

# Migration Constraints and Development: *Hukou* and Capital Accumulation in China.\*

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## Abstract

Rural-urban migration flows are a crucial corollary of economic development. The adverse or beneficial effects of internal migration, for sending as well as receiving areas, and the definition of optimal migration policies, have remained much discussed issues since the seminal works of Harris and Todaro (1970). This debate is especially acute in China where the “household registration system” (*hukou*) acts as a strong constraint on individual migration. This paper aims to assess the consequences of *hukou* through a simple model of a developing dual economy with overlapping generations. Contrary to existing studies focused on the contemporaneous allocation of economic resources, it deals with the dynamic consequences of migration flows and migration policies. It shows that, in fairly general circumstances, *hukou*-related migration constraints can actually hasten development, understood as the transfer of the labor force to the modern sector, driven by capital accumulation. The *hukou* system could thus be one of the causes of the extremely high Chinese saving rate and of the high pace of Chinese development.

*Keywords:* migration, migration policies, dual economy, Chinese economy, *hukou*.

*JEL* J61, O15, O24, O41, R11.

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# 1 Introduction

The historical experiences of developed countries since the XIX<sup>th</sup> century and of LDCs after WWII have shown that the process of development, basically an intersectoral transfer of the labor force from traditional to modern activities, is paralleled by a geographical redistribution of the population, mainly through intense migration flows from rural to urban areas. There are two main ways to understand this link between development and urbanization.

The first is based on the classical baseline model of a dual economy developed by Lewis (1954). For Lewis, development essentially corresponds to the transfer of the labor force from labor-intensive activities to modern and capitalistic sectors. Development is then driven by capital accumulation in the modern sector, and rural-urban migration flows are simply a by-product of this process, as technology, capital and thus modern sector jobs are more likely to be located in cities.

Externalities are a second way to understand the link between growth and agglomeration. Indeed, if the effects of beneficial externalities are only locally felt, then the concentration of people and activities through urbanization is a crucial determinant of economic growth. These local externalities can be pecuniary, based on scale economies, as underlined by the New Economic Geography literature (Krugman (1991)), or due to human capital, as stressed by Lucas (1988) and Endogenous Growth theories.

Both of these standpoints leave room for policy intervention in internal migration flows, for pure market processes are not likely to lead to optimal results. Indeed, in the dual economy case, the existence of a traditional sector provides capital owners with an “unlimited supply of labor” (Lewis (1954)), which prevents the emergence of a market-clearing wage. In such a context, free migration flows can end up in detrimental phenomena, like urban unemployment, as shown by Todaro (1969) and Harris and Todaro (1970). And if there are local externalities, this immediately casts doubt on the social optimality of individual migration decisions, for both sending and receiving regions (Taylor and Martin (2001)). Political intervention can then be welfare-enhancing,

as is well-known in the case of international migration flows (Benhabib and Jovanovic (2007)).

However, among the various policy options available to LDC governments, direct controls have been generally ruled out, for, as Lucas (1997) puts it, “direct restrictions upon mobility either prove ineffective or require Draconian enforcement measures, incurring a cost in civil liberties most nations are fortunately unwilling to tolerate”. This does not really constitute an issue as direct restrictions are generally seen, on economic efficiency grounds, as too tight a policy. To quote Stark (1980), “the ‘cannot’ tallies with the ‘should not’ ”.

From this point of view, the People’s Republic of China stands as a stunning outlier. Since the beginning of the “Reform and Opening” era in 1978, the Chinese State has retained extremely tight controls on individual moves, through the “household registration system” (*hukou*), but at the same time, the PRC has developed at an unprecedented pace. Within the span of one generation, between the end of the 1970s and the mid-2000s, real GDP per capita has increased seven-fold (Bosworth and Collins (2008)), while the urbanization rate has only doubled. In 2002, the PRC urbanization rate was only 39.09 per cent, 13 percentage points below the average urbanization rate of LDCs at the same level of development (Chang and Brada (2006)). And this urbanization gap has steadily increased as China developed.

This “paradox of China’s growing under-urbanization” (Chang and Brada (2006)) has fueled an extremely lively debate in Chinese political and academic circles about internal migration controls and their political, social and economic consequences (Xiang and Tan (2005)). As for the economic side of the debate, most studies have tended to show that the *hukou* system and related migration constraints prevent a better allocation of economic resources in China (Au and Henderson (2006), Whalley and Zhang (2007)), and thus hinder Chinese development. Some scholars, on the other hand, defend the *hukou* institution on the grounds that it prevents socially suboptimal migration flows from rural to urban areas (Fan and Stark (2008)).

On both sides of the debate, the arguments are thus based on considerations of

resource allocation: would it be more efficient if migration flows were freer? But the dynamic, temporal aspect of this problem has been largely neglected. The *hukou* system and its various modifications and adjustments are likely to have important consequences on individual life-cycles and consequently on the dynamics of capital accumulation, in both urban and rural areas. The *hukou* constraints thus concern not only the sectoral and geographical allocation of resources in China, but also their intertemporal allocation. In particular, it could be one of the factors explaining the structurally extremely high aggregate saving rate in China and the pace of Chinese development.

The very high level of the Chinese aggregate savings has aroused much debate about its causes and worries about its consequences. China has displayed the world's highest domestic saving rate for the last quarter of a century. Savings were above 35 per cent of Chinese GDP in the 1980s, they exceeded 40 per cent in the 1990s, and even reached an astonishing 52 per cent in 2006 (NBS (Various years)). The causes behind this phenomenon have been widely discussed, and the reasons proposed include traditional Confucian culture (Franke, Hofstede, and Bond (1991)), demographic and age structure evolution (Modigliani and Cao (2004)), precautionary savings in a context of rapid economic changes and dismantling of social services (Chamon and Prasad (2008)), habit formation (Carroll, Overland, and Weil (2000)), and even the PRC one-child policy and the consequent sex ratio imbalance (Wei and Zhang (2009)).

In this paper, a simple overlapping generations model of a dual economy with two regions is used to show that, in a context where production factor markets are imperfect, *hukou*-related migration constraints between a developing (rural) and a developed (urban) region can be a factor raising aggregate saving rate and hastening development, understood as the transfer of the labor force from traditional to modern activities, driven by capital accumulation.

The plan of the paper is as follows. In the first section, the basic settings of the model, with only one region, are presented. In the second section, a second region is introduced, and the effects of different labor migration policies are discussed. The final section discusses how this simple model can explain some aspects of the Chinese

experience.

## 2 The process of development in a dual economy with overlapping generations

### General setting

This simple model aims to describe the dynamic process of development in a dual economy with two-period life cycle agents. We will first deal with the production and employment aspects of the model, and then with the agents' life cycle and intertemporal trade-off. That will finally lead to the characterization of the development process.

As in the classical Lewis (1954) model, development is understood here as the transfer of labor from a traditional to a modern sector, this intersectoral transfer being driven by capital accumulation.

