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### **Author**

Chen, Yiu Por (Vincent), Dr.

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## Fiscal Decentralization, Rural Industrialization, and Undocumented Labor Mobility in Rural China (1982-87)

Dr. Yiu Por (Vincent) Chen  
Department of Public Policy  
City University of Hong Kong

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# Fiscal Decentralization, Rural Industrialization, and Undocumented Labor Mobility in Rural China (1982-87)

## **Abstract**

This paper uses a unique panel dataset from China's initial reform of fiscal decentralization to analyze the relationships between fiscal decentralization, local economic development, and rural-rural undocumented inter-provincial labor mobility. Using a modified gravity model with Heckman Maximum Likelihood Estimation method, this paper shows that fiscal decentralization has two contending effects on labor market integration: Local economic development promotes labor mobility at the labor migration destination, but local public goods crowding restrains the inflow of labor. This paper also demonstrates that the crowding effect is stronger at lower levels of government.

JEL: H30 J61 J68 D72

Keywords: fiscal decentralization, local economic development, local public goods, rural labor mobility

**Word Count: 8156**

## 1. Introduction:

Fiscal decentralization has been one of the key instruments for the economic development of local governments around the world (Arzaghi and Henderson, 2002). However, the effect of fiscal decentralization on factor market development and integration at the national level remains controversial.<sup>1</sup>

Theoretically speaking, Tiebout (1956) argued that fiscal decentralization would induce local governments to produce public goods that matched residents' preferences better than centralized policies.<sup>2</sup> However, labor in-migration may cause congestion of local public goods and welfare loss for local residents, known as the *public goods crowding effects* (hereafter crowding effect). The crowding effect is then considered to be the source of local governments' (and residents') resistance to in-migration and has been one of the focuses of research in fiscal decentralization theories (Epple and Nechyba, 2002; Scotchmer, 2002).

The empirical results are also mixed. While some find a strong positive link between fiscal decentralization and market development at the national and regional level (Qian and Weingast, 1997; Lin and Liu, 2000), others disagree with these results (Young, 2001; Zhou, 2001). These dichotomized findings may be due to the interactions between local economic development and crowding effect, i.e., the contending forces generated by fiscal decentralization.

As both of these fiscal decentralization theories and empirical investigations provide logical arguments about the effect of fiscal decentralization on factor mobility at

the national level, few empirical studies truly contrast the effect on labor mobility with these two views of fiscal decentralization in the same model.

This paper engages in this debate by analyzing the incentives of rural governments to promote undocumented (non-*hukou*) labor migration under fiscal decentralization.<sup>34 5</sup> Under fiscal decentralization, in order to achieve local economic development, rural governments may, on the one hand, promote local economic development through undocumented rural in-migration when their local investment increases and local labor force is limited. On the other hand, within a level of government, when the number of governmental units increases, the average jurisdiction size, resource availability, and agglomeration effects are reduced.<sup>6</sup> Moreover, due to the need to finance the local public goods provision, which is limited to providing for local residents, local governments' inward-looking behaviors, such as protection of local welfare and local jobs, may result in blockage of labor in-migration.

My research strategy focuses on comparing two contending effects under fiscal decentralization -- the local economic development effect and local public goods crowding effect -- from a hierarchical perspective, employing panel data at the initial fiscal decentralization stage (1982-87) in China with a modified gravity model.<sup>78</sup> *This initial period is of particular importance because production factors, such as land and capital, were immobile* (Kirby, 1985; Perkins, 1988; Riskin, 1987); however, labor as one of the very important input factors, indexed by interprovincial rural-rural undocumented labor migration, had begun to surge.<sup>9</sup> Another highlight of this study is that I utilize the exogenous changes in the number of county governments and villages<sup>10</sup>, due to the

restructuring of the system of local government by the central government, as a quasi-natural experimental condition of this study.

Using an augmented gravity model with Heckman Maximum Likelihood Estimations (thereafter Heckman Model), I first demonstrate that the efforts of local economic development, measured by TVE output, is positively related to labor mobility. Secondly, I show that the crowding effect (the negative effect on labor in-migration) is inversely related to jurisdictional size and number.<sup>11</sup> From a hierarchical point of view, I find that the crowding effect is stronger at the lowest (village) level than at the county level. Third, I demonstrate that the fiscal decentralization (negative) effect on labor absorption only matters for labor-receiving provinces with high Marginal Retention Rate and with a share remittance rate.

The paper is organized as follows. In section 2, I review the policies on fiscal decentralization, local economic development, and labor migration in China during the period of 1982-87. In section 3, I connect the policy review with the vast literature and related policies on fiscal decentralization, local economic and market development, and labor mobility. Section 4 outlines the data and methodology used, and section 5 reports my empirical findings. Finally, in section 6, I conclude with a discussion on the implications of my findings.

## **2. Fiscal Decentralization, Local Economic Development, and Labor Migration in China (1982-87):**

The 1980's laid down the foundations for the debate on fiscal decentralization and labor mobility. Some related policies will be reviewed here. First, I will go through the transition of the commune system before reform in 1983, the sub-provincial restructuring, and fiscal decentralization. Second, I will discuss the relations between local government budgets and TVE development. Third, the political economy of disparity of TVEs' development and labor mobility will be reviewed. Forth, I will review the emergence of labor mobility during this period; finally I will highlight the blockages of undocumented rural-rural migration at the end of this section.

### *2.1 Changing sub-provincial-level governments:*

Closely related to the Household Responsibility System (HRS) is the restructuring of rural governmental structure.<sup>12</sup> The post-Mao leadership stressed the withdrawal of the party from daily micro-management and administration, and the separation of governmental and economic administration (*zhenshe fenkai*) (White, 1990 p.38).<sup>13</sup>

[Figure 1 about here]

[Table 1 about here]

Restructuring of the different levels of rural government began after the reform. Between 1982 and 1985, rural people's communes were converted to township (*xiang*) and town (*zhen*) governments, with economic functions transferred to subordinate economic management committees (*jingji guanli weiyuanhui*). Similarly, production



brigades were converted to administrative villages (*xingzhen cun*) led by villagers' committees (*cunmin wei yuanhui*), and production teams to village small groups (*cun xiaozu*) (White, 1990, p.39).<sup>14</sup>

As shown in Figure 2, the organizational change in 1984-5 resulted in an increase of nearly two-thirds in the number of commune-level units, a 30% increase in the number of brigade-level units, and a 20% decline in the number of team-level units. By 1986, however, the number of towns and townships had declined by nearly 20,000 and the number of administrative villages by nearly 100,000.<sup>15</sup> This structural shock, together with fiscal decentralization, created new local governance and local fiscal needs at the sub-provincial-level.

[Figure 2 about here]

Perhaps, the ups-and-downs of the number of sub-provincial-level governments may contribute to understanding the governance structures and its implications. Because, first, the local governments' numbers can be controlled by the central government, the central government has a certain extent of control over the local governance structure.<sup>16</sup> Second, fiscal decentralization, with changing of the number of local governments, should be viewed as the qualitative change of governance due to changing financial considerations. Third, everything being equal, as setting up a government body requires basic fixed costs, the increase in numbers at one level of government will reduce the resource available to pay for the public expenditures at localities.<sup>17</sup> In other words, this

structural change of sub-provincial-level government creates a set of new the local government budget relations.

*2.2 Fiscal decentralization arrangements, Rural (Town/Village) governmental budgets, and the TVEs' development:*

Two fiscal decentralization arrangements have also been developed. First, the inter-governmental levels' revenue-sharing contract is an important instrument to determine the form of sharing in this inter-governmental fiscal relation at the rural-level. The rural sharing contracts closely mirror the form of central-provincial contracts.<sup>18</sup> Second, above-quota arrangements have also been set for the extra income-sharing between levels.

The immediate effect of the two reforms is that the rural-level government, facing increasing local expenditure burdens, such as increasing personnel in office, as well as education and medical expenditures, has to generate local financial sources. There can be two main sources of income, promoting local business, such as TVEs for income taxation, or increasing the agricultural "fee" for covering expenses (see Li, 2002). While both can occur together in a sub-provincial-level administration system, the former usually happens in places that can be more easily industrialized, such as coastal and eastern areas. The latter, due to no other possible sources of income, usually takes place in poorer areas, such as the western part of China.

Oi (1990) argued that the fate of the collective is linked not to structural reform as such, but rather to the "source of income" in a village.<sup>19</sup> She added that, "to assess fully

the impact of the reforms, one must look at what has happened to the industrial sector of the rural economy as well” (p. 19).<sup>20</sup>

TVEs have been growing very rapidly and become the key moneymakers during the 1980s.<sup>21</sup> The number of township enterprises increased from 1.346 million to 6.065 million in just one year, an increase of 3.5 times; simultaneously, employment in TVEs rose from 3224.6 million to 5208.1 million, an increase of 61%. The growth of TVEs employment has been increasing; from 1984 to 1988, there was an average annual growth rate of over 24% (Duan and Ye, 2009).<sup>22</sup> In 1984, *xiang* (township) and *cun* (village) government commanded an overall 43.9% of after-tax profits from TVEs (Oi, 1990 p. 24). Meanwhile, TVEs are sometimes vulnerable to uncontrollable tax hikes and proliferations in fees.<sup>23</sup>

### *2.3 Disparity of TVEs' development and labor mobility:*

It is worth noting that the disparity in TVEs' development has been huge since the beginning of reforms. According to the World Bank, the nominal value of TVEs' industrial output rose by 415% in Zhejiang province, but only by 37% in Inner Mongolia. Eight of China's provinces had an increase of less than 120%.<sup>24</sup> While the remittance burden from TVEs to local level governments may be very high, to sustain the captioned taxation pattern, certain input factor optimization in either the well or the less developed village/ townships has to be put in place for profitability. For example, labor has to be relocated in order to promote local economic development and, hence, the local tax burden for counties/towns in less developed provinces.<sup>25</sup>

On the other hand, in some well-developed provinces, once the TVE development is relatively advanced and local labor shortages have emerged, a functioning local labor market facilitates excessively rapid increases in wages. This occurred in Nanhai, a county in Guangdong province, which was opened up to interregional labor flows in 1986 (Byrd and Lin, 1990: 278).

