terms of trade volume, reaching $3.87 trillion in goods trade,

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[1] Fa Zhi Wan Bao (Law Evening News): http://www.jdnews.com.cn/jdpd/syxw/62119634.html

earning a surplus of $2000 billion. Even the previous No.1, the U.S., felt hard its impact in various ways such as unemployment, prices, income inequality, labor force participation and even political voting behavior such as the presidential election (see Autor, Dorn and Hanson, 2013; Che, Lu, Pierce, Schott and Tao, 2016; Pierce and Schott, 2016). [2] However, more surprisingly, the Chinese trade pattern has been reversed from 30 years ago: in 1980, the share of primary exports was roughly 50 percent, but by 2011, it had fallen to merely 4.5 percent.

Steady urbanization is also observed during this period. In 1982, urban population (including both urban and rural status) was only 20.91 percent of the total population, but the ratio reached 26.44 percent in 1990, 36.22 percent in 2000, and 49.68 percent in 2010. [3] And this trend is expected to increase because one of the goals of the central government's plan for the period 2014--2020 is urbanization. However, in a recent study with 2005 countrywide data, Fu, Li and Yang (2015) find that rural migrants benefit much less from China's urbanization than do workers with urban status. There exists "double discrimination", against residents who carry both rural and between-province migrant status (vs. local rural status). In fact, *Hukou* restrictions take away a big part of migrants' contributions and redistribute them to residents with urban status. According to Tombe and Zhu (2015), in 2000, the average cost of within-province rural-urban migration is around 51% of annual income. [4] Knight and Song (1995) call employees in state-owned enterprises "insiders", and Chan (2009) terms the discrimination and

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[2] Keller and Utar (2016) find that import competition from China caused job polarization in Denmark through shifts from manufacturing to services, increasing income inequality.

[3] Source: Chinese government: http://www.stats.gov.cn/tjsj/Ndsj/2011/html/D0305e.htm

[4] "The costs of between-province migration are even higher: 94% of annual income for rural to-rural or urban-to-urban migration and 98% for rural-to-urban migration," which are prohibitive for most potential migrants.

exploitation generated by *Hukou* the "secret recipe" for China's recent success in economic growth. Zhao (1999a) and Meng (2012) argue that the *Hukou* generated migrant workers in China are just like the guest workers in Europe.

Graph 1 presents the earnings for workers of different status from 2001 to 2014. It clearly shows that urban workers in public (state- and local public-owned) enterprises earn the highest income, rural workers earn the least, and migrant workers earn slightly higher than rural workers; and the gap appears to be increasing. However, this is not the whole story, because residents with urban status possess housing properties in China's booming cities, a privilege most rural residents have been deprived off until very recently.

Graph 1: Average Annual Income of Chinese Workers in RMB
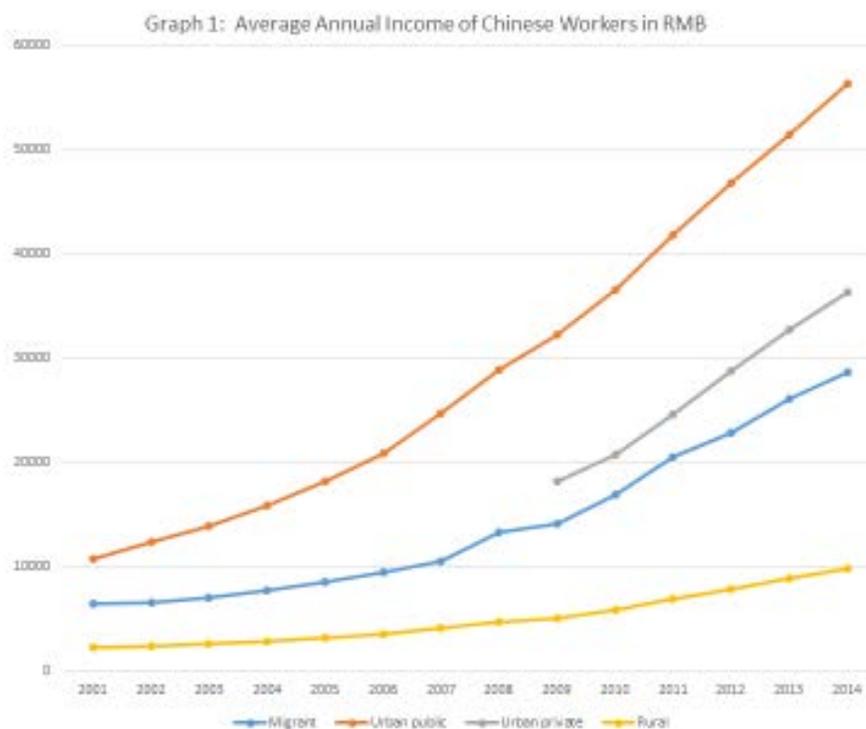
Sources: China Bureau of Statistics: 「National Migrant Survey」, 「China Statistics Almanac」

Besides the urban-rural divide, *Hukou* also creates a regional divide among urban-status holders in different cities, such as between Beijing Hukou and Zhengzhou Hukou. The urban-rural divide played dominant roles in the China's early transition, and the regional divide is becoming more important only recently when the housing markets in different cities behave differently, that enlarged the regional inequality through real estate values.

In this paper, we model the *Hukou* reform in the early transition period, i.e., the so-called Deng Xiaoping era, a main feature of which is the urban-rural divide. We argue that the Chinese migrant workers are to a large extent responsible for the recent boom of Chinese exports and the reversal of its trade pattern. These migrant workers are created by an important institutional factor, namely, the loosening of the Chinese household registration system (*Hukou*). Hukou control generates a segmented, dual labor market—the urban-rural divide, associated with two different types of status and earnings. We first document some stylized characteristics of *Hukou*, then build a simple model of the resulted dual labor market, and link it to China's recent export changes. We demonstrate that during the transition period when rural workers are allowed to work in the cities, the remaining *Hukou* rationing keeps migrant wages at low levels, enabling urban manufacturing firms to increase output and exports, and raise the income of those residents with urban status. [5]

Reform certainly recovers some of the deadweight losses due to Mao's strict *Hukou* control, but the gains of reform are unevenly distributed. In particular, a big part of the migrant workers' contributions is taken away by residents with urban status. In other words, the recent Chinese urban expansion rests on the countrywide systematic exploitation of rural residents. We also

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[5] In reality, the income increase of urban residents may exist in different forms, such as the surge of housing assets, etc.

extend the model to incorporate seasonal migration, when peasants work in the countryside during busy seasons but migrate to cities for work during off-seasons.

In addition, we apply the basic model to examine the impacts of various Chinese policies and ongoing reforms such as "special economic zones (SEZs)", export-tax refund, urbanization, foreign direct investment (FDI), privatization of the state-owned firms, the creation of a service sector using migrant labor, one-child policy and the "demographic dividend", etc. Specifically, we investigate how these reforms and policies affect the rural and urban wages, peasant migration and exports. We find that the mass migration movement from rural villages to expanding cities made China "the manufacturing hub of the world", and it has been transforming Chinese society in many different ways, in essence much as immigration to America's shores remade the U.S. a century also ago. However, as the "demographic dividend" is gradually eroding, China may lose its competitive edge in manufacturing.