### 2.1 Production and employment

#### 2.1.1 Production technologies

The economy is dual in the sense that, while one single homogeneous product is produced, of an (exogenously given) price normalized to 1, two technologies are available: a traditional technology, using only labor ( $L_T$ ), with constant returns to scale,  $Y_T = a_T L_T$ , where  $a_T$  indicates the productivity of labor, and a modern, "capitalistic" one, using labor ( $L_C$ ) and capital ( $K$ ), and displaying constant returns to scale and decreasing returns to each factor,  $Y_C = F(L_C, K)$ . We can thus write modern sector production in a capital-intensive form, for every period  $t$ :

$$Y_{Ct} = F(L_{Ct}, K_t) = F\left(\frac{L_{Ct}}{K_t}, 1\right)K_t = f\left(\frac{L_{Ct}}{K_t}\right)K_t$$

With:

$$f(0) = 0 \qquad f'\left(\frac{L_{Ct}}{K_t}\right) > 0 \qquad f''\left(\frac{L_{Ct}}{K_t}\right) < 0$$

where  $f'\left(\frac{L_{Ct}}{K_t}\right)$  is the marginal product of labor, the marginal product of capital being  $f\left(\frac{L_{Ct}}{K_t}\right) - \frac{L_{Ct}}{K_t} f'\left(\frac{L_{Ct}}{K_t}\right)$ . We consider here a case without technological progress: neither the traditional nor the modern production functions change over time.

### 2.1.2 Labor market

There is a total quantity  $L$ , assumed constant over time, of identical workers at each generation, who are allocated to the traditional and modern sectors,  $L = L_{Tt} + L_{Ct}$ , in every period  $t$ .

As each worker in the traditional sector produces  $a_T$  units of goods, individual real income in traditional activities is simply  $w_T = a_T$ . This sets the subsistence wage, or minimum conventional income in this economy, as no worker would accept to work for a lower wage.

At any given time  $t$ , capitalists have a quantity of capital  $K_t$  to invest. As long as the economy is still developing and some workers remain in the traditional sector, capitalists are in a monopsonistic position, they do not have to raise wages to hire more workers, or, to put it another way, for every level of the modern sector wage  $w_C$  above the subsistence wage  $w_T$ , there is an “unlimited supply of labor” (Lewis (1954)). Market processes thus cannot lead to an equilibrium, market-clearing level of modern sector wage, which is therefore determined in an exogenous or institutional way. Various options for modern wage setting are studied at the end of this section. For simplicity, it is assumed here to remain constant over time, as in the Lewis (1954) framework. For any level  $w_C$  of modern sector wage, capital owners hire laborers in order to maximize their profits:

$$\max_{L_{Ct}} \Pi = f\left(\frac{L_{Ct}}{K_t}\right)K_t - w_C L_{Ct}$$

This evidently gives the solution:

$$f'\left(\frac{L_{Ct}}{K_t}\right) = w_C$$

This defines, for a given real wage, a relationship between the capital invested and the workforce hired in the modern sector. As  $f(\cdot)$  is monotonously increasing, we can write:

$$L_{Ct} = f'^{-1}(w_C)K_t$$

where  $f'^{-1}(\cdot)$  denotes the inverse of  $f'(\cdot)$ , and is thus also decreasing.

Aggregate profit in the modern sector is then:

$$\Pi_t = [f \circ f'^{-1}(w_C) - w_C f'^{-1}(w_C)]K_t$$

The average and marginal rates of return to capital are equal, and can be expressed as a function of  $w_C$ :

$$r(w_C) = f \circ f'^{-1}(w_C) - w_C f'^{-1}(w_C)$$

At a given time  $t$ , when a quantity  $K_t$  of capital is invested,  $L_{Ct} = f'^{-1}(w_C)K_t$  workers are employed in the modern sector, and the residual workers,  $L_{Tt} = L - L_{Ct} = L - f'^{-1}(w_C)K_t$  are employed in the traditional sector. Overall production  $Y_t$  is then:

$$Y_t = Y_{Ct} + Y_{Tt} = w_T L + [f \circ f'^{-1}(w_C) - w_T f'^{-1}(w_C)]K_t$$

### 2.1.3 Comments

The dual structure of the economy is purely technological and arises from the coexistence of traditional and modern technologies for the same product, the first one necessitating only labor, with constant returns, while the second combines capital and labor. As in most dual economy models, the critical consequence of this technological dualism is on the labor market: the existence of a traditional sector prevents the emergence of a

market-clearing modern sector wage, and gives capitalists a monopsonistic position.

Naturally, both the rate of return to capital  $r$  and the number of workers employed in the modern sector per unit of capital,  $f'^{-1}(w_C)$ , are decreasing functions of modern sector wage,  $w_C$ . As a consequence, overall production  $Y_t$  is also a decreasing function of modern sector wage, for an increase in  $w_C$  reduces the number of workers hired in the more productive modern sector. Overall production is also linearly increasing with the capital stock, as long as profit is positive, for  $w_C \geq w_T$ , and then:

$$f \circ f'^{-1}(w_C) - w_T f'^{-1}(w_C) \geq f \circ f'^{-1}(w_C) - w_C f'^{-1}(w_C) = \Pi \geq 0$$

All these consequences of the dual structure of the economy on production and employment are exactly similar to the classical conclusions of Lewis (1954). In such a setting, the critical determinant of the level of development is the amount of invested capital, which is studied in the next section.

## 2.2 Life-cycle, intertemporal trade-off and savings

All agents are identical. Each has a lifespan of two periods, and a life cycle *à la* Diamond (1965). In the first part of his life, when the agent is young ( $Y$ ), he works and saves, while in the second part of his life, when he is old ( $O$ ), he invests and consumes his capital. For simplicity, we assume that the intertemporal utility function is homothetic, additively separable, and that the agent has the same utility function  $u(c)$ , satisfying Inada conditions, in both periods, and that he attaches equal weight to first and second period utility. Under these assumptions, the level of individual savings  $S$  of a Young agent working during period  $t$  is such that:

$$S(r_{t+1}, w_t) = s(r_{t+1})w_t \text{ with } 0 < s(r_{t+1}) < 1$$

A Young worker's level of individual savings is then linearly increasing with his labor income  $w$ , but the effect of an increase in returns to capital  $r$  depends, as usual, on the relative importance of intertemporal substitution and income effects. Moreover, as

individual labor incomes and consequently returns to capital remain constant throughout the development process, in both sectors, savings rates are also constant over time and sectors. Finally, the level of individual savings in the modern sector is higher than that in the traditional sector, because the labor income is higher:

$$S_C = s(r)w_C \geq S_T = s(r)w_T \text{ as } w_C \geq w_T$$

## 2.3 The process of development

### 2.3.1 Capital accumulation

In this classical framework, economic development is understood as the transfer of the labor force from the traditional to the modern sector, which is essentially determined by the dynamics of capital accumulation. In the overlapping generations (OLG) setting, the stock of capital available and invested at the beginning of a period  $t$  comes from the savings made by Young agents in the preceding period  $t - 1$ . In this preceding period, there were two kinds of Young agents. A quantity  $L_{Tt-1} = L - L_{Ct-1}$  of them were working in the traditional sector, for a real income  $w_T$ , and their aggregate savings were thus equal to  $(L - L_{Ct-1})S_T$ . And a quantity  $L_{Ct-1}$  were working in the modern sector, for a real income of  $w_C$ , and their aggregate savings were thus equal to  $L_{Ct-1}S_C$ .