The interesting point is that labor mobility has gone beyond the nearby towns within the provincial limits that set by the state (Fei, 1985). Liang et al. (2002), using the 1990 China Population Census, also demonstrate no statistically significant effect of TVE on intra-provincial labor migration that casts serious doubt on the efficacy of using TVEs as a strategy to stem the flow of (intra-provincial) migration at the national level (Liang et al., 2002: 2185).<sup>26</sup>

#### *2.4 Labor migration during the period of 1982-87:*

Perhaps the puzzle that Liang et al. (2002: 2185) posted is laid in the pattern and type of labor migration. Following the direction of labor migration policy, researches in China has also been focusing on rural-to-urban migration, partly due to the importance of the urban sector.<sup>27</sup> I will, however, demonstrate rural-to-rural labor migration is also an important subject to study due to its size and growth since the reform. Table 2 shows intra-provincial and inter-provincial migration by *hukou* status. The number of “*hukou* migrants” is steady over the period; whereas, both intra- and inter-provincial non-*hukou* migration grew substantially from around 20% in 1982-3 to over half of the total number of migrants in 1986-7. In addition, the proportion of non-*hukou* in-migrant in the village and town category has been increasing from 28.82% and 25% in 1982-3 to 66.95% and

89.29% in 1986-7, respectively. In particular, in the first column of the last section of Table 2, when comparing the different *hukou* migrations in the inter-provincial migrant section in 1986-7, a stunning pattern of steadily growing non-*hukou* migration emerges in all of the accounts -- over 60% of the total are non-*hukou* migrants.

[Table 2 about here]

The next question is where these rural in-migrants are likely to go. This is related to the importance of rural-to-rural inter-provincial non-*hukou* migration? Table 3 shows the breakdown of rural in-migration by area of destination -- urban, town, and village. While row percentages across years demonstrate that all of the *hukou* in-migration rates in all destinations are steady, the last column of Table 3 shows that village and town non-*hukou* in-migrant constitutes a significant portion of the total in-migrants in both of the intra- and inter-provincial migrant categories.<sup>28</sup> Another interesting observation is that, when focusing only on non-*hukou* in-migrants to towns and villages, their proportions are high. Also, from the column % in Table 3, the sum of non-*hukou* village in-migrants to towns and villages is 59.56 percent and 55.54 percent of the total non-*hukou* intra-provincial village in-migrants and total inter-provincial village in-migrants, respectively. These observations suggest, besides the well-reported rural-urban non-*hukou* migration, that rural-to-rural non-*hukou* migrations, indeed, contribute substantially to the largest labor migration wave in human history.<sup>29</sup>

However, a substantial rise in inter-provincial village-village migration is found, although its absolute amount is still smaller than intra-provincial migration. In addition,

within the inter-provincial village-village categories, the amounts of *hukou* and non-*hukou* in-migrants are very close and are 309 and 283, respectively. This kind of migration is interesting to study not only because of its growing size, but also because it was considered as a challenge of the existing *hukou* system.<sup>30</sup> Nevertheless, non-*hukou* inter-provincial labor migration flourished, and triumphed over rural police administrations, provincial administration barriers, and eventually the macro-institutional constraints imposed by the central government (Roberts, 1997).

[Table 3 about here]

### *2.5 Limited supplies of local public goods under fiscal decentralization and the measures that rural governments employed to block labor migration:*

As mentioned previously, even though the non-*hukou* labor mobility has been emerging, migrants are not free to move as they wish because of institutional barriers. In particular, migrants may increase the potential of the so-called *public goods crowding* effects that local residents' welfare might have been affected. Two of the major concerns in local public goods in rural areas are health services (Liu, et al, 1995; Meng et al, 2000; Shi, 1993)<sup>31</sup> and rural education (Brown and Park, 2002; Connelly and Zheng, 2003; Wang and Moll, 2010).<sup>32</sup>

Furthermore, West and Wong (1995) demonstrate that fiscal decentralization has an effect on the low quality and quantity of public services, after examining a number of education and health status indicators.<sup>33</sup> As a result, on the one hand, as some areas were benefiting from the reform and TVEs development more than others, regional disparities

in rural local public goods have been increasing (Dabla-Norris, 2005: 3-4). On the other hand, rural governments with low TVEs development are forced to search for other funding sources, other than the budget, such as imposing a variety of fees and levies. Following this logic, as local public goods have been undersupplied, even for local resident, a sense of exclusion for migrants to further dilute these services could be a possible outcome (Liu, et al, 1995).<sup>34</sup> Therefore, measures have been introduced to control the flow and block “unwanted” migration (Mallee, 2000; Roberts, 1997; Solinger, 1999; Zwieng, 1992).<sup>35</sup> While *hukou* was still the major instrument to restrict migrants’ welfare, even some migrations were not restricted, County/town officials still maintain serious controls over migration into town and responded passively, if not reluctantly, although restraints on migration are breaking down year by year.<sup>36</sup> Another obstacle to in-migrants is from the social pressure from local residents to prevent “potential crowding.” Migrants in Chinese could be labeled as ‘People from the outside’ (*wailai renkou*, or outsiders).<sup>37</sup> The negative images of rural migrants have been developed since the mid-1950s before the *hukou* system.<sup>38</sup> In addition, under the pressure of higher inflation, employment, traffic congestion, and a series of inconveniences that potentially come along with in-migration, although much work of migrant workers in the non-state sector has not been substantially eroded from the majority of the public welfare privileges, they can still be regarded as "invaders" (Tian, 2011).<sup>39</sup>

Siu (1990) also found that only rural residents with immediate *family members in town could register*, and only as *zili kouliang hu* (households who supply their own grain) since 1983.<sup>40</sup> In this sense, native place identity (*tongxiang*) is a "critical component of personal identity" and social network in China; intra-provincial migrant are far more

likely to benefit from the effect of *tongxiang* than inter-provincial migrants (Roberts, 1997). However, inter-provincial migrants who do not have work unit or permits would be subject to deportation at their own expense (Lu, 2000).

For undocumented migrants to stay in the destinations, they often have to endure unfair treatment, such as fees, fines, and permits, from local carders and related people in-charge.<sup>41</sup> To raise their expected earnings and lower their risk, they pay the local police for a residence permit and the rural government for a work permit (Zhou and Zhang, 1995). Another response to the unfair treatment in some destinations, undocumented migrant workers may become “seasonal workers” or “temporary workers” who migrate according to job availability and work environment, where local governments might be more accommodating, due to labor shortages (Gu and Liu, 1996; Roberts, 1997; Solinger, 1999). The section below elucidates the policy review in this section and distills the argument into testable hypotheses.

### **3. Local Economic Development Effect and Local Public Goods Crowding Effect on Factor Market Development under Fiscal decentralization: Theoretical discussions and hypotheses development**

In this section, I connect the policy review above and review the general effects of local public goods provision and local economic development on labor mobility under fiscal decentralization. I propose three testable hypotheses at the end of this section.

#### *3.1 Local economic development and factor market development:*



Studies on the relationship between fiscal decentralization and market development are numerous in China.<sup>42</sup> Prevailing research reported positive relationships between the two (Qian and Weingast, 1997; Lin and Liu, 2000; Feltenstein and Iwata, 2004).<sup>43</sup> In particular, fieldwork and research in China have found that fiscal decentralization can induce incentives at the sub-provincial government level to promote local economies using TVEs development (Vogel, 1989; Wong et al., 1995; Wong et al., 1997; Oi, 1999).<sup>44</sup>

To sustain the TVEs developments, input factors, such as labor, have to be available to promote this kind of labor insensitive industry (Wen, 1998; Wen, Wang, and Shi, 2008). Moreover, labor migrations were encouraged from some provinces, such as Sichuan, where labor resources were rich and industrial development was low (Bruce, 1996). As a result, labor (factor) market mobility is encouraged from both the labor supply and demand sides. However, some researchers in the field reject the notion that fiscal decentralization induces factor market integration and development (Young, 2001; Zhou, 2001).<sup>45</sup>

From the above discussions, one may hypothesize that fiscal decentralization may induce local economic development (Bardhan, 2002: 200). However, the effect of fiscal decentralization on factor market integration is still empirically unclear (Bardhan, 2002: 201). If fiscal decentralization affects economic growth, and factor market mobility and integration, why have some countries decentralized without a resultant economic growth with market integration? One of the explanations may be that fiscal decentralization may have more than one effect on factor market integration.<sup>46</sup> Some effects may work against each other. The reason may lie in the side effect produced by local public goods

crowding (Buchanan, 1965) and local protectionism (Young, 2001) at different levels of jurisdiction. These specific jurisdiction effects may be summarized into the local public goods and factor mobility argument below.

### *3.2 Local public good provision and factor mobility in the jurisdiction hierarchy:*

Tiebout's (1956) seminal paper argues that fiscal decentralization would induce local governments to produce public goods that match residents' preferences better than centralized policies. Free factor mobility would then be the key to generate an optimal outcome in his model. However, optimal outcome of free factor mobility from this pure theory has been subject to challenge from the public goods crowding effect, given the size and the number of the jurisdictions.<sup>47</sup>

Scotchmer (2002) argues that *the size of the crowding effect in a jurisdiction is determined by the impacts of labor in-migration on land-related costs, such as land rent and local governments' budget.* Since the jurisdictions' sizes and the local budgets are predetermined by upper level governments, they are important to determine the crowding effects in jurisdictions; therefore, it is logical to deduce that, at a level of government, an increase in the *number of governments* may reduce their average jurisdiction size and increase the crowding effects.