There is an abundance of empirical literature and documentation on the *Hukou* system and its influence on Chinese economic development, such as Lin, Cai and Li (1994), Knight and Song (1995), Knight, Song and Jia (1997), Solinger (1999), Zhao (1999a, 1999b), Wang (2005), Au and Henderson (2006), Naughton (2007), Brandt and Rawski (2008), Ito (2008), Dong and Xu (2009), Cai (2010), Chan (2009, 2010a, 2010b), Knight, Deng and Li (2011), Li, Li, Wu and Xiong (2012), Meng (2012), Zhu (2012), and Fu, Li and Yang (2015). The vast empirical literature deals with rural-urban migration, earnings inequality and rural and urban employment. under *Hukou* control. For in-depth surveys of the *Hukou* system, see Knight and Song (1995) and Chan (2009), the latter of which especially argues that this system has become an obstacle for China's further modernization.

However, one can hardly find any rigorous theoretical work on the *Hukou* system.

Recently, Fields and Song (2015) study the Chinese dual labor market, using a job-search approach and focusing on search costs and benefits of different worker options. They analyze the effects of labor policies on Chinese welfare using criteria like first-order stochastic dominance and an abbreviated social welfare function. In contrast, the present paper adopts a simple approach, but is able to tie *Hukou* to the recent Chinese trade boom and trade pattern reversal, and unify various ongoing reforms such as special economic zones, urbanization, one-child policy, privatization and their effects on the Chinese economy. Tombe and Zhu (2015) estimate the contributions of various factors to China's GDP growth during 2000~2005, paying special attention to China's internal trade cost and migration cost, in addition to its external trade.

The paper is also closely related to the literature on dual labor markets and migration in general, such as the classic works by Lewis (1954), Harris and Todaro (1970), Jones (1971), Mussa (1974), Fields (1975) and Stiglitz (1982). Becker (1971) pioneers the research on the economics of discrimination; Feenstra (1980) studies factor market distortions in an open economy; Bulow and Summers (1986) show the necessity to segregate the labor market when employers pay more to some workers to elicit effort; and Young (2000), Hsieh and Klenew (2009), Huang and Tao (2010) and Brandt, Tombe and Zhu (2013) examine factor and resource distortions in China.

The reminder of the paper proceeds as follows. Section 2 briefly reviews the Hukou system; Section 3 sets up the basic model with Hukou control and labor market segmentation; Section 4 incorporates rural-urban migration into the model and establishes the "quasi migration" equilibrium under *Hukou*; Section 5 analyzes the gains and distribution of gains from reform; Section 6 introduces trade into the model and shows how migrants create the Chinese trade pattern reversal and trade boom; Section 7 examines some ongoing reforms such as special

economic zones, export tax refund, urbanization and one-child policy; Finally, Section 8 includes concluding remarks.

2. A Brief Review of Some Historical Facts

One sometimes sees harsh discrimination in the labor market against foreign citizens. But in China, it is used to systematically discriminate against rural residents. Soon after the communists took over China, a new constitution was established in 1954, and it actually stated that citizens have the freedom to migrate, across region and occupation. However, in January 1958, a new regulation changed all that: a very rigid household registration system, *Hukou*, was imposed, which segments the population into two status groups: agriculture (rural) and non-agriculture (urban). Each and every resident must reside and work in the registered village or community and firm premises ("danwei" in Chinese). It is almost impossible to change status or residency, especially from rural status to urban status, or from small towns to big cities. Urban citizens enjoy a range of social, economic and cultural benefits that rural citizens do not receive. To be more exact, urban earnings in fact include food and clothing rations, health care, retirement pension, housing benefits, guaranteed admittance to an urban school up to high school, theatres, parks, libraries, sports and other entertainment facilities, etc., which are privileges a resident with rural status is deprived off.

The intended goal was threefold: to reduce urban unemployment caused by the regime changeover, and to lock most of the population into agriculture in order to provide life support for the minority living in the cities, and to accumulate surplus for industrial development, just as explained in Lewis (1954). In early 1958, urban population was 99.49 million, roughly about 15.4% of the total population in the country (China Statistics Yearbook, 1987, p.89). *Hukou*

rationing in essence forces 85% of the country's population to the subsistence level of living with rural status. Migration was banned and those who dared to move without official permit would be charged and even put into prison for serious offenses.

Hukou control was the most fundamental and effective tool for China's command economy during the Mao era. Its impact would be so overwhelming that Tian (2003) calls the *Hukou* book "China's No. 1 Document." Historians argue that *Hukou* control heavily aggravated the death toll during the so-called "Great Leap Forward" period (1958-1960), when peasants were locked to their villages and over 36 million were starved to death by officially published Chinese figures (See Yang (2007)).

Also, almost immediately after the Communists overthrew the Nationalists in 1949, land was taken away from landlords and capital was confiscated from capitalists by the central government through a series of land reforms and commercial and industrial reforms. Then *collective ownership* was imposed such that all land and all capital belong to the whole country (i.e., the central government). [6] Consequently, all profits from industry and commerce were collected by the government, and peasants must pay taxes every year. In essence, the return to capital in the urban regions and the return to land in the countryside were collected by the government. Under *Hukou* control, while rural residents work in the countryside, urban residents work in state-owned enterprises (SOEs) or local government owned businesses.

However, the strict household registration system was not unique to the communist regime. In fact, about 2370 years ago in Qin-Dynasty China, a similar system was adopted---the

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[6] In practice, only the residents in a certain village have the privilege to use the land there, and only the workers with urban status in a certain company can claim ownership to profits and rents there.

so-called "Shang Yang reform", whose goal was to develop agriculture though. The population was locked to land, commerce was prohibited and no travelling was allowed without official permit. Households were organized to monitor each other, and one would be punished for a neighbor's violations. Meanwhile, the rigid system also helped to collect taxes, draft for war and public projects and strictly control the flow of information. Even this part is also very similar to the Mao era, when China had "railroad soldiers" and "construction soldiers", most of whom consisted of young men from the countryside.

3. Basic Model Setup

Based on the historical facts, we can construct a framework that is roughly a combination of the Harris-Todaro model, the Lewis model and the Ricardo-Viner model, with some twists. The monopolistic competition model in the spirits of Dixit-Stiglitz-Krugman can also deal with labor migration to some extent, but land is not a factor in that model, agriculture production exhibits constant returns to scale and capital is either nonexistent or can be owned by anybody in a country in principle, which are far from the Chinese reality where peasants are abundant and have not been allowed to own properties in urban regions until very recently. In contrast, our setup incorporates various aspects of recent Chinese institutions and thus is relevant in analyzing the Chinese transition, as will become clear soon.

Consider an economy consisting of two sectors: manufacturing (x) and agriculture (y), with y as the numeraire good. Perfect competition prevails in both sectors. Households maximize the following homothetic utility function, $\mu = C_x^{\alpha} C_y^{1-\alpha}$, where C_x and C_y are respectively the domestic consumption of goods x and y, and $\alpha \in (0,1)$ is a positive constant. Utility

maximization subject to the standard budget constraint yields the following inverse demand function, where $p(\cdot)$ is also the relative price of good x:

$$p(C_x, C_y) = \alpha C_y / (1 - \alpha) C_x. \tag{1}$$

Suppose China is a small economy in the Mao era, which was in fact very close to the reality at the time because China had little trade, then $p(\bullet) = p^*$, where p^* is the world relative price of good x. And to maintain balanced trade, we must have

$$C_x = x - q, \tag{2a}$$

$$C_y = y + p^* q \tag{2b}$$

where q is the amount of manufacturing exports. Eqs. (1), (2a) and (2b) jointly give implicit solutions to C_x, C_y and q.