We then have:

$$K_t = (L - L_{Ct-1})S_T + L_{Ct-1}S_C = S_T L + (S_C - S_T)L_{Ct-1}$$

$L_{Ct-1}$  is itself a function of  $K_{t-1}$ , and as  $w_T$ ,  $w_C$ , and  $r$  remain constant over time until the labor force is entirely transferred to the modern sector, the dynamics of capital accumulation is then given by the simple relationship:

$$K_t = s(r)w_T L + s(r)(w_C - w_T)f'^{-1}(w_C)K_{t-1} \quad (1)$$

In this expression, the first term  $s(r)w_T L$  can be seen as the baseline amount of

savings in this economy, that is to say the stock of capital that is available if every worker is paid at the traditional sector rate. The second term,  $s(r)(w_C - w_T)f'^{-1}(w_C)K_{t-1}$ , can be seen as the extra amount of savings due to the fact that some workers are employed in the modern sector and save more than their counterparts in traditional activities.

If we write:

$$\begin{aligned}\alpha &= s(r)w_T L \\ \beta &= s(r)(w_C - w_T)f'^{-1}(w_C)\end{aligned}$$

And if we assume that the initial capital stock  $K_0$  was simply equal to the aggregate amount of savings when no worker was yet employed in the modern sector, *ie*  $K_0 = \alpha$ , then the stock of capital available at every period  $t$  is simply given by the relationship:

$$\begin{aligned}K_t &= \frac{\alpha}{1 - \beta}(1 - \beta^{t+1}) && \text{if } \beta \neq 1 \\ K_t &= (t + 1)\alpha && \text{if } \beta = 1\end{aligned}$$

With growth rates being defined by the relationships:

$$\begin{aligned}g_{K_t} &= (1 - \beta)\frac{\beta^t}{1 - \beta^t} && \text{if } \beta \neq 1 \\ g_{K_t} &= \frac{1}{t + 1} && \text{if } \beta = 1\end{aligned}$$

Capital stock growth rate is then always positive and decreasing. However, if  $\beta \geq 1$ , the capital stock is not bounded, and then capital continues to be accumulated until all workers are employed in the modern sector. If  $\beta < 1$ , then the steady-state stock of capital  $K^*$  corresponding to the dynamics of capital accumulation (1) is:

$$K^* = \frac{\alpha}{1 - \beta} \tag{2}$$

### 2.3.2 Intersectoral transfer and growth

As employment in the modern sector  $L_{Ct}$  and overall production  $Y_t$  at every period depend on capital accumulation, their dynamics can now be determined. If we note  $\gamma = f \circ f'^{-1}(w_C) - w_T f'^{-1}(w_C)$ , we have::

$$\begin{aligned} L_{Ct} &= \frac{\alpha}{1-\beta}(1-\beta^{t+1})f'^{-1}(w_C) & \text{and } Y_t &= \frac{\alpha}{s(r)} + \frac{\alpha\gamma}{1-\beta}(1-\beta^{t+1}) & \text{if } \beta \neq 1 \\ L_{Ct} &= (t+1)\alpha f'^{-1}(w_C) & \text{and } Y_t &= \frac{\alpha}{s(r)} + (t+1)\alpha\gamma & \text{if } \beta = 1 \end{aligned}$$

Growth rates are then:

$$\begin{aligned} g_{L_{Ct}} &= (1-\beta)\frac{\beta^t}{1-\beta^t}f'^{-1}(w_C) & \text{and } g_{Y_t} &= \frac{(1-\beta)\beta^t}{\frac{1-\beta}{s\gamma} + 1 - \beta^t} & \text{if } \beta \neq 1 \\ g_{L_{Ct}} &= \frac{f'^{-1}(w_C)}{(t+1)} & \text{and } g_{Y_t} &= \frac{1}{\frac{\alpha}{\gamma s(r)} + t} & \text{if } \beta = 1 \end{aligned}$$

Note that these growth rates are also positive and decreasing. Following the dynamics of capital accumulation, modern sector employment and overall production converge to a steady-state level if  $\beta < 1$ , and diverge if  $\beta \geq 1$ .

### 2.3.3 Development conditions

The process of development is entirely driven by capital accumulation, which allows the labor force to gradually move from traditional activities to the more productive modern sector. Development is eventually complete when the whole labor force has been transferred to the modern sector, that is to say, when the capital stock has reached a level  $\bar{K}$  such that  $L = f'^{-1}(w_C)\bar{K}$ .

According to what has been shown in the preceding section, complete development will always occur if  $\beta \geq 1$ , since the capital stock diverges. However, if  $\beta < 1$ , the capital stock converges, to a steady-state level that can be lower than  $\bar{K}$ . Whether or not development actually occurs and capital accumulation reaches a point where the

whole labor force is absorbed into the modern sector depends on the ratio:

$$\frac{K^*}{\bar{K}} = \frac{s(r)w_T f'^{-1}(w_C)}{1 - s(r)[w_C - w_T] f'^{-1}(w_C)} \quad (3)$$

There are then two cases. If capital accumulation converges to a capital stock  $K^*$  that is lower than  $\bar{K}$ , then the economy is stuck in an equilibrium of partial modernization:

$$0 < \frac{K^*}{\bar{K}} < 1 \Leftrightarrow s(r)w_C f'^{-1}(w_C) < 1$$

On the other hand, if capital accumulation converges to a capital stock  $K^*$  that is greater than  $\bar{K}$ , then the economy eventually reaches  $\bar{K}$ , becomes “modern”, and then follows standard growth pattern:

$$\frac{K^*}{\bar{K}} \geq 1 \Leftrightarrow s(r)w_C f'^{-1}(w_C) \geq 1$$

So finally, the necessary condition for complete development is:

$$s(r)w_C f'^{-1}(w_C) \geq 1 \quad (4)$$

This condition encompasses the “explosive development” case when  $\beta = s(r)(w_C - w_T) f'^{-1}(w_C) \geq 1$ .

Intuitively, the left-hand side of inequality 4 is the amount of savings generated by one unit of capital invested in the modern sector. One unit of capital creates  $f'^{-1}(w_C)$  jobs in the modern sector, and each worker then saves an amount  $s(r)w_C$ . If this value is greater than unity, it means that one unit of capital invested in the modern sector generates, through savings, more than one unit of capital in the next period.