There are some researches about the positive relations between the community size and public goods provision. In a game theoretical setting, Stiglitz (1982) demonstrate that *very small communities can provide a very low level of welfare, because they cannot provide much of a supply of public goods.*<sup>48</sup> Also, small communities could provide less welfare because of the lack of an agglomeration effect (Duration and Puga, 2003; Fujita

and Thisse, 2002).<sup>49</sup> In other words, local public goods, like other products, may be constrained by the size of the jurisdiction due to a lack of relevant externalities for the formation of clusters, such as mass production, availability of specialized inputs, labor, services, ideas, and modern infrastructure.<sup>50</sup> In addition, as Zhang (2006: 722) mentioned, the unit size at the rural government level is moderately homogenous, which means that the fixed cost of expenditure is similar among rural governments, regardless of the size of the jurisdiction.<sup>51</sup> Similar to the agglomeration argument above, as the size of the jurisdiction is small, the resource available for public goods expenditure after deducting the fixed cost will be very limited. As a result, they are more vulnerable to the potential welfare loss from undocumented migrants and could enforce the law more strictly than those that have larger sizes and better resources.

Given the above conditions, increasing in-migration could result in a potential loss of limited welfare, such as increasing congestion, unemployment, crime rate, etc., (Fujita and Thisse, 2002: 271). This means that, with lacking of resource and agglomeration effects, small jurisdictions are vulnerable to public goods crowding, even though their current level of local public goods provisions might be able fill the basic needs of local residents. As a result, blockage might be occurred and reduction of the opportunities for undocumented in-migrant at the destinations might have happened. Indeed, Zwiag (1992: 355), when generalizing his fieldwork experiences during the 1980s, also added “in smaller towns illegal migrants probably find even fewer opportunities for illegal businesses or places to hide [for undocumented in-migrant]<sup>52</sup>.” To put the above studies on the size and number of governments into a hierarchical perspective: if the number of government units at a given level increases, three effects are likely to occur. First, if the

number of units at a given level of government increases without the budget allocation also increasing, blockage of in-migration is likely to result for the sake of local residents' welfare. Second, even if the budget allocation does increase proportionally, increasing the number of government units in a given area may also cause reduction for local resources, in addition to the reduction in agglomeration effects. Third, the lower-level governments may be more responsive to in-migration, since their sizes are smaller and their local public goods and local economic development are more directly affected by the benefits and welfare losses due to in-migration than those at the upper level.

In summary, the theoretical discussions suggest that local economic development, and the size and number of jurisdictions might have an effect on in-migration. Three hypotheses could be summarized in this empirical analysis:

1. Local economic development could induce labor (factor) mobility under fiscal decentralization in labor-receiving provinces, or vice versa.
2. The size and number of local government units at a given level of government may have an effect on labor mobility. In labor-receiving provinces, reductions in the size of local governments or increases in the number of government units at a given level may block labor out-migration because these governments may need more local workers to contribute to their budget, and vice versa.
3. The hierarchical level of government may have an effect on undocumented labor mobility under fiscal decentralization. The lower-level government units may be directly

affected by undocumented labor migration; one may expect those units to suffer a stronger effect than those at higher levels.

#### **4. Data and Methodology:**

##### *4.1 Data:*

I utilize the initial fiscal decentralization stage (1982-87) in China as a case. The change in fiscal decentralization and jurisdiction number and boundaries are exogenous. Fiscal decentralization in China was tested in 1982 and implemented in 1985. The change in the number of jurisdictions at the rural level was also initiated in 1982 and stabilized in 1987.<sup>53</sup>

When considering factor mobility, only undocumented labor was mobilized by the market in that period. This is because local investment capital was dominated and captured by rural government, and formal labor mobility is restricted in rural areas. These initial conditions serve as a natural experiment to estimate the effect of fiscal decentralization and change in number of rural government units on labor mobility.

For data selection, I aggregate the individual level data from a 5% random sample extracted from 1% of the 1987 Chinese population census data and match it with other provincial level data available in various Chinese statistical yearbooks.<sup>54</sup>

#### 4.2 Modified gravity model:

This paper uses a modified gravity model to capture the reduced form supply and demand relationships of rural-rural non-*hukou* migration. The observed number of migrants is a result of the supply of sending and receiving provinces.<sup>55</sup>

Denoting the origin province  $i$  and destination province  $j$ , the migrant flow from  $i$  to  $j$  will depend on potential supply factors,  $S_i$ .

$Y_{i(t-1)}$  and  $Y_{j(t-1)}$  are lag variables and are functions of GDP per capita, population size, and other variables that represent the factor endowments at time  $t-1$ . Therefore,

$$S_i = Y_{i(t-1)}' b_1$$

Potential demand factors  $D_{jt}$  are representing the pull factors in the receiving province. Thus,

$$D_{jt} = Y_{j(t-1)}' c_1$$

Where  $Y_{i(t-1)}$ ,  $Y_{j(t-1)}$  and  $b_1$ ,  $c_1$  are column vectors; and  $t$  = timing of the variable belonging to year of movers.

Combining  $S_{i(t-1)}$  and  $D_{j(t-1)}$  yields a migrant flow equation as:

$$F_{ijt} = A * \left( \frac{Y_{i(t-1)}' Y_{j(t-1)}}{R_{ij(t-1)}} \right)$$

$F_{ijt}$  = resultant migrant flow from  $i$  province to  $j$  province at time  $t$ <sup>56</sup>

$A$  = constant

$i = 1, \dots, 28$  sending provinces

$j = 1, \dots, 28$  receiving provinces

$R_{ij(t-1)}$  = factors aiding or restraining migrant flows from i to j, such as transport costs. The specification in the equation  $F_{ijt}$  implies a constant elasticity of the size of migrant flows with respect to supply and demand factors rather than a constant propensity. Taking logs of both sides of the migrant flow equation, and replacing terms by their equivalents, yields the migration model as:

$$\begin{aligned}
RUM_{ijt} = & \beta_0 \\
& + [\beta_{1i}TVE_{i(t-1)} + \beta_{2i}Vill_{i(t-1)} + \beta_{3i}Town_{i(t-1)} + \beta_{4i}villpop_{i(t-1)} \\
& + \beta_{5i}HRS_{i(t-1)} + \beta_{6i}FD_{i(t-1)} + \beta_{7i}Party_{i(t-1)} + \beta_{8i}Road_{i(t-1)} \\
& + \beta_{9i}Inktraur_{i(t)} + \beta_{10i}inktratwru_{i(t)} + \beta_{11i}ihutraur_{i(t)} \\
& + \beta_{12i}ihutratwru_{i(t)} + \beta_{13i}inkterur_{i(t)} + \beta_{14i}ihuterall_{i(t)} ] \\
& + [\beta_{1j}TVE_{j(t-1)} + \beta_{2j}Vill_{j(t-1)} + \beta_{3j}Town_{j(t-1)} + \beta_{4j}villpop_{j(t-1)} \\
& + \beta_{5j}HRS_{j(t-1)} + \beta_{6j}FD_{j(t-1)} + \beta_{7j}Party_{j(t-1)} + \beta_{8j}Road_{j(t-1)} \\
& + \beta_{9j}Inktraur_{i(t)} + \beta_{10j}inktratwru_{i(t)} + \beta_{11j}ihutraur_{i(t)} \\
& + \beta_{12j}ihutratwru_{i(t)} + \beta_{13j}inkterur_{i(t)} + \beta_{14j}ihuterall_{i(t)} ] \\
& - [\beta_{9ij}RD_{ij(t-1)} + \beta_{10ij}GDPP_{ij(t-1)}] + u_{ijt}
\end{aligned}$$

More specifically, the dependent variable  $RUM_{ij}$ , “number of inter-provincial rural-rural non-*hukou* migrants,” is a result of a provincial supply and demand function. A group of lagged independent variables is specified in this model.<sup>57</sup> *TVE* measures the local economic development effect; *Vill* and *Town* measures the jurisdictions’ effects at two different levels of rural government; *Villpop* measures the crowding effect in the rural area; *HRS* measures the Household Responsibility Reform effect; *FD* measures the Fiscal Decentralization effect; and *Party* measures the political decentralization effect.

For measuring the transaction cost of migration, in addition to use the *RD*, distance between the origin and destination, as proxies for transportation cost, I also employ the difference in GDP per capita between the origin and destination as proxies for incentive

to migrate and use the density of road/square mile, *Road*, to define the concept of accessibility.<sup>58</sup>

[Table 4 about here]

As migration is a decision that migrants compare with possible alternative migration types and destinations, other types of migration could be very influential to the dependent variable, the inter-provincial rural-rural undocumented migration flows and magnitudes (Davanzo, 1980). To resemble this tradeoff of migration decision, I also includes all inter- and intra- provincial rural in-migrant who migrate with and without their hukou changes at the same year, excluding the dependent variable, in the model to control over their possible effects to the inter-provincial rural-rural undocumented migration.<sup>59</sup>

To further ensure the proper estimation outcomes from the gravity models, this study controls for the omitted year-specific and province-specific variables, by using yearly dummies and a group of seven dummies of these 28 provinces that ranks them according to their per capita GDP, as Mátyás (1997) suggested.<sup>60</sup> This can help reduce the incidental parameter problem and increase the power of the test.