The country is endowed with a total labor of $L = L^R + L^U$, initially with L^R and L^U of them living in the rural and urban areas respectively. Manufacturing uses labor and sector-specific capital K:

$$x = x(L^U, K). \tag{3a}$$

In contrast, agricultural production uses labor and sector-specific land T:

$$y = y(L - L^U, T). \tag{3b}$$

3.1 *Hukou* control--labor market segmentation in the Mao era

Under China's strict *Hukou* system in the Mao era, the number of residents with urban status, L^U, is determined by the government, and the rest of the population, $L^R = L - L^U$, is given rural status and must reside and work in the countryside. Urban status comes with many benefits such as better medical benefits, guaranteed urban education up to high school, [7] retirement pension, guaranteed job opportunities in state-owned or publicly owned businesses, renting or buying apartments with substantial government subsidies, etc. In contrast, rural residents have none of them.

Given the above facts, the rural and urban earnings under a simple *Hukou* system can be respectively written as,

$$w_0^R = y_L(L^R, T),$$
(4a)

$$w_0^U = x_L(L^U, K)p.$$
(4b)

In Figure 1, the horizontal and vertical axes denote respectively labor employment (rural from the left and urban from the right) and earnings (the value marginal products of labor, i.e., VMP^R and VMP^U). In the absence of labor market impediments, the wages would be equalized by labor migration between the two sectors, at the intersection of the yellow-colored VMP curves at $\tilde{w}$. However, *Hukou* rationing keeps only L^U as urban residents, disturbing this equilibrium.

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[7] *Hukou* control not only creates an urban-rural divide, but also an inter-city divide. Even today, the chances of getting into Peking University or Tsinghua University (arguably the top 2 universities in China) would be 30 to 50 times higher (which can be easily calculated based on the ratio of enrollment over the number of college entrance exam takers), if the student has a Beijing Hukou rather than a Hukou from a city in a remote province such as Guizhou, Henan, Jiangxi, Sichuan or Yunnan.

As a consequence, it cuts away the bottom section of VMP^U, forcing the new intersection of

VMP^R and VMP^U down to w_0^R. This generates a large gap between the urban earnings w_0^U

and the rural earnings w_0^R. In addition, the strict *Hukou* system creates severe overemployment

in the countryside, leading to extremely low productivity and low earnings.

Figure 1. *Hukou*—Mao Era Income Gap: $w_m^U - w_m^R$

Urban income supported by agriculture tax,
or price control, coupons, etc   Urban Hukou
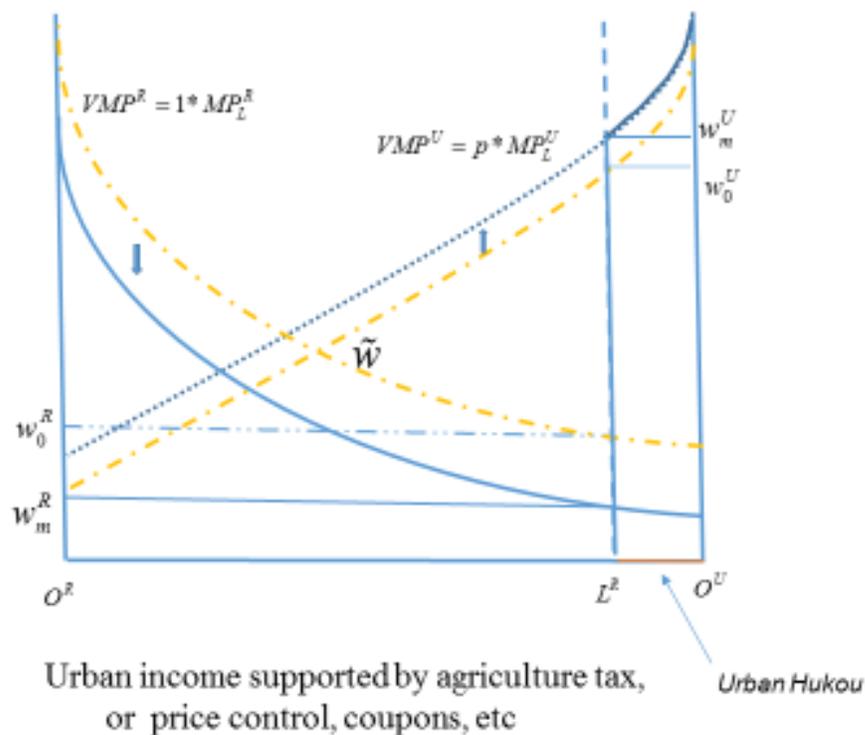
Notice also that under the *Hukou* system, there is no unemployment in either sector,

which was touted as one of the most important advantages of socialism over capitalism. In fact,

excess labor is forced to the countryside with the rural status, that had about 85% of the

country's total population in early 1959. Thus, we abstract from modeling urban unemployment

which is not essential for our purpose. Readers are referred to Harris and Todaro (1970) for the

treatment of urban unemployment with rural-urban migration. Also, in the classic Lewis model (1954), the marginal product of labor in agriculture is assumed to be zero, while in the present model, the earnings gap is caused endogenously by the government policy, *Hukou*, and labor supply in the countryside is not unlimited.

In addition to the *Hukou* restrictions, peasants must pay an agriculture tax, which was only abolished on January 1, 2006. In Figure 1, the agriculture tax shifts the VMP^R curve downward, and as a consequence, the rural wage is forced down from w_0^R to w_m^R. On the other hand, the collected tax is used to support construction of roads, factories or simply parks and entertainment facilities in urban areas, that can shift up the VMP^U curve and the urban earnings from w_0^U to w_m^U, enlarging the urban-rural gap. It is interesting to note that even without the agriculture tax, large urban-rural earnings gap can be maintained similarly with other institutions, such as price controls and rations, which were rampant in the Mao era (including different coupons for rice, wheat, cloth, meat, oil, salt, soap, sugar, etc.). China abolished most coupons in 1993, fifteen years after Deng Xiaoping started the reform.

4. The Reform Era and Rural–Urban Migration

In the past 35 years also, gradually rural residents have been allowed to migrate to cities, initially for work only. Until very recently, migrants do not enjoy the aforementioned benefits as city residents, and usually return to the countryside when their work is finished. That is, while *status discrimination* is maintained, peasants are now allowed to use their labor in urban areas, increasing their productivity as a consequence. In practice, they can be hired as part-time workers in publically owned firms and township firms ("xiang zhen qi ye" in Chinese) such as construction workers, or even open their own small businesses such as in services (repairs,

vending, homecare, delivery, doorman, etc.). In some cases, a tiny fraction of them can obtain

urban status, by for instance, joining the military and then retiring to work in a state-owned firm,

or going to college and then changing the registration status given at birth, or passing exams

when the state-owned sector expands and hires workers from the countryside. [8]

Denote L_y^R and L_x^R as the residents with rural status but working in the rural and urban

regions respectively, satisfying $L_x^R + L_y^R = L^R$. In addition, among those migrant rural residents,

the government chooses a tiny fraction $\rho > 0$ to obtain urban status, i.e., ρL_x^R qualifies as city

residents, while $(1-\rho)L_x^R$ of them work in cities but retain rural status. Then the total number of

urban residents becomes $L^U + \rho L_x^R$ in the reform era.

As a result, there exist three types of workers with three wages in the whole country

under migration: the urban residents who earn the urban income w^U, the rural workers who do

not migrate and earn the rural income w^R, and the migrant workers who return to rural areas

after work and receive the migrant income w_x^R.

