# A simple model of the Hukou system and Chinese exports

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# A Simple Model of the *Hukou* System and Chinese Exports

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**Abstract:** We construct a simple model of *hukou* reform for the transition period (specifically, 1984-2010) when peasants were allowed to migrate to cities for work only. We show that reform recovers some of the deadweight losses from Mao's strict *hukou* control, but the gains from reform are unevenly distributed. Using the basic model, we illustrate two factors that contribute to China's trade boom and *export pattern reversal*, namely, the rural-urban migration caused by the institutional reform in the labor market and the demographic dividend China has enjoyed for the past 40 years. We apply the model to examine the impacts of various policies such as special economic zones, export-tax refund, urbanization, etc., which should provide directions for empirical and quantitative research.

**Keywords**: Chinese institutions, *hukou*, urban-rural divide, demographic dividend, special economic zones

**JEL Classification**: N1, F1

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## 1. Introduction

While many blame government subsidies and State-owned enterprises (SOEs) for the ongoing trade disputes between the U.S. and China, this paper shows that there are more fundamental reasons in the structure of the Chinese labor market, especially in the *hukou* system. This system was formally set up in 1958, and had been strictly enforced for more than 20 years until after Mao Tsetung's death. Beginning in the 1980s, restrictions in the *hukou* system were gradually loosened, which resulted in large-scale rural-urban migration. Chinese firms timely used the migrant workers to manufacture cheap products for exports, a large share of which eventually went to the U.S. In this sense, the Trump administration's insistence on structural change in the Chinese economy might have a point. As a matter of fact there exist other distortions, such as the monopolization of energy, transportation and telecommunications. But *hukou* discrimination is the most notorious since it has been enforced as law. In this paper, we attempt to examine *hukou* and its early reform with a simple, heuristic approach, that should be helpful for researchers interested in the Chinese economy and in development and international economics in general.

To motivate our study, let us begin with some very well-known facts that occurred not long ago. In 2013, the official figure for migrant workers is 260 million (China Daily web, March 6, 2013), [1] 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 2016. [2] It is no coincidence that China's share of world merchandise exports increased from 1.2 percent in

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[1] Some Chinese media calls the migrant workers "low-end population" (see various web news in China around Nov. 27, 2017). The New York Times kept the story running for almost a month, see for instance, Nov. 30, Dec. 1, Dec. 14, 2017, etc. As a result, the population in privilege-ridden and booming Beijing decreased by 22,000 from a year ago, standing at 21.7 million by the end of 2017 (Source: Statistics Bureau of Beijing).