### 2.3.4 The modern sector wage and development

According to (1) and (4), both the likelihood of full development and the speed of capital accumulation are determined by the quantity  $s(r)w_C f'^{-1}(w_C)$ . This quantity critically

depends on the modern sector wage  $w_C$ , and we have:

$$\frac{\partial[s(r)w_C f'^{-1}(w_C)]}{\partial w_C} = s(r)f'^{-1}(w_C)(e_{s,r}e_{r,w_C} + e_{L_C,w_C} + 1)$$

Where :

$$s(r)f'^{-1}(w_C) > 0$$

$e_{s,r} = \frac{s'}{s}r$  is the elasticity of savings with respect to returns to capital,

$e_{r,w_C} = \frac{r'}{r}w_C < 0$  is the elasticity of returns to capital with respect to wage,

$e_{L_C,w_C} = \frac{w_C}{f'^{-1}(w_C)f'' \circ f'^{-1}(w_C)} < 0$  is the wage elasticity of modern labor demand.

Intuitively, an increase in  $w_C$  increases the individual savings of modern sector workers, but reduces their number, as it reduces demand for labor. The two effects on capital accumulation, through labor demand and savings behavior, work in opposite directions. However, the critical quantity  $s(r)w_C f'^{-1}(w_C)$  is increasing in  $w_C$  under the two following sufficient conditions.

First, the elasticity of the saving rate with respect to rates of return to capital  $e_{s,r}$  must be negative or zero. That is to say, in agents' savings decisions, the income effect of an increase in returns to capital must outweigh the substitution effect. Agents must have a preference for smoothing consumption across their life cycle. Empirically, the response of individual savings to interest rates is still being debated. However, since the study of Giovannini (1985), the general consensus is that in developing countries, the interest elasticity of savings is zero, and if not, it is more likely to be negative than positive (Schmidt-Hebbel, Webb, and Corsetti (1992), Bandiera, Caprio, Honohan, and Schiantarelli (2000), Ogaki, Ostry, and Reinhart (1996), Loayza, Schmidt-Hebbel, and Servén (1999)). To quote Schmidt-Hebbel, Servén, and Solimano (1996), “the evidence generally shows that interest rates and tax incentives have little or no effect on saving”, and “in those exceptional cases in which saving shows a positive response to the interest rate, that response is very small”. The fact that the elasticity of savings with respect to

interest rates or returns to capital is zero or negative seems to be confirmed in the case of China (Kraay (2000), Qin (2003), and Chamon and Prasad (2008)).

The second sufficient condition is that the elasticity of the demand for labor with respect to wages in the modern sector is, in absolute value, smaller than one. Since the seminal study of Hamermesh (1993), it is widely agreed that the order of magnitude of the elasticity of the labor demand ranges between  $-0.5$  and  $-0.3$  (Clark and Freeman (1980), Fuchs, Krueger, and Poterba (1998)), depending on the exact definition of the elasticity under scrutiny. Even if most studies have focused on developed countries, most notably the USA and UK, similar results are obtained for developing countries. According to the study of Meng (2000), the elasticity of the demand for labor with respect to wages is even lower in the case of China.

Finally, under these two sufficient conditions, which are quite consensual and empirically sound, we get our first result.

**Result 1:** The pace of capital accumulation, as well as the equilibrium level of development and hence the likelihood of full development, are increasing in modern sector wage levels.

## 2.4 The Modern Sector Wage-Setting Issue

For a given technology, that is to say a given modern production function, the critical determinant of the development of this simple dual economy is then the wage level in the modern sector. This directly determines saving behavior and employment structure and indirectly influences saving rates through the level of returns to capital. However, because of the existence of a traditional sector that guarantees an income  $w_T$ , there is, in a Lewisian way, an “unlimited supply of labor” above this threshold. No labor market clearing wage can thus emerge, and the wage level must be set in some institutional manner. Different options or processes are possible for this modern sector wage-setting.

### 2.4.1 Pure monopsony

In the simplest and most natural case, Old agents, who own and invest capital, take full advantage of their monopsonistic position, and so set the modern sector wage at the lowest possible level,  $w_T$ . The economy then remains totally stationary, at the lowest possible level of development.

### 2.4.2 Bargaining

One could imagine that the modern sector wage is set, each period, through a process of bargaining or conflict between Old capitalists and Young workers. The Old agents evidently have a simple and unambiguous interest in lowering the modern sector wage, whereas the Young workers' interests are ambivalent. On the one hand, an increase in modern sector wages increases their income and utility levels. On the other hand, however, it reduces the number of modern sector workers, and thus their aggregate welfare. As the economy progressively develops, more and more workers are hired in the modern sector, and so the former effect should become relatively more and more important. The modern sector wage should thus progressively increase, and development therefore accelerates over time.

### 2.4.3 Conventional setting by a social planner

A last solution is that the modern sector wage is set by a political or administrative authority. This authority, acting as a social planner in a context where market processes cannot work, may have various objective functions. Here, we will take a simple case.

At the beginning of a period  $t$ , the social planner sets the modern sector wage for the period, having two arguments in his objective function: the overall level of production during the period,  $Y_t$ , and the growth rate to  $t+1$ , or, equivalently, the level of production during the next period,  $Y_{t+1}$ .

To sum up, the problem faced by the social planner when setting the modern sector wage is a trade-off between current and future production. This is actually a trade-off

because  $Y_t$  is increasing in  $w_{Ct}$  while  $Y_{t+1}$  is decreasing in  $w_C$ . Indeed:

$$\begin{aligned}
Y_t &= w_T L + [f \circ f'^{-1}(w_{Ct}) - w_T f'^{-1}(w_{Ct})] K_t \\
&\Rightarrow \frac{\partial Y_t}{\partial w_{Ct}} = \frac{w_{Ct} - w_T}{f'' \circ f'^{-1}(w_{Ct})} K_t \leq 0 \text{ depending on } w_{Ct} \geq 0 \\
Y_{t+1} &= w_T L + [f \circ f'^{-1}(w_{C_{t+1}}) - w_T f'^{-1}(w_{C_{t+1}})] \\
&\quad \times [w_T L + (w_{Ct} - w_T) f'^{-1}(w_{Ct})] s(r_{t+1}) K_t \\
&\Rightarrow \frac{\partial Y_{t+1}}{\partial w_{Ct}} = [f \circ f'^{-1}(w_{C_{t+1}}) - w_T f'^{-1}(w_{C_{t+1}})] \\
&\quad \times [f'^{-1}(w_{Ct}) + \frac{w_{Ct} - w_T}{f'' \circ f'^{-1}(w_{Ct})}] s(r_{t+1}) K_t \geq 0 \text{ for } e_{L_C, w_C} > -1
\end{aligned}$$

The marginal benefit of an increase in  $w_{Ct}$  is thus that it increases production in the next period, while its marginal cost is that it decreases current production. Moreover, both the cost and the benefit are proportional to the capital stock  $K_t$  available at the beginning of the period. Therefore, the trade-off between them does not depend on the level of capital accumulation, and so  $w_C$  is constant over time, until development comes to an end.