4.1 Quasi-migration equilibrium

When the urban sector expands, even though the government may act first by announcing

the ratio or quota of recruitment for new urban employees, each migrant is not certain that he or

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[8] In the last couple of years, in the coastal regions such as the Pearl river delta and the Shanghai-Zhejiang regions, rural migrant workers have been allowed to enjoy partial benefits of urban residents, such as allowing their children to enter local schools without extra payment and allowing them to take local college entrance exams instead of sending them back to their hometowns for such exams. Also, in some remote and backward provinces, nowadays it is becoming easier to change from rural *Hukou* to urban *Hukou*, but real differences remain in that the status changers obtain a much lower "minimum pension", and it may be hard for them to find jobs.

she will be able to change status from rural to urban. The expected probability of obtaining urban status is $\rho \in [0,1]$, and with probability $1-\rho$, he/she retains rural status and earn a reservation wage, δw^R, where $\delta \geq 0$ is a constant, used to capture systemic differences between migrant workers and peasants, such as education level, age, preference, etc., since it is argued that migrant workers tend to be younger, healthier and more risk-loving than non-migrants. If $\delta = 1$, then the migrant's reservation wage is the rural wage; but in reality $\delta > 1$ is more likely, as shown by the income gaps in Table 1.

Given the above description, the migrant's expected gross wage, w_x^R, can be written as

$$w_x^R = \rho w^U + (1-\rho)\delta w^R .\tag{5}$$

Note that w^U is not fixed; rather, $w^U \equiv w^U (L^U + \rho L_x^R)$.

We also assume that each migrant must pay c (>0) as the migration cost. This cost is non-negligible, because it can include costs of travelling, search cost for jobs, and costs for living away from home, etc. When choosing to migrate or not, the typical rural resident compares $w_x^R - c$ and w^R. Apparently, if $w_x^R - c > w^R$, peasants will keep moving to cities for work. So migration reaches an equilibrium when

$$w_x^R - c = w^R ,\tag{6}$$

which can be combined with (5) to yield the equilibrium rural and migrant earnings as

$$w^R = \frac{\rho}{1-(1-\rho)\delta} w^U (\cdot) - \frac{1}{1-(1-\rho)\delta} c ,\tag{7a}$$

15

$$w_x^R = \frac{\rho}{1-(1-\rho)\delta} w^U(\cdot) - \frac{(1-\rho)\delta}{1-(1-\rho)\delta} c \ . \tag{7b}$$

In the case of $\delta = 1$, the above can be simplified to

$$w^R = w^U(\cdot) - \frac{1}{\rho} c \ , \tag{8a}$$

$$w_x^R = w^U(\cdot) - \frac{1-\rho}{\rho} c \ . \tag{8b}$$

With the added population from rural immigration ρL_x^R obtaining urban status, the urban income is given by,

$$w^U = x_L(L^U + \rho L_x^R, K) p \ . \tag{9}$$

Thus, given the relative price p, the quasi-migration equilibrium in the reform era is determined by Eqs. (5), (6), (9) and $L_x^R + L_y^R = L^R$, which jointly yield the solutions to L_x^R, L_y^R, w^U and w^R.

Figure 2 depicts the quasi-migration equilibrium, drawn with $\delta = 1$ for picture clarity (i.e., the migrant's reservation wage being w^R). With L^U and ρ given by the government, the urban VMP^U curve is cut short by and follows the vertical green line. In contrast, rural migrants face the expectation of ρ, and migration leads to the formation of the negatively sloped dotted curve w_x^R, which is a linear combination of the original VMP^U and VMP^R curves (see eq. (5)), to the *right* of their intersection. Note that w_x^R is negatively sloped, because ρ is assumed to be small, implying that a bigger fraction of w_x^R comes from the negatively sloped curve VMP^R rather than from VMP^U.

In addition, the migrant must pay the migration cost c, shifting w_x^R down to $w_x^R - c$, that

in essence represents the migrants' supply curve. In the absence of any restrictions, the migrants

would receive their marginal products, so their wage would lie on the original VMP^U curve since

rural migrants would become urban residents after migration, but *Hukou* control prohibits them

from changing status and thus lowers their wage, first to the w_x^R curve, and with the migration

cost c, finally down to be located on curve $w_x^R - c$ instead.

Figure 2. Migration Equilibrium under *Hukou*
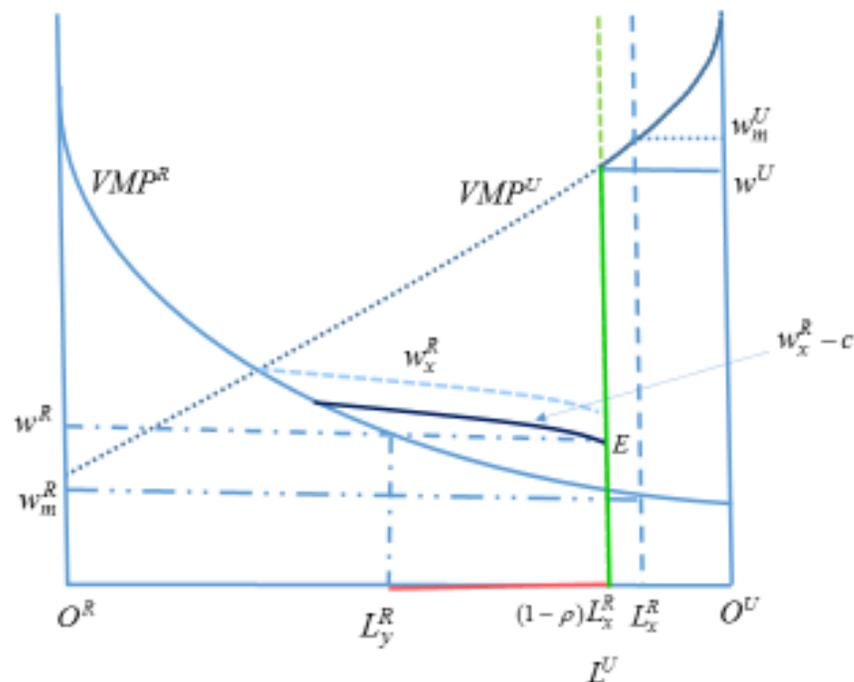
Given the above, a rural resident then faces two choices: either staying in the countryside

and receiving VMP^R, or migrating to the city and receiving $w_x^R - c$. Migrants would keep

coming into the cities since $w_x^R - c > VMP^R$, until curve $w_x^R - c$ intersects the vertical green line which is determined by the government-given ρ. This intersection point E is the quasi-migration equilibrium, at which the migrant net income must be equal to the rural income w^R by eq. (6), yielding labor allocation between the two sectors. In this equilibrium, only ρL_x^R migrant rural workers are able to change their status to urban and receive the urban income w^U, while $(1-\rho)L_x^R$ of them work in the city by keeping their rural status, who receive the migrant income and return to the countryside after their work is finished. In Figure 2, those who successfully change their status are denoted by the horizontal distance between the green vertical line and dotted blue vertical line, and the migrant workers who retain rural status are represented by the red segment on the horizontal axis. At this quasi-migration equilibrium, migrant workers receive the wage $w_x^R - c$, which is less than the value of their marginal product given by VMP^U (since migrants work in manufacturing). As such, firms in the urban sector would like to hire more migrants, but no more migrants come from the countryside due to the remaining *Hukou* rationing, which in reality may prevent them from buying urban homes, receiving equal medical care and retirement pension, and sending children to urban schools, etc.

We can also straightforwardly incorporate *seasonal migration*, to model the fact that some migrants work in the urban area for only a fraction of the year and return home for the rest, perhaps due to family reasons such as taking care of elderly school children, parents and farm work during busy seasons. Suppose the seasonal migrant spends a fraction θ of his time working in the countryside, and the remaining fraction working in the cities, then his income becomes $\theta w^R + (1-\theta)(w_x^R - nc)$, where n represents the number of round-trips he makes. From Figure 2, it is clear that this income is lower than that of a full-time migrant.