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

1983 to 11.4 percent in 2012, replacing Japan as the trading hub of Asia. In the same year, China also became the world No.1 in trade volume, reaching \$3.87 trillion in goods trade. Even the previous No.1, the U.S., felt its impact in various ways such as unemployment, prices, income inequality, labor force participation and even political voting behavior such as the presidential election, leading many to claim a "China syndrome" (see Autor et al., 2013; Pierce and Schott, 2016). [3] However, more surprisingly, there has been a major shift in the Chinese export pattern from about 40 years ago: in 1980, the share of primary exports was roughly 50 percent, but by 2011, it had fallen to merely 4.5 percent.
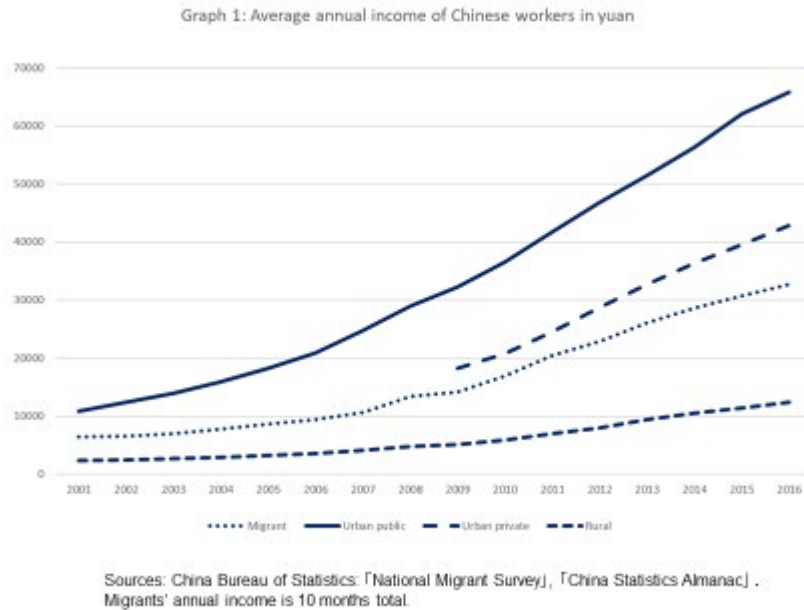
Steady urbanization is also observed during this period. In 1982, urban population (including both urban and rural status) was only 20.91 percent of the total population, but the ratio reached 36.22 percent in 2000, and 49.68 percent in 2010. [4] And this trend is expected to continue. However, in a study with 2005 countrywide data, Fu et al. (2015) find that rural migrants benefit much less from China's urbanization than do workers with urban status: a big part of migrants' contributions are taken away and redistributed to urban *hukou* holders. Chan (2009) terms the discrimination and exploitation created 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 2016. 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

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[3] Recent excellent papers on China's export performance include Feenstra et al. (2014), Liu and Lu (2015), Lu and Yu (2015), Yu (2015), Dai et al. (2016), and Brandt et al. (2017), who focus on reasons such as intermediates importing, export processing zones, WTO accession, tariff reduction, credit constraints, firm investment and the global value chain, etc.

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

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 *hukou* holders have been deprived off until very recently.

Graph 1: Average annual income of Chinese workers in yuan



Sources: China Bureau of Statistics: 「National Migrant Survey」,「China Statistics Almanac」.
Migrants' annual income is 10 months total.

*Hukou* control was the most fundamental and most effective tool of governance for China's command economy before Mao's death. Its impact would be so overwhelming that Tian (2003) calls the *hukou* certificate "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, even in officially published Chinese figures (See Yang (2007)).

In this paper, we rigorously examine the *hukou* system per se and its reform in early transition (i.e., 1984-2010), by constructing a theoretical model that incorporates the *urban-rural divide.* We argue that the loosening of *hukou* control creates large-scale rural-urban migration,

that is responsible for the recent boom of Chinese exports and a *reversal* of its export pattern, mainly because the remaining *hukou* rationing keeps migrant wages low, enabling manufacturing firms to increase output and to export at low costs. Reform certainly recovers some of the deadweight losses from strict *hukou* control, but the gains of reform are unevenly distributed. In per capita terms, a typical urban hukou holder gains more due to the distortion caused by the remaining hukou rationing.

Also, we apply the basic model to examine the impacts of various Chinese policies and ongoing reforms such as "special economic zones (SEZs)", tax refund for exports, urbanization, foreign direct investment (FDI), 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. While the mass migration from rural villages to expanding cities has made China "the manufacturing hub of the world," as the "demographic dividend" is gradually eroding and fewer migrants are coming from the rural sector, China's competitive edge in manufacturing may be substantially weakened.

There is an abundance of empirical literature and documentation on *hukou* and its influence on Chinese economic development, such as Lin et al. (1994), Knight et al. (1997), Zhao (1999), Naughton (2007), Cai (2010), Chan (2009, 2010), Meng (2012) and Zhu (2012). This literature deals with rural-urban migration, earnings inequality and rural and urban employment. For in-depth surveys of the *hukou* system, see Chan (2009), who argues that the system has become an obstacle for China's further modernization. Lin et al. (1994) and Cai (2018) especially state that incentives were distorted and resources misallocated in the Mao era, some of which got corrected by Deng's reform and overall efficiency improved.