Finally, if the modern sector wage level is set by a social planner through a trade-off between present and future production, we get the two following results. Firstly, the incentive to choose a modern sector wage above the subsistence wage comes from a desire to hasten growth, and from the fact that the marginal cost of raising the modern sector wage tends to 0 when  $w_{Ct}$  tends to  $w_T$ . Secondly, as both terms of the trade-off linearly depend on the current level of development, *i.e.* on the current stock of capital, the wage level chosen by the social planner remains constant over time. We thus have, in this case:

$$\forall t, w_{Ct} = w_C > w_T$$

For simplicity, we will consider this case for the rest of the paper.

### 3 A two-region model of development

#### General Setting

We now introduce a second region, which is seen as urban and fully developed, that is to say, basically, where there is no longer a traditional sector. We will denote the developing region by  $R$  for rural and the developed one by  $U$  for urban. Initially, the two regions are completely disconnected, that is to say goods, capital and labor cannot move across their borders. Prices and factor incomes are therefore different. We make the following assumptions.

The two regions have access to the same technology, that is to say, the production function in the modern sector is the same in both regions.

We will assume that there are  $L_U$  urban people born at each generation, and that they are identical to the rural workers.

The only difference between the two regions is then that the rural one is still developing, *i.e.* still has a traditional sector, whereas the urban one is fully developed.

We will consider the impact on capital accumulation of two alternative migration policies, one of **Labor Market Opening** (*hukou* case), where young rural people are allowed to work in cities, but cannot settle down there when old, and one of **Complete Integration**, where rural people are allowed to spend all their life (Young and Old) in the urban area. The consequences of these two policies on development will be compared with the situation of **Autarky**, described in the previous section.

#### 3.1 Labor Market Opening

The first policy is to allow young rural workers to come and work in cities, but to deny them the right to invest and settle down in urban areas. Capital markets are not integrated between the two regions, and so returns to capital are not equalized. As the urban region is now opened to Young rural workers, at each period the rural labor force is allocated between the rural traditional and modern sectors and the urban modern sector.

### 3.1.1 Urban wage setting

At every period  $t$ , the wage offered to the rural-to-urban migrants in the urban modern sector  $w_{Ut}$  is determined by a condition *à la* Harris and Todaro (1970), that is to say equilibrium in the labor market between the two regions requires that  $w_{Ut}$  is equal to the expected labor income in the rural area. This is because, at the beginning of a period, Young workers choose between moving to the urban area and staying in the rural one. In the rural area, the income they can expect to earn is the average income in rural areas, *i.e.* the average of subsistence and modern sector wages, weighted by the respective shares of these two sectors in the labor force. We then have, with  $L_R$  being the rural labor force and  $K_{Rt}$  the capital stock invested in the rural area at time  $t$ :

$$w_{Ut} = \frac{L_{Ct}}{L_R} w_C + \left(1 - \frac{L_{Ct}}{L_R}\right) w_T = w_T + (w_C - w_T) \frac{L_{Ct}}{L_R} = w_T + (w_C - w_T) f'^{-1}(w_C) K_{Rt}$$

As an immediate consequence of this equilibrium condition,  $w_{Ut}$  varies between  $w_T$  and  $w_C$  and steadily increases as capital accumulates in the rural area:

$$\begin{aligned} w_T &\leq w_{Ut} \leq w_C \\ w_{Ut} &= w_{Ut}(K_{Rt}) \text{ with } \frac{\partial w_{Ut}}{\partial K_{Rt}} > 0 \end{aligned}$$

We will also assume that there is no segregation, that is to say that urban workers and rural migrant workers earn the same income in the urban labor market, as they are assumed to have the same characteristics. This assumption greatly simplifies the reasoning without altering the results.

### 3.1.2 Employment and capital accumulation in the urban area

At the beginning of every period  $t$ ,  $L_U$  urbanites are born. When Young, these urbanites earn a labor income  $w_{Ut}$  determined as previously stated. When Old, they invest their savings and get a return of  $r(w_{Ut+1})$ . During a period  $t$ , aggregate urbanite savings are

thus equal to:

$$L_U s(r(w_{U_{t+1}}))w_{U_t} = L_U S_{U_t}$$

At time  $t$ , urban Old people invest their savings and, as described above, employ workers in order to maximize their profit. We assume that they act under the constraint of an “urbanites first” policy, that is to say they first employ Young urban workers, and resort to rural migrants only if there are jobs left. Using the same notations as before, the quantity  $L_{Mt}$  of rural migrants they hire during period  $t$  is thus:

$$L_{Mt} = [f'^{-1}(w_{U_t})S_{U_{t-1}} - 1] L_U \text{ if } \geq 0, \text{ and } 0 \text{ otherwise.}$$

Note that the number of rural migrants hired in urban areas is ultimately a function of the capital stock accumulated in the countryside, as it is a function of  $w_{U_t}$  and  $w_{U_{t+1}}$ , which are themselves functions of  $K_{Rt}$  and  $K_{R_{t+1}}$  respectively.

### 3.1.3 Employment and capital accumulation in the rural area

There are now three kinds of people in the rural area, according to their life cycles. All of them have to return and invest in the rural area when they are Old, but while Young, they can be rural traditional workers, rural modern sector workers or rural migrant workers. Finally, their situation at time  $t$ , like that of urban workers, can be summed up as follows:

Status	Label	Qty	Wage	K Returns	Savings
Rural	Rural traditional worker	$L_{Tt}$	$w_T$	$r(w_C)$	$S_T = s(r(w_C))w_T$
	Rural modern worker	$L_{Ct}$	$w_C$	$r(w_C)$	$S_C = s(r(w_C))w_C$
	Rural migrant worker	$L_{Mt}$	$w_{U_t}$	$r(w_C)$	$S_{Mt} = s(r(w_C))w_{U_t}$
Urban	Urban worker	$L_U$	$w_{U_t}$	$r(w_{U_{t+1}})$	$S_{U_t} = s(r(w_{U_{t+1}}))w_{U_t}$

With the following relationships between variables:

$$\begin{aligned}
L_R &= L_{Tt} + L_{Ct} + L_{Mt} \\
L_{Ct} &= f'^{-1}(w_C)K_{Rt} \\
L_{Mt} &= \max\{[f'^{-1}(w_{Ut})S_{Ut-1} - 1] L_U; 0\} \\
w_{Ut} &= w_T + (w_C - w_T)f'^{-1}(w_C)K_{Rt}
\end{aligned}$$

We also have the following inequalities, for all  $t$ :

$$\begin{aligned}
w_T &\leq w_{Ut} \leq w_C \\
r(w_{Ut}) &\geq r(w_C) \\
s(r(w_{Ut})) &\leq s(r(w_C))
\end{aligned}$$