18

5. Gains from Reform and the Distribution of Gains

In this section, we examine the net gains from allowing partial rural-urban migration and the distribution of the gains. In order to do that, we need to first define ownership to some extent. As described in Section 2, under *collective ownership*, all land and all capital belonged to the whole country (i.e., the central government), all profits from industry and commerce were collected by the government, and peasants must pay taxes every year. We thus assume the return to capital in the urban regions and the return to land in the countryside are all collected by the government. As in Lewis (1954), the government could accumulate the collected rents to develop the industrial base in a dynamic setting, and hire more migrant workers in the long run, which is beyond the scope of the present paper though.

From Figure 3, it is straightforward to see that both rural and urban residents gain from reform, and the country as a whole gains by the combined colored areas. More important is the distribution of the gains though. To be specific, the yellow area is created and obtained by the residents who have successfully changed their status from rural to urban, and the rest of the colored areas is created by the rural migrants, of which only the red area is obtained by them, but the *grey area* is taken away by the capital owner—the government. In other words, this area is created by migrant workers who cannot claim ownership of it due to the remaining *Hukou* control, showing the "exploitation" nature of the *Hukou* system under migration. In reality, the exploited income may be redistributed to residents with urban status through various channels,

such as retirement pension, education, housing and health benefits, etc.

Figure 3. Gains of Reform and Redistribution
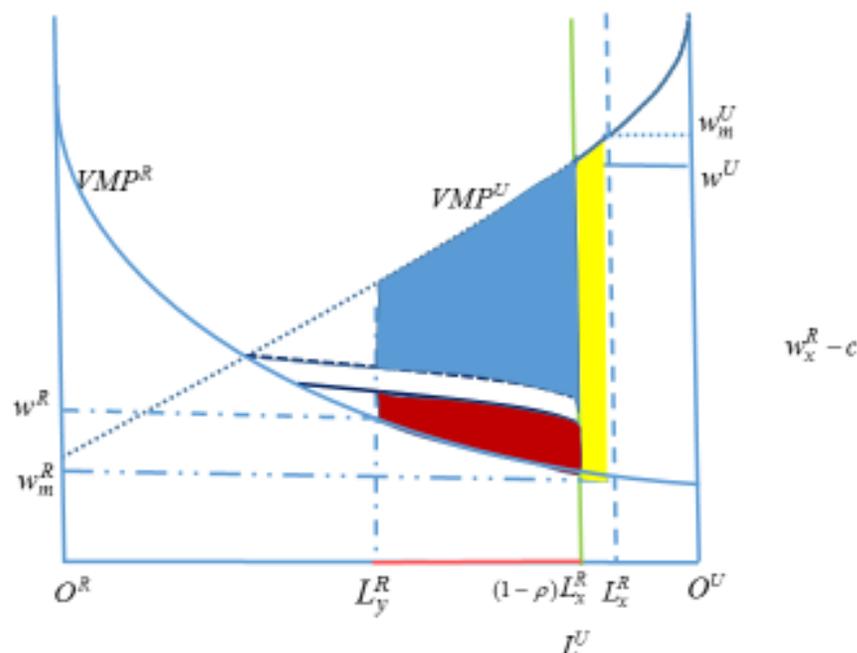
In sum, while the loosening of the *Hukou* system allows the whole country to gain, in per-capita terms, a typical urban resident gains more due to the distortion caused by the remaining *Hukou* rationing, which is confirmed by recent empirical findings in Fu, Li and Yang (2015), as mentioned in the Introduction.

6. Trade Pattern Reversal and the Export Boom

To deliver the point we want to make, let us assume that in the Mao era, China is a small country which takes world price as given, and it has reached a special external equilibrium with the rest of the world in the sense that it exports agricultural goods and imports manufacturing goods.

Next, China enters the reform era and allows quasi labor migration as described in the

previous sections, thereby releasing tremendous excess labor from the countryside. As official

numbers show, there are 260 million migrant workers in 2013, leaving behind them 100 million

children. Figure 2 indicates that *Hukou* easing causes rural employment to decrease but urban

employment to increase, by L_x^R, raising urban output but lowering rural output.

Figure 4 can be used to illustrate this change. In the Mao era, strict *Hukou* control leads

to a heavily distorted economy, whose production possibility frontier (PPF) can be represented

by *PPF₀*. With the international price *p*, the country produces at *A₀* and consumes at *C₀*. That is,

it exports agricultural goods and imports manufacturing.

Figure 4: Trade Pattern Reversal with *Hukou* Easing
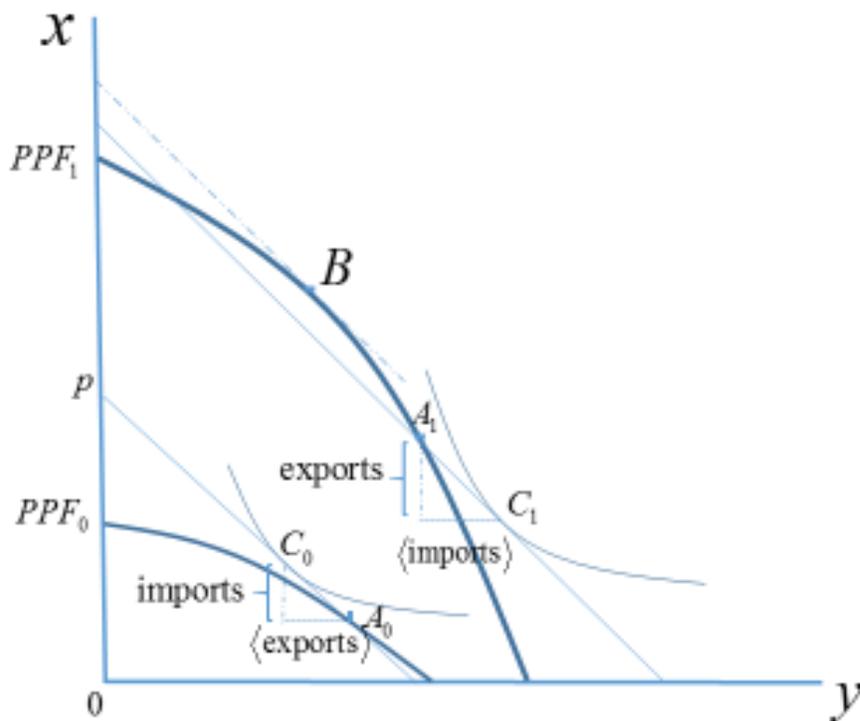
Entering the reform era, *Hukou* control is gradually loosened, and the distortion is partially corrected, which greatly increases China's productivity, expanding the production possibility frontier to *PPF₁* (Certainly, other factors such as technology improvement may have contributed to this productivity increase also). Even under the same world price *p*, China now produces at *A₁* and consumes at *C₁*. In this equilibrium, it exports manufacturing but imports agricultural products, reversing the trade pattern. In other words, it is the released excess labor from the countryside, who becomes migrant workers without urban status, that has generated the sudden boom in manufacturing exports. Note that if *Hukou* control were completely removed, the production equilibrium would move to point *B* on *PPF₁*.

As a matter of fact, China in 2013 is the world's biggest importer of soybean, #2 importer of rice, a top-10 importer of corn and wheat. China also imports large quantities of other agricultural products, including beef, milk, wine, deep-sea fishery, tropical fruits, etc., not to mention natural resources such as petroleum, gold, natural gas and iron ore. In 2011, primary exports was only 4.5 percent, compared to about 50 percent in 1980; that is, the production and contribution of the migrant workers *reversed the Chinese trade pattern* and led to the recent trade boom, which is what Chan (2005) calls the "secret recipe" for China's success.