#### *4.3 Dealing with zero observation problems in gravity model:*

While our data captures the important initial period of the development in fiscal decentralization and undocumented labor mobility in China, as it is at the beginning of the dynamic, our data only have 221 pair of provinces record non-zero undocumented rural-rural labor migration out of 3780 observations for the panel data. Perhaps, one of



the most important concerns is zero observations in the log-log gravity models. . I therefore reviewed the possible method to deal with this issue in gravity models as follows.

In fact, zero flow is one of the common issues in aggregated data for trade between small or distant countries when the expected trade is small (Frankel, 1997; Haq, Meilke, and Cranfield, 2011). Since the missing values or the zero observations may be due to some unobservable reasons; that is, the zero values are the outcomes of the choices of some localities. Missing this part of information may be resulted in biased estimations (Linders, 2006; Haq, Meilke, and Cranfield, 2011).

Recently literature about the zero trade in gravity models has developed some measures to deal with this problem. The measures includes: first, the traditional way, to delete the zero trade information if it is randomly selected or to add a small constant in the double-log gravity model (Brakman et al., 2010; Linders, 2006). Second, use alternative estimation methods, such as the Tobit model (Brakman et al., 2010) or Poisson fixed-effects model (Martijn, Oort, and Linders, 2009) to capture the truncated information due to zero trade.<sup>61</sup> Third, use Heckman Selection Model to formalize the selection process at the first stage of regression.<sup>62</sup> There are advantages and caveats among these models. While the first method is simple, it has a high potential of bias, as selection processes are not likely to be randomly selected. The second method, while it can capture the zero trade information, does not provide much understanding as to the reason behind the zero trade. The literature has suggested using the Heckman Maximum Likelihood Selection model to deal with the zero trade problems because it provides cleaner information as to the reasons behind the zero trade and the potential biases due to

missing the selection model (Manning, Duan, and Rogers, 1987; Leung and Yu, 1996).<sup>63</sup>

I, therefore, employ the Heckman Models in my analyses as follow.

#### 4.4 Heckman Maximum Likelihood Estimation Method procedures:

I utilize two-way fixed effects regression controlling for panel-level heteroskedasticity in both of the first and second stage of the Heckman model. In the first stage selection model, I hypothesize that the selection is due to the GDP at origin and the destination, road density, and also the provincial level fiscal decentralization index and party index are matters for the migration decision, while the second stage is the gravity model specified in the above sub-section.

The simple Heckman selection model specification (Gronau, 1974; Lewis, 1974; Heckman, 1979) assumes that there exists an underlying regression relationship as follows.

At the second stage, the regression equation is the modified Gravity model:

$$\begin{aligned}
 RUM_{ijt} &= \beta_0 \\
 &+ [\beta_{1i} TVE_{i(t-1)} + \beta_{2i} Vill_{i(t-1)} + \beta_{3i} Town_{i(t-1)} + \beta_{4i} villpop_{i(t-1)} \\
 &+ \beta_{5i} HRS_{i(t-1)} + \beta_{6i} FD_{i(t-1)} + \beta_{7i} Party_{i(t-1)} + \beta_{8i} Road_{i(t-1)} \\
 &+ \beta_{9i} Inktraur_{i(t)} + \beta_{10i} inktratwru_{i(t)} + \beta_{11i} ihutraur_{i(t)} \\
 &+ \beta_{12i} ihutratwru_{i(t)} + \beta_{13i} inkterur_{i(t)} + \beta_{14i} ihuterall_{i(t)} ] \\
 &+ [\beta_{1j} TVE_{j(t-1)} + \beta_{2j} Vill_{j(t-1)} + \beta_{3j} Town_{j(t-1)} + \beta_{4j} villpop_{j(t-1)} \\
 &+ \beta_{5j} HRS_{j(t-1)} + \beta_{6j} FD_{j(t-1)} + \beta_{7j} Party_{j(t-1)} + \beta_{8j} Road_{j(t-1)} \\
 &+ \beta_{9j} Inktraur_{i(t)} + \beta_{10j} inktratwru_{i(t)} + \beta_{11j} ihutraur_{i(t)} \\
 &+ \beta_{12j} ihutratwru_{i(t)} + \beta_{13j} inkterur_{i(t)} + \beta_{14j} ihuterall_{i(t)} ] \\
 &- [\beta_{9ij} RD_{ij(t-1)} + \beta_{10ij} GDPD_{ij(t-1)}] + u_{ijt}
 \end{aligned}
 \left. \vphantom{\begin{aligned} RUM_{ijt} &= \beta_0 \\ &+ [\beta_{1i} TVE_{i(t-1)} + \beta_{2i} Vill_{i(t-1)} + \beta_{3i} Town_{i(t-1)} + \beta_{4i} villpop_{i(t-1)} \\ &+ \beta_{5i} HRS_{i(t-1)} + \beta_{6i} FD_{i(t-1)} + \beta_{7i} Party_{i(t-1)} + \beta_{8i} Road_{i(t-1)} \\ &+ \beta_{9i} Inktraur_{i(t)} + \beta_{10i} inktratwru_{i(t)} + \beta_{11i} ihutraur_{i(t)} \\ &+ \beta_{12i} ihutratwru_{i(t)} + \beta_{13i} inkterur_{i(t)} + \beta_{14i} ihuterall_{i(t)} ] \\ &+ [\beta_{1j} TVE_{j(t-1)} + \beta_{2j} Vill_{j(t-1)} + \beta_{3j} Town_{j(t-1)} + \beta_{4j} villpop_{j(t-1)} \\ &+ \beta_{5j} HRS_{j(t-1)} + \beta_{6j} FD_{j(t-1)} + \beta_{7j} Party_{j(t-1)} + \beta_{8j} Road_{j(t-1)} \\ &+ \beta_{9j} Inktraur_{i(t)} + \beta_{10j} inktratwru_{i(t)} + \beta_{11j} ihutraur_{i(t)} \\ &+ \beta_{12j} ihutratwru_{i(t)} + \beta_{13j} inkterur_{i(t)} + \beta_{14j} ihuterall_{i(t)} ] \\ &- [\beta_{9ij} RD_{ij(t-1)} + \beta_{10ij} GDPD_{ij(t-1)}] + u_{ijt} \right\} \text{if } P_{ijt} > 0
 \end{aligned}$$

$$RUM_{ijt} = \text{missing if } P_{ijt} \leq 0$$

That is, the dependent variable,  $RUM_{ijt}$ , is not always observed. The variable,  $P_{ijt}$ , is an unobservable (latent) variable, as the probability of an observation is included in the sample.  $M_{ijt}$ , however, is an observation dummy variable that:

$$\left. \begin{array}{l} M_{ijt} = 1 \text{ if } P_{ijt} > 0 \\ M_{ijt} = 0 \text{ if } P_{ijt} \leq 0 \end{array} \right\}$$

That is, the dependent variable for observation at a particular  $ijt$  is observed if

$$\begin{aligned} M_{ijt} &= \gamma_0 \\ &+ [\gamma_{1i} GDP_{i(t-1)} + \gamma_{2i} Road_{i(t-1)} + \gamma_{3i} FD_{i(t-1)} + \gamma_{4i} Party_{i(t-1)}] \\ &+ [\gamma_{1j} GDP_{j(t-1)} + \gamma_{2j} Road_{j(t-1)} + \gamma_{3j} FD_{j(t-1)} + \gamma_{4j} Party_{j(t-1)}] \\ &+ u_{2ijt} > 0 \end{aligned}$$

where

$$u_{1ijt} \sim N(0; \sigma)$$

$$u_{2ijt} \sim N(0; 1)$$

$$corr(u_{1ijt}; u_{2ijt}) = \rho$$

When  $\rho \neq 0$ , standard regression techniques applied to the first equation yield biased results. Heckman model provides consistent, asymptotically efficient estimates for all of the parameters in such models.

The first stage of the Heckman model is the non-linear selection model that specifies the reasons (decision variables) related to a place that rural-rural migration occurs. The dependent variable is the “ $Mijt$ ,” a dummy variable that represents the decision of migration within the period of time  $t$ .<sup>64</sup> Certainly, many variables could be related to the migration decision; I highlights the following lagged independent variables at both origins and destinations, such as GDP per capita, road density, provincial party indices,

and fiscal decentralization indices could be important to migration decisions. The reasons are that, first, GDP per capita should be an important variable for migrant decisions because GDP could be related to expected wage. The GDP per capita is also used to identify the first stage regression since only the GDP gap between the origin and destination is used in the second stage of the Heckman model.<sup>65</sup> To show the stability of the outcomes, I will various specifications of the model at the result section.

Furthermore, as a member in the group of origin or destination, a province may have some unobservable correlations within the respective group, due to labor market competition or other unobservable connections. I will check the robustness of the models by clustering the origin provinces and the destination provinces, respectively, which allows for these correlations, at the robustness check section.

## **5. Results:**

### *5.1 Results of the Baseline Model:*

Table 5 shows the baseline gravity model using OLS regression and the Heckman models with different specifications at first stage (decision) model.<sup>66</sup>

[Table 5 about here]

Table 5's column 1 shows the result of the basic OLS model. The TVE variables at both sides show strong significant correlations that one percent increase in TVE outputs will contribute to 0.29 percent increase in rural-rural migrant demand at labor-receiving

provinces, but will reduce 0.2 percent labor supply if it occurs at labor-sending provinces instead.<sup>67</sup> This finding suggests that a tight labor market will result and demand for labor will increase, if the TVEs' output is increasing.<sup>68</sup> That means that the labor-sending provinces will "sell" labor, but from their labor surplus. In this sense, localities will be inclined to use their own labor before they allowing their labor to migrate.<sup>69</sup> Perhaps, the only way to maximize TVEs' profit in capital-abundant communities is through attracting "temporary workers."