Regarding theoretical works related to the Chinese dual labor market, Fields and Song (2015)

use a job-search approach and focus on search costs and benefits of different worker options. Ngai et al. (2019) analyze land ownership, government land policy and peasants setting up township and village enterprises, and they conclude that land policy played more important roles than *hukou* restrictions during China's industrialization. Tombe and Zhu (2019) use a general equilibrium model to calibrate the contributions of various factors to China's GDP growth and regional inequality during 2000~2005, paying special attention to internal trade cost and migration cost, in addition to external trade.

In contrast, the present paper tackles *hukou* per se. We adopt a simple approach, tie *hukou* to the recent Chinese trade boom and trade pattern change, and unify various ongoing reforms such as special economic zones, urbanization, one-child policy and their effects on the Chinese economy. Our approach not only complements the literature that is mostly empirical and documentary, but also should provide directions for further empirical and quantitative research.

Finally, the paper is related to the literature on dual labor markets and migration in general, such as the classic works by Lewis (1954) and Harris and Todaro (1970), and Young (2000), Hsieh and Klenew (2009) and Brandt et al. (2013), who examine resource distortions in China, and Yabuuchi (2011) analyzes outsourcing in the Harris-Todaro framework.

## 2. A Brief Review of *Hukou*

One sometimes sees harsh discrimination in the labor market against foreign citizens. [5]   But in the case of China, it has been used to systematically discriminate against rural residents. In January 1958, a rigid household registration system, *hukou*, was imposed, which segments the

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[5] The Canadian-Indian comedian Russell Peters has an episode on Indian migrant workers in Dubai, where he says "They treat us like sh…Indians are the Mexicans in the Middle East. We build everything for them there."

population into two status groups: agriculture (rural) and non-agriculture (urban). It is almost impossible to change status, especially from rural to urban. Urban residents enjoy a range of social, economic and cultural benefits that rural residents do not receive. To be more exact, urban earnings include food and clothing rations, health care, retirement pension, housing benefits, utility subsidies, guaranteed admittance to an urban school up to high school, theatres, parks, libraries, sports and other entertainment facilities, which are privileges a resident with rural status is deprived off.

Apparently *hukou* was set up as a system to govern the whole country. The intended goal was threefold: to reduce urban unemployment caused by the regime changeover, 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, especially heavy industries (see Lin et al. 1994; 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.

Also, almost immediately after the Communists overthrew the Nationalists in 1949, land was taken away from peasants and landlords (see Ngai, Pissarides and Wang, 2019) 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

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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.

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 or local government owned businesses.

Observe that while the *hukou* system originated in ancient China and influenced neighboring countries such as Japan, South Korea and Vietnam, the current *hukou* system also has elements adopted from *propiska* in the former Soviet Union, especially in restricting migration. And due to its discriminatory nature, some scholars also compare *hukou* to the *caste* system in ancient India (Miller, 2012).

## 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 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, especially in labor market structure, 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 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 $p(\cdot) = p^*$, where $p^*$ is the world relative price of good $x$. And to maintain balanced trade, we must have

$$C_x = X - q_x, \tag{2a}$$

$$C_y = Y + q_y, \tag{2b}$$

$$q_x = p^* q_y \tag{2c}$$

where $q_x$ and $q_y$ are respectively the quantities of exports and imports. Eqs. (1), (2a), (2b) and (2c) jointly give implicit solutions to $C_x$, $C_y$, and $q_i$, $i = x, y$. 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 regions 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

Under the 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 initially comes with many benefits such as medical benefits, guaranteed urban education up to high school, retirement pension, guaranteed job opportunities in state or publicly-owned businesses, renting or buying apartments with substantial government subsidies, etc. In contrast, rural status has none of them.