7. Some Ongoing Reforms

In this section, we utilize the above basic model to examine some of the recent and ongoing reforms in China, such as "special economic zones", export tax refund, foreign direct investment (FDI), urbanization, privatization of state-owned firms, the creation of a service sector using migrant labor, etc. Our analysis will also be related to the one-child policy, the so-called

"demographic dividend" and population aging. We investigate how these reforms and policies affect the rural and urban earnings, peasant migration and exports.

7.1 Export tax refund and foreign direct investment

Since 1985, China has been using tax refund to encourage exports. Specifically, the *value added tax* that is imposed on domestically sold goods, is exempt for exported goods. Apparently, such a policy stimulates exports and increases their domestic prices, raising the *VMP* of labor in manufacturing in the present model. In figure 2, the number of migrant workers, manufacturing output and the rural wage will all increase.

In the reform era, China also received tremendous amount of inward FDI. In 2012, it surpassed the U.S. and became the biggest FDI destination country, totaling US $253 billion. In Figure 2, the effects of inward FDI can be shown similarly as the export-tax refund, because an increase in FDI raises capital *K*, raising the *VMP* of labor in manufacturing, and all other effects follow. Note that an increase in *manufacturing technology* would cause similar effects, but an increase in *agricultural technology* would bring opposite qualitative effects.

7.2 Special economic zones

Special economic zones (SEZs) played pioneering roles in the early decades of China's open-door period. They were set up along the coast, such as in Shenzhen, Dongguan, Zhuhai, Xiamen, etc. One distinct feature of SEZs is that they are located not in the cities but in the countryside; in other words, foreign capital comes into the countryside and uses *rural labor to make manufacturing goods,* and most often, for exports.

In Figure 5, since SEZs use foreign capital and rural labor, the yellow segment on the horizontal axis represents rural labor that is used in the SEZs. As a result, employment in agriculture is reduced, which raises VMP^R and the rural wage to w^{SEZ}, lowering labor migrating to the cities. Since SEZs make manufacturing goods for exports, total exports in the country will increase. Hence, SEZs are essentially used as export platforms by foreign multinationals, as processing zones.

Figure 5. Special Economic Zones: taking rural labor for manufacturing use
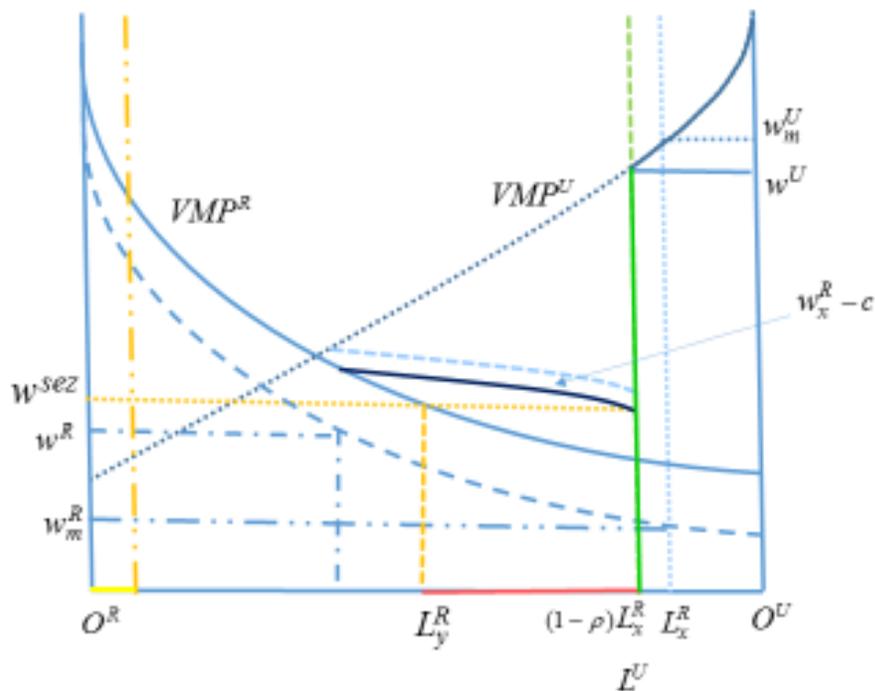
7.3 Urbanization

China today is under rapid urbanization. In fact, the central government has a midterm urbanization plan for the whole country from 2014 to 2020, as a means to transform the economy from export promotion to internal expansion. In March 2014, the Chinese government and the World Bank held a joint conference in Beijing, in which the latter has the following recommendations: i) under current Chinese urbanization, cities are using too much land and the available farmland has dropped to below "the red line"; ii) China should aim at more mobile and versatile labor force with equal access to quality services, giving equal treatment to workers of different status (see Indrawati, 2014). Bai et al. (2004) and Au and Henderson (2006) find that *Hukou* restricts Chinese urbanization in terms of scale and deepening (i.e., migrants obtaining urban status), causing many small cities to build duplicate facilities that prevent the country to take advantage of scale economies.

As reflected in the Word Bank recommendations, so far urbanization in China has been mostly taking farm land away for city construction, either for consumption (building apartments) or production (building factories). Even though the peasants who lose land can obtain urban status, a special feature of the current Chinese urbanization process is that the growth of urban area has outpaced the growth of urban residents, which might be the result of the local governments' ability to seize rural land at will and the fact that their revenue largely depends on land sales. Over the years 2000-2011, the urban built-up areas grow by 76.4%, while the urban population increases by only 50.5% (*Southern Weekend News*, Dec. 4, 2014).

It follows that, each rural worker must have less land to work with. Then in Figure 6, the VMP^R curve shifts down, the VMP^U curve may shift up if the reduced farmland is used for

production purposes, and the green dotted vertical line shifts to the left a bit after land-losing

peasants obtain urban status. As a consequence, the rural income falls and the urban income

rises, inducing more migrant workers to the urban region.

Figure 6. Current & "Ideal" Urbanization
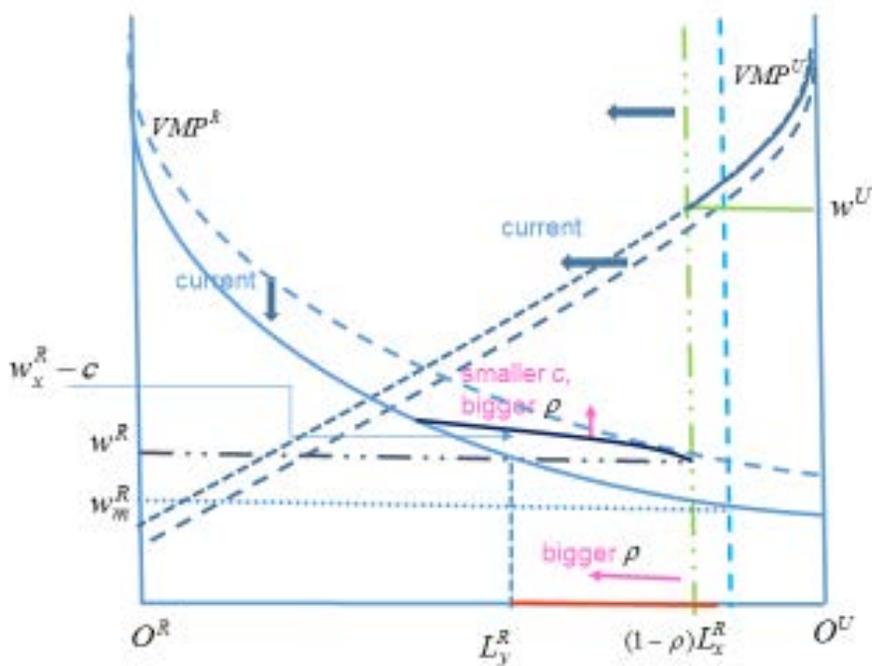
The "ideal" urbanization though, is to follow the recommendations by the World Bank,

and is adequately termed by the Chinese government as "from land-based fiscal policy to

focusing on citizens." This can be illustrated in our model, which is to raise the probability for

rural migrants to change status, ρ, and to lower the migration cost, c. In Figure 6, lowering c

shifts the thick-dark curve $w_x^R - c$ upwards in a parallel fashion. And raising ρ has two effects:

it shifts the green dotted vertical line leftwards, increasing the fraction of migrant workers with urban status; and it also rotates the $w_x^R - c$ curve upwards around its intersection point with curve VMP^R, making it closer to VMP^U.