We can now determine the new dynamics of capital accumulation in the rural area. At a given time  $t + 1$ , capital invested in the rural area comes from savings made in  $t$  by Young workers, *i.e.* rural traditional workers, rural modern sector workers and rural migrant workers:

$$K_{Rt+1} = L_{Tt}S_T + L_{Ct}S_C + L_{Mt}S_{Mt}$$

This relationship, together with the ones described above, allow to express  $K_{Rt+1}$  as a function of the previous period's capital stock, and we then get the following dynamics of capital accumulation:

$$\begin{aligned}
K_{Rt+1} &= S_T L_R + (1 + L_{Mt})(S_C - S_T)f'^{-1}(w_C)K_{Rt} & (5) \\
\text{with } L_{Mt} &= \max\{[f'^{-1}(w_{Ut})S_{Ut-1} - 1] L_U; 0\} \\
\text{and } w_{Ut} &= w_T + (w_C - w_T)f'^{-1}(w_C)K_{Rt}
\end{aligned}$$

This dynamics of capital accumulation under a policy of migration constraint is exactly similar to the relationship obtained in the rural region in autarky, given by (1), except for the new positive term  $L_{Mt}$ , representing savings brought back to rural areas

by returning rural-to-urban migrants. With a policy of constrained migration, the pace of capital accumulation and thus of development in the rural region is higher than it is in autarky, simply because a new source of capital is available for investment: returning migrants' savings. This leads to the second result.

**RESULT 2:** A policy of labor market opening and constrained return migration hastens capital accumulation and development in the developing rural area when compared with a situation of autarky.

### 3.2 Complete Integration

An alternative policy is the complete integration of the two regions. Young people are allowed to work in either region, and Old people are allowed to invest and settle down in whichever region they prefer. In this case, we are in fact back to the one-region case. The determining factor will then be, as previously stated, the level of the wage in the modern sector, at the national level. If  $w_C$  and  $w_{Ut}$  are the wages prevailing in the rural and urban modern sector respectively before complete integration, with  $w_C \geq w_{Ut}$ , then there are three possible cases for wage determination after integration.

If urban and rural wages are not institutionally changed after the complete integration, all Old people will naturally invest their whole capital stock in the region where the returns to capital are highest, that is to say where modern sector wage is lower. Then, the modern sector wage at the national level will necessarily be lower than the one prevailing in the rural region at autarky.

Complete integration can also be accompanied by a renegotiation of modern sector wage at the national level. As the situation is exactly similar to the one-region autarkic case analyzed in the first section, if the social planner has the same objective function as the social planner of the rural region at autarky, it will set the wage at the same level:  $w_C$ .

Finally, complete integration can also be accompanied by a redefinition of modern sector wage, but by a social planner having a different objective function. The new

national modern sector wage can thus be less than, equal to or greater than  $w_C$ , the wage prevailing in the rural area before integration. However, it is quite unlikely that a social planner, or any political authority, would choose to raise the modern sector wage above its level in the rural area, because the immediate effect would be an unexpected fall in returns to capital, a contraction of employment in the modern sector and a general decrease of output, since the overall level of contemporaneous production is a decreasing function of modern sector wage. Raising the modern sector wage is thus extremely costly, in both political and general welfare terms.

To sum up, whatever the solution chosen to set the modern sector wage in the case of complete integration, it is very unlikely that it would be higher than  $w_C$ , its level in the rural region at autarky. After complete integration, the nationally-defined modern sector wage is thus at a level  $w_I$  such that  $w_I \leq w_C$ .

We are then back to the one-region case, with a population  $L_R + L_U$  of similar agents born at each period, and with a modern sector wage  $w_I$ . We thus have an expression of the ratio of convergence capital stock  $K_I^*$  to the capital stock necessary for development  $\bar{K}_I$  similar to (3):

$$\frac{K_I^*}{\bar{K}_I} = \frac{s(r)w_T f'^{-1}(w_I)}{1 - s(r)[w_I - w_T] f'^{-1}(w_I)} \quad (6)$$

As  $w_I \leq w_C$  and according to Result 1, this ratio 6 is then inferior or equal to the ratio 3 prevailing in the rural region in autarky. That is to say, as complete integration leads to a national modern sector wage which is (weakly) lower than the one existing in the rural area in autarky, it leads to a (weakly) lower likelihood of development. This constitutes the third result.

**RESULT 3:** Complete integration reduces the pace of capital accumulation, as well as the equilibrium level of development and the likelihood of full development, when compared with a situation of autarky.

A policy of migration constraints thus unambiguously hastens development, understood as the transfer of the labor force into the modern sector due to capital accumulation, when compared with autarky. A policy of complete integration, however, is very

likely to lead to a lower likelihood of development, as it would probably lead to a lower wage in the modern sector.

## 4 An application to the Chinese case

### Outline

Since the beginning of the “Opening and Reform” era in 1978, the People’s Republic of China has maintained one of the tightest migration control systems of developing countries, through the “Household responsibility system” (known in Chinese as the *hukou* system). Individual *hukou* defines, for each Chinese citizen, a set of rights and opportunities, as well as the localities where they can be exercised. This institution thus has a strong influence on individual locational choices. We will check here if the model previously outlined can shed some light on the impact of this *hukou* system on Chinese development.

Firstly, the model deals with an economy composed of two regions, a developing rural one and a developed urban one, with two markets, capital and labor. The rural region is seen as developing because it is still a dual economy, characterized by the coexistence of a modern sector and of traditional activities, and thus by the existence of “surplus labor” in the Lewisian sense, that is to say, labor supply elasticity is infinite. The model also assumes that capital cannot flow from one region to the other. In this section, we will first verify whether this general framework can be relevant in the case of China.

Secondly, according to the model results, the migration policy that leads to the higher pace of capital accumulation is the one of an open labor market with constrained return migration. We will then examine whether the *hukou* institution, as it functions today, can be interpreted in this way, and whether the behavior of rural people fits with the model’s predictions.

## 4.1 Chinese dualism

### 4.1.1 Developing and developed China

The People's Republic has been, at least since 1978, characterized by very varying growth and development patterns. If the rural-urban income gap has steadily increased since 1985 (Sicular, Ximing, Gustafsson, and Shi (2007)), one the main and growing dimensions of inequality in China has been the inter-provincial divergence in growth patterns. Already manifest in the 1990s (Naughton (2002)), this trend seems to be continuing at the beginning of the XXI<sup>st</sup> century, confirming the unequal economic achievements of eastern coastal provinces<sup>1</sup> when compared with central and western inner ones (Yao and Zhang (2001), Zhang, Liu, and Yao (2001)). Zou and Zhou (2007) contrast a “developed club”, including a reduced set of coastal eastern provinces<sup>2</sup>, with the “underdeveloped” rest of China. From a dual economy point of view, these coastal provinces had a lower share of surplus labor in the 1980s (Cai, Wang, and Du (2002)), and this is still the case today (Wang and Ding (2006)). Not surprisingly, most of these regions also have an urbanization rate well above national average (Chen (2002)).

Despite very diverse local situations, it therefore seems reasonable to consider China as being divided, at a very aggregate level, into a developed and urbanized coast and a under-developed and still dualistic hinterland. This characterization fits well with the model developed in the previous sections. However, for this model to be relevant, a second necessary condition is that these two regions should not be well integrated, and especially that capital should not flow easily over borders.