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

$$w_0^U = X_L(L^U, K)p, \tag{4a}$$

$$w_0^R = Y_L(L - L^U, T). \tag{4b}$$

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 $VMP$ curves. However, *hukou* rationing keeps only $L^U$ as urban residents, distorting this equilibrium. As a consequence, it cuts away the bottom section of $VMP^U$, replacing it with a straight line and forcing the new intersection of $VMP^R$ and $VMP^U$ down to $w_m^R$. This generates a gap between the urban earnings $w_m^U$ and the rural earnings $w_m^R$. Also, strict *hukou* rationing creates severe overemployment in the countryside, resulting in extremely low productivity and low earnings.

Figure 1. *Hukou*—Mao Era Income Gap: $w_m^U - w_m^R$
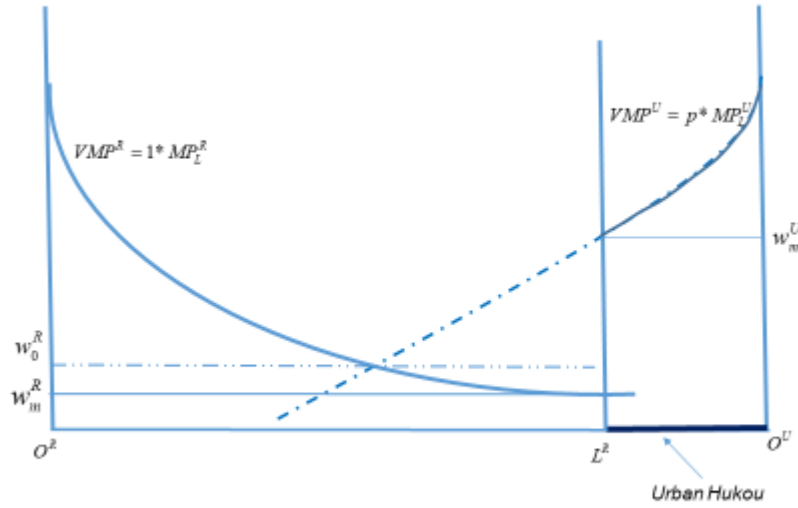
Notice also that under the *hukou* system, there is no unemployment in either sector, which was touted as one of the most unique advantages of socialism over capitalism. But in fact, excess labor is driven to the countryside with the rural status, that had about 85% of the country's total population in early 1959, leading Cai (2018) to call simply, "surplus labor." 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. Also, in Lewis (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 government policy, *hukou*, and labor supply in the countryside is not unlimited, which are closer to the Chinese reality.

## 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 urban

*hukou* holders, 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 regions, increasing their productivity as a consequence. [7] In practice, they can be hired as part-time workers in publically owned firms (such as construction workers, security guards, service workers, etc.), in township firms ("xiang zhen qi ye" in Chinese), or even open their own small businesses such as in services (repairs, vending, homecare, delivery, doorman, etc.). In the early period, only 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 workers, the government chooses a tiny fraction $\rho > 0$ to obtain urban status, i.e., $\rho L_x^R$ 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-status holders 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 residents who do not

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[7] However, Beijing started to drive away the migrants and their dependents in late November, 2017, causing cries not only in China but also in important media throughout the world. See also footnote #1.

[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 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 poor provinces, nowadays it is becoming easier to change from rural *hukou* to urban *hukou*, based on a point system. But real differences and obstacles remain in that the status changers obtain a much lower "minimum pension", and it may be hard for them to find jobs (see Cai, 2018).

migrate and earn the rural income $w^R$, and the migrant workers whose expected income is $w^R_x$.

A resident in the countryside will face two choices, either to stay in the countryside and earn $w^R$, or to migrate to work in the city and earn $w^R_x$. Below we examine a typical migrant's problem in detail, and see how $w^R_x$ is determined.

## 4.1 Quasi-migration equilibrium

When the urban sector expands, even though the government may act first by announcing the quota of recruitment for new urban employees, each migrant is not certain that he or 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 earns a migrant reservation wage, $\delta w^R$, where $\delta \geq 1$ 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-taking 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 Graph 1.