As has been argued, the number of village committees per town has two important implications from the jurisdiction effects: the reduction in resources and agglomeration effects follow by an additional "quasi-government" at the village level. As the number of rural-level government increases, the average budget available and agglomeration effects for each unit is reduced, the pressure on "local public good provision" to outsiders who are not entitled to local welfare will increase. The OLS findings support the above observations that one percent increase in village at the labor-receiving province will result in 0.9 percent increase of migrant labor demand; on the other hand, it will increase 0.32 percent of labor supply at the labor-sending provinces.<sup>70</sup> On the contrary, a labor-sending town with more villages will send more labor out due to their inability to effectively utilize labor as input. Also, due to their fiscal needs, rural governments will promote labor mobility for "fees" (Meng, 1990).

At the township level, the "town/township government number" creates a similar effect to that of the village committees per town, but at an upper level. Labor-receiving provinces' one percent increase in town will reduce only .23 percent in migrant labor demand; whereas, 0.21 percent labor supply will be increased when this one percent

increase occurs in labor-sending provinces. One interesting observation here is that both coefficients of this pair of variables are less than the village committee variables, although towns are supposed to be more important than villages in both political and economic sense in a province. That means that this pair of variables contributes less to *non-hukou* labor migration during the period.<sup>71</sup> Following this logic, the lower the government body at the hierarchy, the more influential to rural-rural labor mobility because these lowest level government bodies are more immediately affected by the incomes generated by rural-rural labor migrations than higher level government bodies. As has been found since the early 1990s, return migrant workers bring fresh capital and new skills to their hometowns, as well as novel techniques for earning income (Bruce, 1996). In this regard, labor migration can be considered as an engine for development at the lowest level.

The provincial-level political index shows insignificant negative signs that means, politically speaking, the province leaders are not so close to the central government and are relatively autonomous.

The HRS, which Lin (1989) showed to be very important with respect to rural agricultural development, still demonstrates positive impact, but does not significantly contribute to the variations of the dependent variable; this is understandable.<sup>72</sup>

For the fiscal decentralization indices, the interaction terms of MRR X Sharing Scheme of the labor-receiving province shows negative significance only from the MRR with Scheme *a* means the one unit higher the MRR at scheme *a*, will result in 0.01 percent decrease in labor demand.<sup>73</sup> This finding makes sense because the provinces that are counted toward the high MRR group at the Scheme *a* at Table 3 are Shandong,

Hebei, Henan, Anhui, Hunan, and Shanxi. Most of them are labor-abundant and poor provinces, as opposed to richer provinces at MRR group 1, Shanghai, Tianjin, Jiangsu, Beijing, Liaoning, and Zhejiang.<sup>74</sup>

The interaction terms of MRR X Sharing Scheme of the labor-sending province are positive, but insignificant; this may be due to the fact that the contributions of migrants are most immediately benefiting the rural locals and then the upper level government. Therefore, although migrants may have some contributions at the provincial level as in Sichuan province, but may still be considered as “spillover effects” (Bruce, 1996).

As discussed in the methodology section, OLS estimations may be biased, as the zero observations may not be randomly chosen. Heckman models are used to address the potential selection bias problem and make use of the information that has been left out in the OLS model.<sup>75</sup>

Table 5’s Model 2 presents the Heckman model with GDP levels at the origin and the destination at the first stage regression; I add road density and provincial governor’s party index at model 3 and further add a set of provincial level fiscal decentralization indices at model 4.<sup>76</sup> Their results are highly consistent with the OLS outcomes. Moreover, the Rhos at the first stage regression models, i.e., the correlations coefficient between the first stage and the second stage, are not significant, which shows that the selection biases are serious.<sup>77</sup>

Collectively, Table 5’s findings suggest that local economic developments have an effect on labor mobility and jurisdictions’ effect as contending effects to labor mobility in the model. In order to clarify that labor mobility was in fact co-related to TVE’s investments and local governments’ budget considerations, we need further investigation.

Furthermore, some other important variables, such as other migration type, may also affect the resultant labor mobility. Table 6 below will demonstrate the Heckman Model with a production function perspective and will include other variables discussed in the next sub-section.

*5.2 Extended Heckman regression on production function, expected rural government expenditure, additional variables, and other in-migrant variables:*

To further test the validity of the assertions in this paper, Table 6 uses a production function argument to replace the TVE outputs and expected rural government expenditure to replace the number of village and township government units in model 1.

From Table 6 onward, I employ an alternative method to model the local economic development effect and the jurisdiction effect. The local economic development effect is now represented by a production function argument in which land, TVE labor, and TVE capital are specified. The jurisdiction effects are represented by the “expected rural governments’ expenditures” estimated by regressing lagged total provincial expenditures on lagged village per town and town per province in the first stage of the Heckman Models. To check the stability of the models, I also add control variables, GDP per capita difference, distance between the labor sending and receiving provinces’ capitals, and agricultural population per village, in the models. To determine if other migrant types may affect the results, I have gradually added a set of other types of migrant flows in the models.

[Table 6 about here]



Table 6's model 1 shows the production function argument with expected government expenditure effects to labor migration. Consistent with the assertion that the labor mobility is driven mainly by the TVEs' investments that one percent increase in TVE investment at labor-receiving provinces will increase 0.55 percent labor demand; whereas, labor supply will be reduced by 0.49 percent as the labor-sending province increases one percent TVE investment. This means that the investment effect is larger than the TVEs' outputs effects at Table 5.<sup>78</sup>

Table 6 also replaced the variables "the number of village in a town" and "number of town in a province" in Table 5 by the expected rural government expenditure.<sup>79</sup> I, therefore, obtain the expected rural government expenditure by regressing the provincial government budget on these two variables on both sides of the provinces using robust OLS estimations.<sup>80</sup> As expected, the expected rural government expenditures' signs at Table 6 are consistent with "the number of village in a town" and "number of town in a province" in Table 5. One distinct feature of this variable is that it gives direct interpretation between rural government expenditures and labor mobility; for example, in Table 6's model 1, one percent increase in expected rural government expenditures will result in 2.3 percent reduction in migrant demand at labor-receiving provinces, but 1.5 percent increase in labor supply at labor-sending provinces.<sup>81</sup>

One important concern about the stability of the models is the effects from other types of in-migrants, as discussed in the data and method section. Table 6 is particularly designed to test the two major but contending effects: *migration substitution effects* at the origin and *labor market complementary effects* in both the origin and destination, by adding other types of in-migrants into the models.<sup>82</sup>

As discussed in the migration history in China in section 2.4, the non-*hukou* migration since the reform started with the intra-provincial migration; therefore, it can be considered as an index for freedom in the labor market that promotes the *labor market complementary effects* in both origin and destination. Table 6's column 1 shows the additional intra-provincial non-*hukou* rural migrants to two destinations: urban and rural. Since both variables demonstrate positive effect to rural-rural undocumented labor migration, they are consistent with the claim of the *labor market complementary effects*. The "Intra-provincial non-*hukou* rural to urban in-migrant" variable shows a stronger statistically significant effect than the "Intra-provincial non-*hukou* rural to rural in-migrant;" that might reflect the attractiveness of the urban labor markets, as a mature market with high expected incomes and opportunities, are more favorable to labor migration than rural labor markets.

Model 2 of Table 6, with two additional variables, Intra-provincial *hukou* rural in-migrant to urban and to rural, shows consistent results as in model 1. The Intra-provincial *hukou* rural-urban in-migrant shows a negative significant effect at the labor-receiving provinces; that means, if a province with large flow of *hukou* intra-provincial rural-urban in-migrants, it is likely that its urban labor markets are more attractive than the rural labor markets. Logically, if the destinations' rural labor markets are relatively less attractive, few inter-provincial rural-rural undocumented in-migrants will result. On the contrary, if the Intra-provincial *hukou* rural in-migrant to rural at the labor-sending provinces is well developed and active, that may also mean that its rural labor markets are active and may be helpful for inter-provincial rural-rural undocumented in-migration.

Model 3 of Table 6 consists of all of the alternative types and destinations available for in-migration other than the outcome variable. This model is also very stable, as it demonstrates consistent results in key variables, as in model 1 again. The two inter-provincial rural in-migrant variables also show very interesting results; both of the Inter-provincial non-*hukou* rural in-migrant to urban and Inter-provincial *hukou* rural in-migrant to ALL destinations shows negative significant results at the labor-sending provinces. This result is consistent with the view of *migration substitution effects* at the origin, in which if a migrant could have a better chance to work in an area with higher wages, usually urban areas, or migrate with *hukou* (with better welfare and job opportunities), they are more likely to choose these options rather than being an undocumented in-migrant.

In summary, Table 6's models extended the original Heckman Models in Table 5 and show consistency in major results. The additional set of other types of in-migrant flows resemble the possible spatial choices of migrants and empirically demonstrate the two major but contending effects: *migration substitution effects* at the origin and *labor market complementary effects* in both origin and destination in the models.

### *5.3 Robustness check: Heckman Models with clustered corrected standard error*

[Table 7 about here]

Table 7 clustered two models used previously, the original production function model and the full model with all of the alternative in-migrant flow. Table 7's model 1 and

model 3 show the Heckman Models with clustered corrected standard error at the labor receiving provinces' side; whereas, model 2 and model 4 are with clustered corrected standard error at the labor sending provinces' side. When looking across the models, I found every consistent pattern as in the original model.<sup>83</sup> The significant signs of Rhos also show that there are selection biases when clustering at the labor-sending provinces at model 2 and model 4. However, the selection biases did not affect the original results.<sup>84</sup>

## **6. Conclusion:**

This paper investigates the impact of fiscal decentralization on factor market integration, using rural-rural undocumented labor mobility as a case. I have argued that fiscal decentralization at the rural-government level creates two competing effects on labor mobility – a local economic development effect and a local public goods crowding effect. The former effect would foster labor in-migration, while the latter would crowd out/block labor mobility at the labor-receiving destination, or vice versa.