### 4.1.2 Capital markets

In the general context of the growing economic fragmentation of China since the beginning of the reforms (Young (2000), Poncet (2003)), banks and capital markets have been particularly little integrated and liberalized. Financial markets remain underdeveloped

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<sup>1</sup>Which include Beijing, Tianjin, Shanghai, Liaoning, Zhejiang, Jiangsu, Guangdong, Fujian, and Hainan (Cai, Wang, and Du (2002)).

<sup>2</sup>Namely: Guangdong, Beijing, Jiangsu, Shanghai, Fujian, Zhejiang, Shandong, Tianjin and Hebei

(Allen, Qian, and Qian (2005)), and the banking sector has retained the structure and habits of the socialist planned economy. Banks are still very closely linked with local authorities and have not developed a modern and efficient credit allocation process (Park and Sehart (1999)). Reforms were implemented at the beginning of the 2000s, but their effects have yet to be felt (Podpiera (2006)). Because of this proximity between banks and local authorities and the poor functioning of capital markets, capital does not flow smoothly across borders within China (Boyreau-Debray and Wei (2005)).

These constraints on internal capital flows lead to significant differences in rates of returns (Bai, Hsieh, and Qian (2006)). Despite some convergence since the mid-1990s, it appears that real rates of returns are, geographically speaking, much higher in coastal, urbanized and modern areas than in inner, rural and more backward regions He, Zhang, and Shek (2007). This constraint is especially significant for rural households, whose savings are mainly deposited in rural credit cooperatives (Xie (2003)) and rural cooperative foundations, which have by essence a local scope of action (Park, Brandt, and Giles (1997)). These savings, through the grass roots financial institutions, were one the main factors permitting the emergence of Township and Village Enterprises and rural industry in the 1980s and 1990s (Naughton (2007)).

The divergence of the economic performance of inner and coastal provinces of China is then paralleled, unsurprisingly, by higher returns to capital in the latter. However, capital does not flow from the former to the latter, because capital markets and financial intermediaries are, as many other markets in China, segmented and restricted by local boundaries. This fits with the general framework of the model described in the previous sections. We can now turn to the consequences of the dual economy structure of Chinese inner provinces and the coexistence of underdeveloped and developed areas for labor market functioning and migration policies.

## 4.2 Labor markets and migration policies

### 4.2.1 Rural labor markets

Our theoretical model assumes that the rural region is still developing, meaning that traditional and modern sectors coexist. So the wage in the rural modern sector should not be determined competitively but institutionally, and jobs in rural industries should be scarce, compared with labor supply. Three characteristics of Chinese rural labor markets indicate that this is indeed the case.

Firstly, labor incomes in the agricultural sector are extremely low compared with wages in rural industry and migrant wages, indicating that the agricultural activity is not very productive, and that off-farm job opportunities are scarce (Meng (2000), Knight and Song (2003)). Consistent with a dual economy structure, many studies have pointed the significant gap between the marginal productivity of labor in traditional (understood as agriculture) and modern (industry and services) activities (Yang and Zhou (1999)), Cook (1999)).

Secondly, it appears that because off-farm job opportunities are scarce, they tend to be allocated through non-market processes, such as networks (*guanxi*), as shown by Zhang and Li (2003), or political connections (Cook (1998), Guang and Zheng (2005)).

Thirdly, if workers' off-farm wages are determined by market processes, they should respond to individual productivity measures, such as experience and education. Although there is still debate on that point, existing studies seem to indicate that human capital had little or no effect on individual wages in the 1980s (Byron and Manaloto (1990)), and even if labor markets do appear to have matured somewhat in the 1990s (Zhang, Huang, and Rozelle (2002)), the impact of human capital on off-farm labor income generally remains low (Fleisher and Wang (2004), de Brauw and Rozelle (2008)). Zhao (1999a) and Zhang, Huang, and Rozelle (2002) show that the main impact of education has been on the access to off-farm jobs, much more than any direct effect on earnings.

These facts are consistent with the coexistence, in rural areas, of two sectors with very

different labor productivity, and with an institutional, non-competitive determination of wages in rural industries.

#### 4.2.2 Migration policies: *hukou* and temporary work migration

Since the beginning of the reform era, the People's Republic has maintained considerable control over the migration of Chinese citizens, through the *hukou* system. However, this institution has undergone various reforms and modifications, and as a consequence, the constraints it has imposed, since the beginning of the 1990s at least, are close to the ones embodied in the migration policy defined as "Labor market opening" in the previous section of this paper.

The *Hukou* system was set up in the 1950s, as a purely administrative household registration device (Chan and Zhang (1999)). In the general context of the administered economy in the 1960s and 1970s, it became a tool for the allocation of resources and access to social services. An individual *hukou* determines a status, specifying what kind of resources and social services are available, and a location, where they are available. Two statuses are defined, agricultural (*nongye*), which gives access to agricultural land and rural social services, and non-agricultural (*feinongye*), which gives access to formal urban sector jobs and urban social services. Nowadays, it is not too difficult for Chinese citizens to change locality, without changing official registration. However, the frontier between the two statuses, through the *nongzhuanfei* process, has remained quite tight (Chan and Buckingham (2008)). Today, the *hukou* divide is less between rural and urban areas than between informal and formal sectors within cities.

Rural workers have thus been gradually allowed to come and work in cities,<sup>3</sup> and this new freedom has given rise to the emergence of huge migration flows out of rural areas. According to NBS (2006), in 2002, out of 478.52 million rural workers, 131.81 million - more than a quarter - out-migrated. Unsurprisingly, migration flows have been increasingly directed toward eastern, coastal and developed provinces (Fan (2005)). At

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<sup>3</sup>In the 1990s, they were called the "floating population" (*liudong renkou*), and are now more generally referred to as the "peasant workers" (*nongminggong*).

their destination, these rural migrants generally seem to face discrimination, in both access to jobs and wage levels (Knight, Song, and Huaibin (1999), Zhao (2005), Lu and Song (2006)), although evidence on the latter is now being questioned (Dong and Bowles (2002), Démurger, Gurgand, Shi, and Ximing (2009)).

However, quite apart from this possible labor market segregation, rural migrants are denied access to urban social services, such as health and education, and segregated in the real estate market, because they are not official urbanites but simply tolerated as temporary workers (Gu and Shen (2003), Wu (2004)). In particular, it is extremely difficult for them to acquire a proper dwelling or to directly invest in their destination urban areas: there is no possibility for them to use their capital in cities.

These constraints have a very strong impact on the life-cycle of rural migrants, making it extremely difficult for them to settle down in urban areas. A body of corroborating evidence seems to indicate that rural migrants in China actually have a life-cycle divided into two stages, the first spent working in the urban area, and the second spent investing in the rural one. The migration decision of rural workers thus appears to be on a temporary basis (Zhao (1999b)).

Firstly, “return migration” flows (*huiliu*), from urban to rural areas, have begun to rise in recent years, especially since 2000 (Hare (1999), Zhao (2002)).