Given the above description, the migrant's expected gross wage, $w^R_x$, can be written as

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

We also assume that each migrant must pay c (>0) as the migration cost. This cost is non-negligible, because it can include travel cost, search cost for jobs, rent costs and other costs for living away from home, etc. According to Tombe and Zhu (2019), in 2000, the average cost of within-province rural-urban migration is around 51% of annual income and that for between

province migration is even higher, about 98% of annual income. 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

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

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

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 $\rho L_x^R$ obtaining urban status, the income

of an urban-status holder becomes,

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

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 $w^R$.
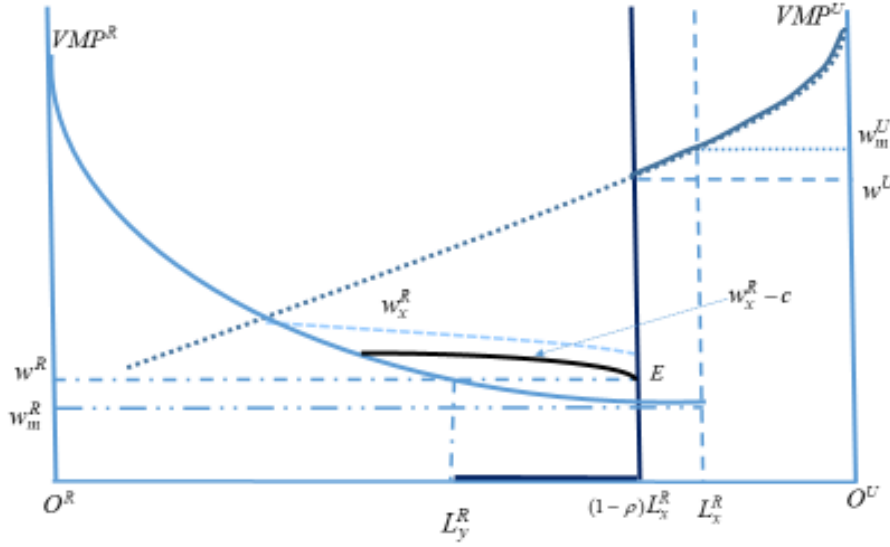
Figure 2. Migration Equilibrium under *Hukou*

Fig. 2 depicts the quasi-migration equilibrium, drawn with $\delta = 1$ for clarity (i.e., the

migrant's reservation wage being $w^R$ ). With $L^U$ and $\rho$ given by the government, the urban

$VMP^U$ curve is cut short and follows the vertical solid line. In contrast, rural migrants face the

expectation of $\rho$, 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 $\rho$ is assumed to be small,

implying that a bigger fraction of $w_x^R$ comes from $VMP^R$ 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

14

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.

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 $w_x^R - c$. Migration would continue as long as $w_x^R - c$ is higher than $VMP^R$, until curve $w_x^R - c$ intersects the vertical solid line which is determined by $\rho$. The 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 $\rho L_x^R$ 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 solid and dotted vertical lines, and the migrant workers who retain rural status are represented by the darkened 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 exhibit in different forms, such as preventing 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 school children, elderly parents and farm work during busy seasons. Suppose the seasonal migrant spends a fraction $\theta$ 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.

## 5. Distribution of Gains from Reform and Export Pattern Reversal

In this section, we examine the net gains from allowing partial rural-urban migration and the distribution of the gains, and also analyze one of the consequences on Chinese trade—export pattern reversal. In order to do that, we need to first define ownership to some extent. Under *collective ownership*, all land and all capital belong to the whole country (i.e., the central government), and all profits from industry and commerce are collected by the government. 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 use the collected rents to develop the industrial base, which will be examined later.

### 5.1 Distribution of gains from reform

Figure 3 shows that both rural and urban residents gain from reform, and the country as a whole gains by the combined shaded areas. More important is the distribution of the gains though. To be specific, the grey vertical rectangle is created and obtained by the residents who have successfully changed their status from rural to urban, and the rest of the shaded areas is created by the rural migrants, of which only the black area is obtained by them, but the *trapezoid 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

16

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, or new investment in infrastructure, etc.