This study utilized a unique panel data set which integrates provincial-level data and individual level aggregated from a 5% random sample extracted from the 1% 1987 Chinese population census. The data set captures the initial stage of fiscal decentralization, exogenous change of rural government units at the village and town levels, and emergence of rural-rural undocumented labor mobility. I have linked the sub-provincial-level incentives and provincial incentives in a unique model by using the number of village management committees and town and township governments as an index of the sub-provincial-level government. I also connected these variables to the

sub-provincial-level governments' public goods effect, together with provincial-level fiscal decentralization variables, such as the marginal retention rate and the political integration index with the central government.

Specifically, using an augmented gravity model with Heckman Maximum Likelihood Estimations to deal with the zero observation issues in labor mobility data, I demonstrate how fiscal decentralization has induced inter-provincial rural to rural *non-hukou* labor migration at the early, yet critical, stage of China's reform during 1982-87. First, I have shown that TVEs (Township and Village Enterprises) development has induced inter-provincial *non-hukou* labor mobility pattern, in which labor-abundant areas migrate to capital-abundant areas where labor resources are limited within the country. This results from the expectation of the rural industrialization policy to keep rural populations at their origin by developing local TVEs at the same time. Second, the model has shown that the jurisdictions' local public good provision effects which "crowded out" *non-hukou* labor mobility at the sub-provincial-levels have prevailed due to the increasing number of town and township governments, as well as village committees. Third, the incentive to promote the rural-rural labor mobility is strongest at the origin village (lowest) level, moderate at the town and township (middle) level, and relatively weak at the provincial (highest) level of fiscal decentralization, as the interaction terms on the indices of fiscal decentralization and sharing schemes show in the regressions. The robustness checks have shown that the results are robust in adding other in-migrant control variables and even clustered the regression model by sending or receiving provinces' standard errors.

This study is consistent with empirical observations that, once decentralized, local rural governments have incentives to act for their own benefit (Meng, 1990). Utilizing

their available resources, these governments' officers act rationally under fiscal decentralization. This study empirically separates the effect of local economic development and the local public goods crowding effect in a unified model. Furthermore, this study unifies the hierarchical relations of government levels in a single analysis. This study not only contributes to the debate on fiscal decentralization and the incentive of local governments to promote factor mobility, it also extends the analysis of the local public goods crowding effect to a government hierarchy perspective.

While this research could be considered as one of the few studies on fiscal decentralization and non-*hukou* (undocumented) migration in China, as most of the early study on labor migration in the initial reform period in China, this study is limited by data availability. Although the wave of TVEs development has ceased to grow in China, I believe that this historical case could serve as a starting point for future research along this line in other developing countries.

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## Appendix 1: Measure of Variables

### *A1.1 Rural-rural undocumented (non-hukou) labor flows:*

The dependent variable  $RUM_{ij}$ , “number of inter-provincial rural-rural non-*hukou* migrants,” is a result of a provincial supply and demand function. The data document the last move of each migrant. The Census defines inter-provincial rural-rural non-*hukou* migrants, by their rural *hukou* status, i.e., whether they have been away from their hometown for over half a year, and whether they are inter-provincial migrants.

I chose this dependent variable because non-*hukou* in-migrants are not entitled to any welfare programs provided by local authorities, such as land, schooling, and hospitals. “Public goods provisions crowding” can be *anonymous* when just the membership size enters the production or utility function, because all members are no different, having no identifiable individual composition or characteristics. This is called *non-anonymous* when composition or characteristics of members enter the production or utility function individually when individuals are identified by their individual composition or characteristics (Epple and Nechyba, 2002: 4). In this sense, undocumented labor can be considered to be those visitors who are *non-anonymous*; in-migrants can be identified as “outsiders” by local residents of rural communities (Bardhan, 2002: 188). Undocumented in-migrants may enter negatively into the utility function of local governments in terms of public goods provision to local residents, since undocumented migrants are not formally tax payers. Although they may not directly affect some local public goods, such as some discriminative local public goods, they and their family members might impose pressures to other local public goods, such as migrant children schooling (Chen and Liang, 2007; Liang and Chen, 2005), health, housing, and social

welfare (Lu, 2008). Even though migrants may be asked to pay extra fees for some of the local public goods, such as hospitals, the limited capacity of local community services may still congest the services and affect the quality of life of local residents. Furthermore, as mentioned in the second section, even though these undocumented migrants may contribute to the local economies, they are often not welcomed by local residents and not expected to settle the localities by local governments (Roberts, 1997; Solinger, 1999). Instead, they are more likely to be exploited by factories and deported by local government institutions when the labor demand reduces, e.g., the 2008 financial crisis (Huang et al., 2011). This is consistent with local public goods and club goods literature that asserts that public goods are provided to local residents in the jurisdiction indiscriminately.

#### *A1.2 Estimating the jurisdiction effects:*

To measure “jurisdiction effects” on labor mobility, I use the number of “village administrative committees” and “number of towns and townships.” This indexing directly addresses the heart of the “jurisdiction effects,” by regarding the township governments and village committees as real agents in the empirical analysis.

One of the highlights of this paper is exploiting one of the most important institutional changes during the early reform era, i.e., the re-establishment of town and villages local government structure from the old commune system. This change can be regarded as a quasi-natural experimental environment of jurisdiction effects (see Figure 1). While no comprehensive account of the change of government at the provincial-level during 1983 to 1984 is available, White (1990, Table 1) shows that the overall change

was completed within the two-year period. In this sense, it is a considerable structural shock at the sub-provincial-level, both in terms of local governance and local fiscal needs due to fiscal decentralization.

Under the hierarchical structure, the number of sub-provincial-level governments is inversely related to average budget. Given that the unit size at the rural government level is moderately homogenous (Zhang, 2006: 722), the fixed cost to set up the government unit in a given level are similar, because the basic government functions have been pre-defined. Because of the limited provision of local public goods, depending on whether a rural government is in a labor-sending or labor-receiving area, it will either tend to block labor inflow in the first case, and to send out labor in the second. Consider the case of the Philippines, in which a large diaspora contributes a large portion of national income. Similarly in China, provincial governments' officers in such provinces as Sichuan, a large labor-sending province, openly admit the important contribution of out-migrants to their hometown and their province (Bruce, 1996).

The notion of "jurisdiction effects" in this paper is that at a labor destination, in order for the local resident's interest to be protected, an increase in the number of village committees per county will negatively affect in-migration to the province. Despite some bad news about rural cadres' (mis)behaviors usually appearing in the media, in a comparative study between Indian and Chinese villages, Drèze and Saran (1995) show that local communist officers have been quite responsive to local needs.

*A1.3 Local expenditure as an alternative to measuring local public good provision:*

Scotchmer (2002) suggests that in local public goods economies, for institutional reasons, budgets within local jurisdictions might have to be balanced. With a balanced budget in mind, migration to or from a jurisdiction will make it necessary to change the jurisdiction's taxes or expenditures because the labor mobility will affect tax income and expenditure of public goods. In this sense, lagged government expenditure could be an alternative variable that measures the local public goods effect on undocumented labor mobility since that labor is not exactly paying the cost of local welfare.

Given this cost consideration, I will utilize an alternative index, the expected expenditure of rural government, which is the appropriate value when using log of the provincial-level government total expenditure regress on the log of number of village committees per town and log of number of town per province. Ideally we should use actual local expenditures as a measure. Unfortunately, public finance data has been incompletely recorded, if not missing, at sub-provincial-levels (Wong et al., 1995:102-3). The thesis is that if fiscal decentralization establishes a stable share of public finance at different levels of government, a portion of provincial total expenditure should be shared by the rural government. The expected government expenditure should be a function of local taxation which is financed by local residents.

*A1.4 Local economic development effect:*

The rural governments in sending and receiving provinces behave differently depending on whether they are capital- or labor-abundant. Under fiscal decentralization, sending and receiving provinces should exhibit sharply contrasting

behavior, both in terms of factor mobility and their own benefit. Rural governments may compete for scarce resources, such as inputs for TVEs for their economic development. Each village or township would, if possible, “sell” the resource in which it is relatively abundant. I shall then interpret the results by labor-receiving and labor-sending provinces, respectively.

I use the lagged TVEs output to measure local economic development effects. If the province is a labor-receiving province, increase in the last year’s TVE output may be likely to increase labor demand, and vice versa. In order to affirm that this is an investment effect, I will use an alternative approach, i.e., a production argument approach, which consists of lagged input variables, TVE investment, TVE labor, and rural land.

*A1.5 The provincial level fiscal decentralization and political decentralization effects:*

Following the study by Lin and Liu (2000), the Marginal Retention Rate (MRR) -- the percentage of locally collected budgetary revenue retained for local utilization at the provincial level -- is used as an index of provincial-level fiscal decentralization. As they argued, the marginal retention rate is a better measure for provincial-level incentives to promote GDP growth. To construct a complete package of the provincial decentralization index, in addition to the use of the central-to-provincial sharing scheme, I shall employ this MRR and sharing scheme to examine how the provincial-level fiscal decentralization affects migration flow in the model.



The political decentralization index at the provincial level is a comprehensive indexing of the “closeness” of a province to the central government. It is composed and provided by Professor Yasheng Huang at MIT. The index is scored as follows for Party secretary integration: 4 = Concurrently serving in a central position while holding a provincial post; 3 = An outsider defined as one with significant service in central ministries; 2 = An outsider defined as one with significant service in other provinces; 1 = An insider, defined as one with significant service in that one province.

The data for the Marginal Retention Rate (MRR) sharing scheme index and other socio-economic variables are extracted from the China statistical yearbook in relevant years, and the HRS data are provided by Professor Justin Lin (please see the data description in Table 3 for details).