7.4 One-child policy and the demographic dividend

Figure 7 in the Appendix depicts the Chinese population pyramid in 2014, from which one sees that over two thirds of the population belong to the groups from age 20 to 60, the legitimate working age. [9] It implies that in a span of one hundred years, China has been enjoying the largest labor force for a couple decades (in fact it is the largest labor force in Chinese history)---hence the so-called "demographic dividend". But this should end in 5 to 10 years as the pyramid base is becoming smaller going downwards on the one hand, and on the other hand, near the top a large number of people are retiring (at age 60). According to UN projections, by 2025, more people will be over 60 than those under 20 years of age, and by 2050, more than 34 percent of the population will be older than 60. There is great concern that China will be "ageing before affluence" (Cai and Wang, 2006). [10] The diminishing pyramid base is obviously caused by the one-child policy imposed since 1979; and after 35 years of adoption, the government announced its abolition in late 2015, hoping to increase the future labor force.

In the present model, the "demographic dividend" that China has been enjoying can be expressed as an increase in labor endowment, which would prolong the horizontal axis in Figure

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[9] Wang. Zhao and Zhao (2016) use the ages 15~60 to indicate the working age, and the population in this age group peaked in 2010, at 74.3% of the total population.

[10] Chan (2010b) also documents the paradox that there appears to be a shortage of labor in eastern China's export-oriented manufacturing belt and an abundant supply of labor in the inner, rural areas.

6, with the left side extending out more than the right side, since there are more rural than urban workers to begin with. As a consequence, both rural and urban wages decrease, but the former decreases relatively more. In addition, an excess of labor supply appears in the rural region, forcing more peasants to become migrant workers at lower wages, enabling Chinese manufacturing firms to produce and export more. In sum, the "demographic dividend" strengthens China's comparative advantage in manufacturing, in addition to the migrant labor released by the loosening of *Hukou* control. Together, they made China "the manufacturing hub of the world".

7.5 Privatization of publicly owned firms and the creation of a service sector

According to official data, by the end of 2012, China has 10.86 million privately owned firms, with US$3110 billion registered capital and US$2010 billion annual revenue, while state-owned firms (SOE) under SASAC (State-owned Assets Supervision and Administration Commission of the State Council) was only 120 in number, but with registered capital and revenue of roughly the same size as the private firms (3120 billion and 2250 billion respectively). [11] So it is teased that one SOE is worth 100,000 private firms. However, this is a result of the government's privatization policy—"grabbing the big while releasing the small (zhua da fang xiao)", indicating that less efficient firms are privatized.

We can illustrate this using Figure 2. "Grabbing the big while releasing the small" implies the government keeps the most productive firms and let go off the less productive ones. As a result, workers in the former firms still receive the urban income, which will rise since less

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[11] Source: SASAC and National Association of Industry and Commerce.

efficient firms are privatized, while those in the privatized firms will have to compete with the migrant workers and receive a wage lower than the urban income. Qualitatively, in Figure 2, privatization of less efficient firms is similar to lowering ρ, moving the green vertical line rightwards. Under *Hukou* rations, laid off urban workers still receive an actual income higher than the migrant wage, due to their urban status that carries special benefits and the fact that they do not need to migrate for work. In sum, "grabbing the big while releasing the small" will likely increase the urban-rural income gap, enlarging social inequality.

Finally, a phenomenon closely related is the development of a service sector, such as opening a small shop, doing repairs, delivery, vending, cleaning, and homecare, etc., which can be created by either the laid off urban workers or the migrant workers. These workers can also work in the construction sector, which mainly requires manual labor. The modeling technique would be similar to the creation of special economic zones, where some rural labor is taken away from agriculture, raising the VMP^R and rural and migrant income as a consequence. Obviously, the expansion of the service sector may not increase as much manufacturing output and exports as the FDI in SEZs does.

8. Concluding Remarks

We have modelled the Chinese *Hukou* system, from the Mao era to the Deng Xiaoping era. The loosening of Hukou control generated large numbers of rural migrants, who reversed the Chinese trade pattern and made China "the manufacturing hub of the world". We analyzed the gains from reform and its distribution during this special transition period. We also used the model to examine some ongoing reforms, such as special economic zones, export tax refund, urbanization,

privatization, one-child policy, etc. Our analysis is qualitative. The extent of each policy effect, of course, depends on further quantitative studies.

The *Hukou* system not only creates an urban-rural divide, but also an urban-urban divide between small and big cities. Our model has focused on the former divide, that has played dominant roles in the past 30 some years. Clearly, more research is needed for the latter one, which is closely related to the rising regional inequalities in China due to the recent real estate boom, especially between the so-called first-tier cities (Beijing, Shanghai, Shenzhen and Guangzhou) and small cities. Our model is static, ignoring capital accumulation. It would be interesting to study how the government uses the rents extracted from migrant workers in expanding urban production in the long run, along the lines in Lewis (1954).

Hukou reform is one of the most complex issues in the Chinese transition. It is closely related to the urbanization of millions of peasants, the privatization of state and publicly owned firms, the migration of urban residents across cities, the ownership of land, and the fairness of the education system, etc. As discussed earlier, so far the government has allowed less efficient firms to be privatized. It certainly remains to be answered whether this is a good policy in terms of welfare and resource allocation. Problems also arise with regard to workers' retirement pension and health care, and sometimes efficient firms and suburban land may be cheaply sold to princelings and those with government connections. In addition, why can workers in privatized firms have urban status while most rural migrant workers cannot? All these tricky and eminent issues are important topics that deserve more detailed research in the future.

9. Appendix

Figure 7: Population Pyramid

Male · China - 2014 · Female

Population (in millions) · Age Group · Population (in millions)
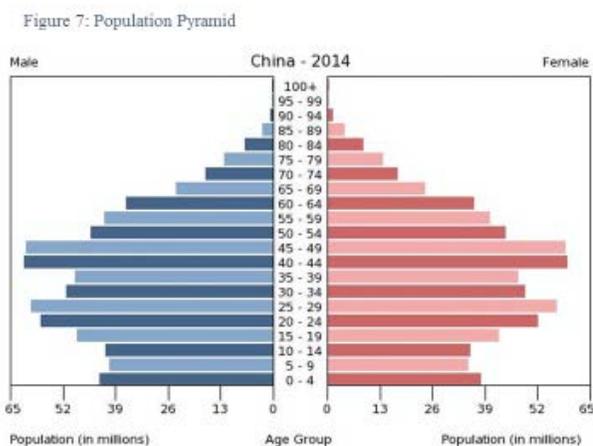
Source: http://www.indexmundi.com/china/age_structure.html

References

Au, C.C. and J.V. Henderson, 2006, How Migration Restrictions Limit Agglomeration and Productivity in China, *Journal of Development Economics* 80, 350-388.

Autor, David H., David Dorn and Gordon H. Hanson, 2013, The China Syndrome: Local Labor Market Effects of Import Competition in the United States, *American Economic Review* 103(6), 2121-68.