Figure 3. Migration Equilibrium under *Hukou*



In sum, while the loosening of the *hukou* control allows the whole country to gain, in per-capita terms, a typical urban *hukou* holder gains more due to the distortion caused by the remaining *hukou* rationing, which is confirmed by recent empirical findings in Fu et a. (2015) and Cai (2018).

## 5.2. The Export boom and export pattern reversal

To deliver the point we want to make, let us assume that before *hukou* reform, China is a small country which takes world price as given, and under balanced trade, 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. 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. Given China's accession to the WTO in 2001, the increased urban output can be exported to the rest of the world (see Brandt et al., 2017; Lu and Yu, 2015; Yu, 2015). In other words, it is the released excess labor from the countryside, who becomes migrant workers without urban status, that has enabled the manufacturing sector to expand output at low costs (wages), which eventually leads to the sudden boom in manufacturing exports.

As a matter of fact, China in 2019 is the world's biggest importer of both rice and soybeans, and a top-10 importer of corn. The country also imports large quantities of other agricultural products, including wheat, 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 were only 4.5 percent, compared to about 50 percent in 1980; that is, the production and contribution of the migrant workers led to the recent trade boom, which is what Chan (2005) calls the "secret recipe" for China's success.

## 6. Some Ongoing Reforms

In this section, we utilize the 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, the creation of a service sector using migrant labor, etc. We will also touch upon issues related to the one-child policy, the so-called "demographic dividend" and population aging. We investigate how the reform policies affect the rural and urban earnings, peasant migration and exports.

## 6.1 Export tax refund and foreign direct investment

Since 1985, China has been using tax refund to encourage exports, which has been a main issue in the recent trade disputes with the U.S. Specifically, the *value added tax* (VAT) 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 $VMP^U$ curve would shift up, resulting in a new intersection with the $VMP^R$ curve, and causing the number of migrant workers, manufacturing output and the rural wage to all increase.

In the reform era, China also received an enormous amount of 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 $K$ used in the urban sector, shifting the $VMP^U$ curve. This again results in a new intersection with the $VMP^R$ curve, increasing the number of migrant workers, manufacturing exports and the rural wage.

## 6.2 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 Shantou, Shenzhen, Zhuhai, Xiamen, etc. One distinct feature of SEZs is that they are located not in the cities but in the

countryside (Shenzhen and Zhuhai were villages before the reform era); in other words, foreign

capital comes into the countryside and uses *rural labor to make manufacturing goods,* and most

often, for exports. Since SEZs use foreign capital and rural labor, employment in agriculture is

reduced, which raises $VMP^R$ and the rural wage, lowering labor migrating to the cities. And since

SEZs make manufacturing goods for exports, total exports in the country increase. Hence, SEZs

are essentially used as export platforms by foreign multinationals.

**6.3 Urbanization**

China today is under rapid urbanization. The recent U.S.-China trade war and COVID-19

have forced the central government to adopt a policy of "dual circulation," aiming to maintain

international trade while deepening domestic reform. Also, the Chinese government and the

World Bank held a joint conference in Beijing in March 2014, in which the latter made 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 a

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) find that *hukou*

restricts urbanization in terms of scale, 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. In Fig. 4, the $VMP^R$ curve shifts down, the $VMP^U$ curve may shift up if the reduced farmland is used for production purposes, and the darkened vertical line shifts to the left after land-losing peasants obtain urban status. Then rural income falls and the urban income rises, inducing more migrant workers to the urban region.