Lin and Liu (2000, footnote 36) pointed out that there is no strong correlation between growth of per capita TVE investment and MRR at the provincial level. I also found that the growth of TVE output has little correlation with MRR. However, some researchers have shown a positive relationship between MRR and TVEs’ employment. For example, Jin, Qian, and Weingast (2001) reveal that such incentive effects do exist and are significant. An increase in the marginal fiscal revenue retention rate in a province by 10 percentage points is associated with an increase of 1 percentage point in the growth rate of employment by non-state enterprises in that province. This result holds when “non-state enterprises” are measured by TVEs only and by all non-agriculture-non-state enterprises, rural and urban. Quantitatively, these numbers are quite significant because the mean of the growth rates of TVEs’ employment is 6 percent, and that of all non-agriculture-non-state employment is 9 percent (Qian, 2002).

Indeed, Table 3 also shows that the MRR and subsidy-receiving scheme might have some relationships with the TVE output level in 1985. Low-level TVE output provinces usually have 100% MRR and have a “fixed subsidy receiving scheme” e and f; whereas, scheme “a,” the share-remitting scheme, is widely separated into different categories of MRR. These are usually less developed provinces, or provinces that receive subsidies from the central government. However, provincial political influence also seems to have some influence over the scheme-making process. Three provinces (Heilongjiang, Jilin, and Hubei), receiving 100 percent MRR, are traditionally industrialized provinces. Only Guangdong and Heilongjiang receive the same package of MRR and scheme despite their good TVE output level, which shows their distinguished position. To answer the question fully, I also have constructed a set of interaction terms on MRR interacts with the sharing scheme dummies in the regression models.

[Table 1 about here]

#### *A1.6 Effects from other types of in-migrants and competing destinations:*

While the amount of rural-rural undocumented labor migration from the provincial  $i$  to  $j$  may be affected from the above variables, other types of migrants could also be very conducive to the outcomes (Pellegrini and Fotheringham, 2002); I define two major but contending effects: *migration substitution effects* at the origin and *labor market complementary effects* in both origin and destinations (DaVanzo,1980; Fafchamps and Shilpi, 2008; Stark,1991). The *migration substitution effects* may occur when better migration choices, or alternatives, would be more easily available than being an rural-

rural undocumented migrant. For example, if an origin  $i$  would have a higher chance for their residents to be become *hukou* migrants legally or migrate to higher wage regions (Stark and Taylor, 1991), such as urban areas (Zhao, 1999), the amount of undocumented migration to rural areas may be reduced because legal migration with *hukou* status change is always preferable as that means that the migrants could enjoy the local public goods in urban areas (Fafchamps and Shilpi, 2008). Other type of undocumented migrants could have *Labor market enhancement effects* for rural-rural undocumented migrant; when other types of undocumented migration such as rural-urban undocumented migration is active in a province may means the local institutions to control undocumented migration is less restrictive, or the local economy is more accommodated to undocumented migration and these migrants could serve as migrant stock and network for potential in-migrant to come to the province; therefore, rural-rural undocumented migration could be encouraged at the localities (Stark and Taylor, 1991). In order to test the above observations, I have specified different types of in-migration, such as in-migrants from intra- and inter-provincial, from urban and rural, and from *hukou* and non-*hukou* status.

**Tables:**

**Table 3: Comparing Village and Town In-migration by Types of Destination (1982-87)**

<b>Village in-migration</b>							
year	1982-3	1983-4	1984-5	1985-6	1986-7	Row Total	Column %
<b>Intra-provincial in-migration</b>							
<u>Hukou village in-migrant</u>							
To urban (row %)	15.00	19.13	24.25	24.00	17.63	800	23.21
To town (row %)	13.48	20.18	27.86	23.64	14.83	1328	38.53
To village (row %)	17.89	20.17	22.59	21.91	17.44	1319	38.27
Total (row %)	15.52	19.93	25.01	23.06	16.48	3447	100.00
<u>Non-hukou village in-migrant</u>							
To urban (row %)	7.72	10.62	20.75	27.14	33.78	829	40.44
To town (row %)	6.88	12.27	20.53	35.79	24.53	799	<b>38.98</b>
To village (row %)	8.53	16.11	22.75	23.22	29.38	422	<b>20.59</b>
Total (row %)	7.56	12.39	21.07	29.71	29.27	2050	100.00
<b>Inter-provincial in-migration</b>							
<u>Hukou village in-migrant</u>							
To urban (row %)	18.21	19.29	21.07	20.00	21.43	280	40.23
To town (row %)	17.76	19.63	34.58	18.69	9.35	107	15.37
To village (row %)	16.50	18.45	22.33	27.83	14.89	309	44.40
Total (row %)	17.39	18.97	23.71	23.28	16.67	696	100.00
<u>Non-hukou village in-migrant</u>							
To urban (row %)	5.78	10.64	21.58	26.75	35.26	329	44.46
To town (row %)	7.81	14.06	17.19	39.84	21.09	128	<b>17.30</b>
To village (row %)	<b>7.07</b>	<b>9.89</b>	<b>18.37</b>	<b>32.16</b>	<b>32.51</b>	283	<b>38.24</b>
Total (row %)	6.62	10.95	19.59	31.08	31.76	740	100.00
<b>Town in-migration</b>							
year	1982-3	1983-4	1984-5	1985-6	1986-7	Row Total	Column %
<b>Intra-provincial in-migration</b>							
<u>Hukou town in-migrant</u>							
To urban (row %)	18.52	22.22	18.52	19.14	21.60	162	18.10
To town (row %)	15.09	19.10	25.94	22.88	16.98	424	47.37
To village (row %)	19.74	20.39	19.42	20.06	20.39	309	34.53
Total (row %)	17.32	20.11	22.35	21.23	18.99	895	100.00
<u>Non-hukou town in-migrant</u>							
To urban (row %)	11.29	14.52	22.58	22.58	29.03	62	16.80
To town (row %)	4.32	18.71	18.71	30.22	28.06	139	37.67
To village (row %)	8.33	17.86	20.24	27.38	26.19	168	45.53
Total (row %)	7.32	17.62	20.05	27.64	27.37	369	100.00
<b>Inter-provincial in-migration</b>							
<u>Hukou town in-migrant</u>							
To urban (row %)	15.38	34.62	30.77	15.38	3.85	26	42.62
To town (row %)	27.78	11.11	22.22	11.11	27.78	18	29.51
To village (row %)	17.65	11.76	35.29	17.65	17.65	17	27.87
Total (row %)	19.67	21.31	29.51	14.75	14.75	61	100.00
<u>Non-hukou town in-migrant</u>							
To urban (row %)	1.33	0.00	0.00	10.67	88.00	<b>75</b>	77.32
To town (row %)	18.18	0.00	9.09	18.18	54.55	<b>11</b>	11.34
To village (row %)	9.09	0.00	18.18	45.45	27.27	<b>11</b>	11.34
Total (row %)	4.12	0.00	3.09	15.46	77.32	97	100.00

Source: 5% random sample of 1% 1987 Chinese Population Census

<b>Table 4: Data Summary Table</b>						
Variable specification and unit	Variable	Obs	Mean	Std. Dev.	Min	Max
log (inter-provincial rural-rural non-hukou migrant number)	lrumij	221	0.42	0.60	0.00	3.26
Inter-provincial rural-rural non-hukou migrant dummy variable	mij	3780	0.06	0.23	0	1
log(Agricultural population per village)(ten thousand)	lapopv	3780	-2.21	0.37	-3.53	-1.43
Gross domestic product (GDP) per capita (Yuen)(1980 = 100)	rjgdp	3780	734.13	678.20	231.81	4155.56
GDP per capita difference between receiving and sending province (Yuen)(1980 = 100) (sending province - receiving province) (Yuen)(1980 = 100)	gdpdiff	3780	0.00	964.92	-3814.94	3814.94
Direct distance between labor receiving and sending province's capital (km)	distance	3780	2080.79	1102.10	140.00	5643.00
log (TVE output) (mill. Yuen)(1980 = 100)	ltveout	3780	11.33	1.56	6.96	14.64
log (village/Town)	lviltown	3780	2.53	0.37	1.89	3.77
log (Town)	lcoungov	3780	7.33	1.03	5.33	9.95
log (TVE labor)(ten thousand)	ltvelab	3780	13.92	1.16	10.66	15.94
log (TVE investment)(mill. Yuen)(1980 = 100)	ltveinv	3780	11.89	1.13	8.99	14.20
log (cultivated land) (1000 mu)	lland	3780	8.55	0.76	7.06	10.01
log (Expected rural government expenditure)	g1	3780	7.93	0.30	7.30	8.63
Intra-provincial non-hukou rural-urban in-migrant	inktraur	3780	5.92	8.53	0.00	84.00
Intra-provincial non-hukou rural-rural in-migrant	inktratwru	3780	8.72	10.10	0.00	59.00
Intra-provincial hukou rural-urban in-migrant	ihutraur	3780	5.71	3.60	0.00	19.00
Intra-provincial hukou rural-rural in-migrant	ihutratwru	3780	18.91	15.20	1.00	92.00
Inter-provincial non-hukou rural-urban in-migrant	inkterur	3780	2.35	3.70	0.00	27.00
Inter-provincial hukou rural in-migrant to ALL destinations	ihuterall	3780	4.97	4.31	0.00	24.00
Party index	partyint	3780	1.73	0.84	1.00	4.00
Marginal Retention Rate (MRR) X sharing scheme a	fsa2	3780	13.32	28.71	0.00	100.00
Marginal Retention Rate (MRR) X sharing scheme c	fsa3	3780	2.86	16.66	0.00	100.00
Marginal Retention Rate (MRR) X sharing scheme e	fsa4	3780	7.14	25.76	0.00	100.00
Marginal Retention Rate (MRR) X sharing scheme f	fsa5	3780	10.00	30.00	0.00	100.00
Agricultural population (ten thousand)	apop	3780	2989.98	2137.12	291.24	8833.90
Household Respon. Farm. Team Ratio (percentage)	hrsa	3780	91.47	18.47	0.00	100.00
log(road density per sq. km)	lnroad	3780	-1.87	0.80	-4.26	-0.64
Income group dummy 1	pera1	3780	0.14	0.35	0.00	1.00
Income group dummy 2	pera2	3780	0.14	0.35	0.00	1.00
Income group dummy 3	pera3	3780	0.14	0.35	0.00	1.00
Income group dummy 4	pera4	3780	0.14	0.35	0.00	1.00
Income group dummy 5	pera5	3780	0.14	0.35	0.00	1.00
Income group dummy 6	pera6	3780	0.14	0.35	0.00	1.00
Income group dummy 7	pera7	3780	0.14	0.35	0.00	1.00
1982	y13	3780	0.20	0.40	0.00	1.00
1983	y14	3780	0.20	0.40	0.00	1.00
1984	y15	3780	0.20	0.40	0.00	1.00
1985	y16	3780	0.20	0.40	0.00	1.00
1986	y17	3780	0.20	0.40	0.00	1.00
Note:						
1. since the province matrix is symmetric, this table show just one side of the data in the gravity model						
2. variables' units that are not specified in the Table are either use the number in the table directly or dummy variables and their interaction terms						
3. all time variate independent variables are one year lagged variables, except in-migrant variables						
4. ALL destinations = destinations that are included in the areas of village, town, and city						