Secondly, the “40 year phenomenon” (40 *sui xianxiang*), meaning that virtually all migrant rural workers are less than 40 years old, seems to indicate that there is a clear-cut age threshold for migration decisions (Wang (2005)).

Thirdly, rural migrants have relatively high savings rates, and they tend to return home when they consider they have accumulated enough (State Council Research Bureau (2006)).

Fourthly, when they return home, rural migrant workers tend to invest and become entrepreneurs, a phenomenon the Chinese call *huixiang chuangye*, “returning to the countryside to found a business” (see for example, Ma (1999), Ma (2001), Murphy (1999) and Murphy (2002)), which plays a key role in local development.

All these facts are consistent with a two-period life-cycle of rural-to-urban migrants,

forced by *hukou* migration controls to eventually return to their home villages to invest the savings accumulated from their work in urban labor markets.

The *hukou* system as it functions today can then be seen as allowing temporary work migration but forcing eventual return migration, as in the "labor market opening" policy defined in previous sections.

### 4.3 Consequences

#### 4.3.1 Rural workers' labor incomes, interest rates and savings behavior

Characteristics of the People's Republic of China such as the dichotomy between the urbanized and developed eastern coastal provinces, and the more backward inner provinces, the segmentation of capital markets and the dual economic structure in rural areas thus seem to correspond quite well with the general background of the model described in the previous sections. Moreover, the way *hukou* migration controls constrain rural people seems quite similar to the migration policy described in the second section under the term "labor market opening". The general theoretical framework thus appears to fit the Chinese experience. A series of stylized facts are also consistent with some important results of the model.

Firstly, the distribution of rural workers in the rural traditional activities, rural off-farm sector and migration described in the second section leads to the conclusion that rural workers favor modern sector jobs over traditional activities and local work over migration. Actually, in China, it seems that migration is a "second best option", as Guang and Zheng (2005) put it, confirming the conclusions drawn by Zhao (1999a). Wages may be nominally higher in urban areas, but once migration costs and the costs of living in urban areas have been taken into account, migration incomes contribute less to a rural household's wealth than local off-farm work (Shi, Heerink, and Qu (2007)). Moreover, the well-established inverted-U shape relationship between assets or wealth and migration probability (Du, Park, and Wang (2005)) shows that migrant workers or rural households including migrants are in the middle of wealth and income distribution. These facts fit well with the Todarian wage equilibrium condition, stating that expected

incomes for rural workers should be equal across the two regions.

Consequently, and according to the mechanisms described in the model, this lower labor income of rural workers in cities is associated with higher returns to capital in urban areas, compared with rural and developing regions. The reverse is true for household savings rates. According to Kraay (2000) and Kuijs (2005), the savings rate of rural households has been structurally higher than that of urban households since 1978, although the gap has tended to narrow in recent years. Moreover, they both find that savings rates respond positively to current real income, and negatively to expected future income, as assumed in the model.

Finally, according to the mechanisms of the model, following the rural region's development through capital accumulation, the wage offered to rural-to-urban migrants should rise, leading to a fall in returns to capital in most developed areas, and consequently to a convergence in the saving rates of urban and rural households. Recent evolutions in China are consistent with these results. In recent years, the wages offered to rural-to-urban workers have steadily increased, and this evolution has been paralleled by a convergence of returns to capital across Chinese provinces (Bai, Hsieh, and Qian (2006)). Finally, the savings rate of urban households has been increasing and gradually converging to that of their rural counterparts, according to Kuijs (2005).

All of these evolutions fit well with the mechanisms at play in the context of the "labor market opening" policy described in the model.

#### **4.3.2 Autarky, *hukou* and complete integration**

The model therefore seems to fit quite well with the main stylized Chinese facts and evolutions. The *hukou* kind of migration constraints, allowing rural laborers to work in urban areas, but forcing them to return to their home rural areas to use their savings and capital, actually hastens the accumulation of capital and then economic development and structural change in rural areas.

Removal of the *hukou* constraints, and complete integration between urban developed areas and rural developing areas, could then lead to an immediate increase of production

and employment in the modern sector, due to capital flows out of rural areas, and consecutively a reallocation of modern sector jobs in urban areas. However, it would come at the price of a decrease in the pace of capital accumulation, because all activities will move to places where returns to capital are higher and labor wages lower, leading to a lower aggregate level of savings. It is then possible that removal of *hukou* migration constraints, while instantaneously raising the share of employment in modern activities, could also end up causing a lower pace of future structural transformation.

## 5 Conclusion

This paper presents a simple model of development in the context of a dual economy, characterized by the coexistence of two sectors, a traditional one using only labor, and a modern one using capital and labor. As usual in such a setting, the wage is not market-clearing, but is institutionally determined, leaving capital owners in a monopsonistic position. This dual setting is combined with agents that have a two-period life-cycle, *à la* Diamond (1965). Within this simple theoretical framework, and under the empirically sound and consensual assumptions that savings do not respond positively to interest rates and that the elasticity of labor demand with respect to wages is less than one, it is shown that when a second, developed, region is introduced, then alternative migration policies between the two regions can be ranked as follows, according to their impact on capital accumulation and on the dynamics of development: first a policy of "labor market opening", but with constrained return for rural workers; second a policy of autarky, and finally a policy of complete integration.

Compared with autarky, a policy of labor market opening with constrained return migration allows rural workers to work and earn wages in urban areas, but forces them eventually to return and invest in their home rural areas, and this leads to a higher level of savings and pace of capital accumulation than in autarky.

On the other hand, in the case of complete integration between the developing rural region and the developed urban one, all capital will flow to the urban area where rates

of returns are higher, and modern sector wages lower. This will eventually cause lower savings and then a lower pace of development.

This simple model then shows that, under very general assumptions, and if the objective is to ensure that full development will occur, *i.e.* that all the labor force will be absorbed in the modern sector, then the best policy is to allow young rural workers to be hired in the urban labor market, but to deny them the right to settle down and invest in urban areas when old. This constrains the life-cycle of rural people, and eventually raises the overall saving rate, while channeling their savings into the rural modern sector. Such a policy, of labor market opening without full migration liberalization, leads to a higher likelihood of full development and a higher pace of development, when compared either with the initial situation of mere separation or with a policy of complete liberalization of migration flows. However, this outcome comes at the price of lower current production.

This result is especially interesting for the analysis of the Chinese case. Indeed, since 1978, the People's Republic of China has gradually opened the urban labor markets for its rural citizens, but still denies them the right to permanently settle in cities. This has led to the emergence of a huge population of "peasant laborers" (*nongmingong*) working in cities, but forced to return, after a certain time, to their home rural area, where they often become entrepreneurs and play a key role in local development.

Consequently, the migration constraints in China, embodied in the *hukou* system, probably explain part of the very high Chinese savings rate, as well as the very rapid pace of Chinese development. Although *hukou* migration constraints prevent better instantaneous allocation of economic resources, they could hasten capital accumulation and structural change.

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