Figure 4. Current & "Ideal" Urbanization
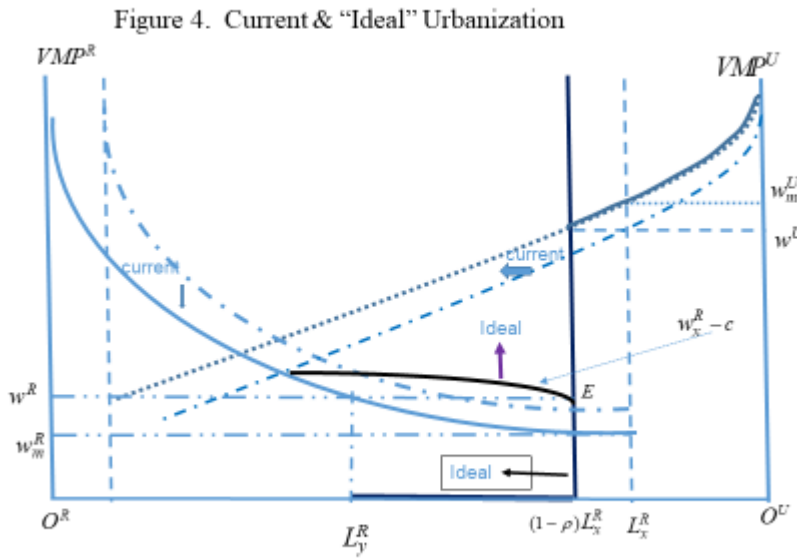
The "ideal" urbanization, though, is to follow the recommendations by the World Bank, and is adequately termed by the Chinese government as "from land-based fiscal policy to focusing on citizens." This can be illustrated in our model, which is to raise the probability for rural migrants to change status, $\rho$, and to lower the migration cost, $c$. In Figure 4, lowering $c$ shifts the thick-dark curve $w_x^R - c$ upwards in a parallel fashion.

And raising $\rho$ has two effects: it shifts the darkened vertical line on the right leftwards, increasing the probability 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 $VMP^U$.

## 6.4 One-child policy and the demographic dividend

One can easily find a picture of the Chinese population pyramid, in any recent year. Typically, it would show 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 several decades (in fact it is the largest labor force in any country ever)---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 4, with the left side extending out more than the right side, since there are more rural than urban

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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 (2010) 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.

labor to begin with. Then, 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".

## 6.5  Creation of a service sector

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 hiring 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.

## 7. Concluding Remarks

We have examined the Chinese *hukou* reform, in the early transition period, by rigorously modelling two distinct features of *hukou* control: the urban-rural divide and the rural-urban migration. The institutional and structural reform in the labor market generated large numbers of rural migrants, who are paid low wages due to the remaining *hukou* control. But it is their contribution that changed 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 study reform policies, such as special economic zones, export

tax refund, urbanization, one-child policy, etc. Our analysis is qualitative. The extent of each policy effect, of course, depends on further quantitative and empirical studies. Also, one could incorporate increasing returns in the manufacturing sector, which would magnify the urban-rural divide and the urban-urban divide, without altering our qualitative results.

Besides the urban-rural divide, *hukou* creates an "*urban-urban divide*" among urban-status holders in different cities, such as between Beijing *hukou* and Shijiazhuang (capital city of Hebei province) *hukou*. As a matter of fact, the chances of getting into Peking University or Tsinghua University (arguably the top 2 universities in China) would be 40 to 60 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. Even today, only Beijing *hukou* holders can drive a taxi in Beijing, and similar for Shanghai. The urban-rural divide played dominant roles in China's early transition, and the urban-urban divide is becoming more important recently when the housing markets behave differently across cities that enlarges the regional inequality via real estate value changes.

*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 owned firms, the migration of urban residents across cities, the ownership of land, and the fairness of the education system, retirement system and medical system, and long-term sustainable growth of the Chinese economy, 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. In addition, is it fair for workers in privatized firms to keep urban status while most

rural migrant workers cannot? How to coordinate the incentives of the central government to reform *hukou* and those of local governments to save cost on accepting rural workers? All these tricky and eminent issues are important topics that deserve more detailed research in the future.

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