Bai, C.E., Y. Du, Z. Tao and S.Y. Tong, 2004, Local Protectionism and Regional Specialization: Evidence from China's Industries, *Journal of International Economics* 63(2), 397-417.

Becker, Gary S. 1971. *The Economics of Discrimination*, 2nd ed. Chicago: University of Chicago.

Brandt, Loren and Thomas Rawski, *China's Great Economic Transformation*, Cambridge University Press, New York, 2008.

Brandt, L., T. Tombe, and X. Zhu, 2013, Factor Market Distortions across Time, Space and Sectors in China, *Review of Economic Dynamics* 16: 39-58.

Bulow, J.I. and L.H. Summers, 1986, A Theory of Dual Labor Markets with Application to Industrial Policy, Discrimination and Keynesian Unemployment. Journal of Labor Economics, 376-414.

Cai, F., 2010, Demographic Transition, Demographic Dividend, and Lewis Turning Point in China. *China Economic Journal* 3 (2): 107-119.

Cai, F. and M. Wang, 2006, Challenge Facing China's Economic Growth in Its Aging but not Affluent Era. *China and World Economy* 14(5): 20-31.

Chan, Kam Wing, 2009, The Chinese *Hukou* System at 50, *Eurasian Geography and Economics* 50(2), 197–221.

Chan, Kam Wing, 2010a, The Household Registration System and Migrant Labor in China: Notes on a Debate. *Population and Development Review* 36 (2): 357-364.

Chan, Kam Wing, 2010b, A China Paradox: Migrant Labor Shortage amidst Rural Labor Supply Abundance, *Eurasian Geography and Economics* 51(4), 513–530.

Chang, Leslie T., *Factory Girls---From Village to City in a Changing China*, Spiegel & Grau, 2008.

Che, Y., Y. Lu, J.R. Pierce, P.K. Schott and Z. Tao, 2016. Does Trade Liberalization with China Influence U.S. Elections? NBER Working Paper No. 22178.

Dong, Xiao-Yuan, and Lixin Colin Xu. 2009. "Labor Restructuring in China: Toward a Functioning Labor Market." *Journal of Comparative Economics* 37(2): 287-305.

Feenstra, Robert, 1980, Monopsony Distortions in an Open Economy: A Theoretical Analysis," *Journal of International Economics* 10(2), 213-235.

Fields, Gary S. 1975, Rural-Urban Migration, Urban Unemployment and Underemployment and Job Search Activity in LDC's. *Journal of Development Economics* 2 (2): 165-188.

Fields, Gary and Yang Song, 2015, A Theoretical Model of the Chinese Labor Market, Mimeo.

Fu, S., L. Li and G. Yang, 2015, Do Rural Migrants Benefit from Urban Labor Market Agglomeration Economies: Evidence from Chinese Cities. Paper presented at RIEB, Kobe University, Dec. 17, 2015.

Harris, John, and Michael Todaro. 1970. Migration, Unemployment, and Development: A Two Sector Analysis. *American Economic Review* 60 (1): 126-142.

Hsieh, C. T. and P. J. Klenow, 2009, "Misallocation and Manufacturing TFP in China and India," *Quarterly Journal of Economics* 124: 1403-1448.

Huang, Yiping and Kunyu Tao, 2010, Factor Market Distortion and the Current Account Surplus in China, *Asian Economic Papers* 9(3): 1–36.

Indrawati, Sri Mulyani, 2014, Toward Efficient, Inclusive and Sustainable Urbanization, *Remarks at the International Conference on Urban China*, Beijing, March 25, 2014.

Ito, Junichi. 2008. The Removal of Institutional Impediments to Migration and Its Impact on Employment, Production and Income Distribution in China. *Economic Change and Restructuring* 41 (3): 239–265.

Jones, Ronald, 1971, A Three Factor Model in Theory, Trade, and History, in Bhagwati, Jones, Mundell and Vanek (eds.), *Trade, Balance of Payments and Growth*, North-Holland: Amsterdam.

Keller, Wolfgang and Hale Utar, 2016, International Trade and Job Polarization: Evidence at the Worker-Level, paper presented at the CCER Summer Institute, Yantai, China, June 19, 2016.

Knight, John, Deng Quheng, and Li Shi. 2011. The Puzzle of Migrant Labor Shortage and Rural Labor Surplus in China. *China Economic Review* 22 (4): 585-600.

Knight, John and Lina Song, 1995, Towards a Labor Market in China, *Oxford Review of Economic Policy* 11(4), 97-117.

Knight, John, Lina Song and Jia Huaibin, 1997, Chinese Rural Migrants in Urban Enterprises: Three Perspectives, *Journal of Development Studies* 35(3), 73-104.

Lewis, W. Arthur. 1954. Economic Development with Unlimited Supplies of Labour. *Manchester School* 22: 139-191.

Li, Hongbin, Lei Li, Binzhen Wu, and Yanyan Xiong, 2012, The End of Cheap Chinese Labor, *Journal of Economic Perspectives,* 26(4): 57-74.

Lin, Y., F. Cai, and Z. Li, 1994, *The Chinese Miracle: Development Strategy and Economic Reform*, Shanghai: Shanghai People' s Press.

Meng, X. 2012. Labor Market Outcomes and Reforms in China. *The Journal of Economic Perspectives* 26(4): 75-101.

Miller, Tom, 2012, *China's Urban Billion: The Story behind the Biggest Migration in Human History*, Zed Books.

Mussa, M., 1974, Tariffs and the Distribution of Income: The Importance of Factor Specificity, Substitutability, and Intensity in the Short and Long-Run*, Journal of Political Economy* 82: 1191–03.

Naughton, Barry, 2007, *The Chinese Economy*. Cambridge, MA: MIT Press.

Solinger, D., 1999, *Contesting Citizenship in Urban China*. Berkeley, CA: University of California Press.

Pierce, J.R. and P.K. Schott, 2016. The Surprisingly Swift Decline of U.S. Manufacturing Employment. *American Economic Review* 106(7), 1632-62.

Stiglitz, Joseph E. 1982. The Structure of Labor Markets and Shadow Prices in L.D.C.'s. In *Migration and the Labor Market in Developing Countries*, edited by R.H. Sabot, 13-63. Boulder: Westview Press.

Tian, Bingxing, 2003, *Zhongguo di yi zhengjian (China's No. 1 document)*. Huizhou, China: Guangdong Renmin Chubanshe.

Tombe, Trevor and Xiaodong Zhu, 2015, Trade, Migration and Productivity: A Quantitative Analysis of China, University of Toronto Working paper No. 542.

Wang, Fei, Liqiu Zhao and Zhong Zhao, 2016, China's Family Planning Policies and Their Labor Market Consequences, *Journal of Population Economics*, forthcoming.

Wang, Fei Ling, 2005, *Organizing through Division and Exclusion: China's Hukou System*. Stanford, CA: Stanford University Press.

Yang, J.S., 2008, *Tomb Stone (Mu Bei): the Chinese Great Famine in the 1960s*. Tian Di Books Publisher, China.

Young, Alwyn, 2000, "The Razor's Edge: Distortions and Incremental Reform in the People's Republic of China," *Quarterly Journal of Economics*, 115 (4), 1091–1135.

Zhao, Yaohui, 1999a, Leaving the countryside: rural to urban migration decisions in China, *American Economic Review* (papers and proceedings) 89, 281-286.

Zhao, Yaohui, 1999b, Labor migration and earnings differences: the case of China, *Economic Development and Cultural Change* 47(4), 767-782.

Zhu, Xiaodong, 2012, Understanding China's Growth: Past, Present and Future. *Journal of Economic Perspectives* 26(4), 103-124.