**Table 5: OLS and Basic Heckman Regression on Rural-rural Undocumented Migration (1982-1987)**

	Model 1		Model 2		Model 3		Model 4	
<b>Second Stage Model</b>	receiving	sending	receiving	sending	receiving	sending	receiving	sending
Dependent variable: Irumij	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
log(TVE output )	0.29*** (0.10)	-0.20** (0.10)	0.28*** (0.10)	-0.19*** (0.08)	0.28*** (0.10)	-0.19*** (0.08)	0.29*** (0.10)	-0.19*** (0.08)
log(village per Town)	-0.91*** (0.17)	0.32** (0.16)	-0.89*** (0.18)	0.32*** (0.13)	-0.89*** (0.18)	0.31** (0.13)	-0.89*** (0.18)	0.32*** (0.13)
log(# of Town)	-0.23*** (0.08)	0.21*** (0.07)	-0.22*** (0.07)	0.20*** (0.06)	-0.22*** (0.07)	0.20*** (0.06)	-0.22*** (0.07)	0.20*** (0.06)
party index	-0.02 (0.06)	-0.02 (0.05)	-0.02 (0.06)	-0.02 (0.05)	-0.03 (0.06)	-0.01 (0.05)	-0.03 (0.06)	-0.01 (0.05)
Household Respon. Farm Ratio	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	0.00 (0.01)
(MRR X scheme a)	-0.01*** (0.00)	0.00 (0.00)	-0.01*** (0.00)	0.00 (0.00)	-0.01*** (0.00)	0.00 (0.00)	-0.01*** (0.00)	0.00 (0.00)
(MRR X scheme c)	-0.01* (0.00)	0.00 (0.00)	-0.01* (0.00)	0.00 (0.00)	-0.01* (0.00)	0.00 (0.00)	-0.01* (0.00)	0.00 (0.00)
(MRR X scheme e)	-0.01* (0.00)	0.00 (0.00)	-0.01* (0.00)	0.00 (0.00)	-0.01* (0.00)	0.00 (0.00)	-0.01* (0.00)	0.00 (0.00)
(MRR X scheme f)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
log(Road Density)	0.13 (0.10)	-0.11 (0.10)	0.13 (0.10)	-0.12 (0.09)	0.14 (0.10)	-0.13 (0.09)	0.14 (0.10)	-0.13 (0.09)
Constant	0.89 (2.34)		1.07 (2.31)		1.08 (2.31)		1.09 (2.31)	
<b>First Stage (decision) model:</b> Dependent variable: Mij								
gdp per capita			0.00*** (0.00)	-0.00*** (0.00)	0.00*** (0.00)	-0.00** (0.00)	0.00*** (0.00)	-0.00** (0.00)
log(Road Density)					-0.15*** (0.05)	0.17*** (0.05)	-0.21*** (0.05)	0.24*** (0.07)
party index					0.13*** (0.05)	-0.12** (0.06)	0.18*** (0.05)	-0.11** (0.06)
(MRR X scheme a)							-0.00 (0.00)	0.01** (0.00)
(MRR X scheme c)							0.00 (0.00)	0.00 (0.00)
(MRR X scheme e)							-0.00 (0.00)	0.00 (0.00)
(MRR X scheme f)							-0.00 (0.00)	0.01*** (0.00)
Constant			-1.59*** (0.09)		-1.56*** (0.24)		-1.74*** (0.27)	
rho			-0.22 (0.24)		-0.25 (0.26)		-0.23 (0.21)	
sigma			-0.88*** (0.07)		-0.88*** (0.08)		-0.88*** (0.07)	
Number of obs	221		3780		3780		3780	
Except the first model, others are Heckman Maximum Likelihood Selection Model								
Heteroskedastic-consistent Standard Errors are in the parentheses.								
Model 1: OLS regression on the basic model, Standard errors in parentheses.								
Model 2: First stage model on both sides: gdp per capita								
Model 3: First stage model on both sides: gdp per capita, log(road density per sq. km), party index								
Model 4: First stage model on both sides: gdp per capita, log(road density per sq. km), party index, and Interaction Terms of Marginal Retention Schedule and Sharing Scheme dummies								
="* p<0.10", ** p<0.05, *** p<0.01"								

**Table 6: Extended Heckman Regression on Production Function, Expected Rural Govt. Expenditure, Additional Variables, and Other In-migrant Variables**

	Model 1		Model 2		Model 3	
<b>Second Stage Model</b>	receiving	sending	receiving	sending	receiving	sending
Dependent variable: lumij	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
log(TVE Investment)	0.55*** (0.23)	-0.49*** (0.19)	0.57*** (0.23)	-0.48*** (0.19)	0.53*** (0.23)	-0.40** (0.19)
log(TVE labor )	-0.14 (0.17)	0.14 (0.17)	-0.25 (0.19)	0.13 (0.17)	-0.30 (0.21)	0.14 (0.17)
log(land )	0.20* (0.11)	-0.09 (0.13)	0.28*** (0.11)	-0.09 (0.15)	0.26*** (0.11)	0.00 (0.14)
log(Expected Rural Govt. Expenditure)	-2.33*** (0.69)	1.50*** (0.44)	-2.21*** (0.72)	1.40*** (0.48)	-1.98*** (0.70)	1.10** (0.49)
Party index	0.01 (0.05)	-0.04 (0.05)	-0.02 (0.06)	-0.01 (0.04)	-0.06 (0.06)	0.05 (0.05)
Household Respon. Farm Ratio	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.01)
(MRR X scheme a)	-0.01*** (0.00)	0.00 (0.00)	-0.01** (0.00)	0.00 (0.00)	-0.01*** (0.00)	-0.00 (0.00)
(MRR X scheme c)	-0.01*** (0.00)	-0.00 (0.00)	-0.01*** (0.00)	0.00 (0.00)	-0.01*** (0.00)	-0.00 (0.00)
(MRR X scheme e)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
(MRR X scheme f)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
log(Road Density)	0.13 (0.12)	-0.12 (0.13)	0.19* (0.12)	-0.10 (0.13)	0.24** (0.12)	-0.16 (0.13)
GDP Per Capita Difference	-0.00 (0.00)		-0.00 (0.00)		-0.00* (0.00)	
log(Distance)	-0.00 (0.00)		-0.00* (0.00)		-0.00** (0.00)	
log(Agricultural Population per Village)	-0.44** (0.19)	0.06 (0.12)	-0.47*** (0.19)	0.02 (0.12)	-0.44*** (0.18)	-0.05 (0.12)
<b>Rural in-migrant by type, hukou, and destination:</b>						
Intra-provincial non-hukou to urban	0.02*** (0.01)	0.01*** (0.00)	0.03*** (0.01)	0.01*** (0.00)	0.03*** (0.01)	0.01*** (0.00)
Intra-provincial non-hukou to rural	0.00 (0.00)	0.01* (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Intra-provincial hukou to urban			-0.04*** (0.01)	0.00 (0.01)	-0.04*** (0.01)	-0.00 (0.01)
Intra-provincial hukou to rural			-0.00 (0.00)	0.01** (0.00)	-0.00 (0.00)	0.00* (0.00)
Inter-provincial non-hukou to urban					-0.00 (0.01)	-0.04*** (0.01)
Inter-provincial hukou to ALL destinations					0.01 (0.01)	-0.02*** (0.01)
Constant	4.84 (3.72)		5.51 (3.67)		5.95* (3.76)	
<b>First Stage (decision) model:</b>						
gdp per capita	0.00*** (0.00)	-0.00** (0.00)	0.00*** (0.00)	-0.00** (0.00)	0.00*** (0.00)	-0.00** (0.00)
log(Road Density)	-0.21*** (0.05)	0.24*** (0.07)	-0.21*** (0.05)	0.24*** (0.07)	-0.21*** (0.06)	0.24*** (0.07)
party index	0.18*** (0.05)	-0.11** (0.06)	0.18*** (0.05)	-0.11** (0.06)	0.18*** (0.05)	-0.11** (0.06)
(MRR X scheme a)	-0.00 (0.00)	0.01** (0.00)	-0.00 (0.00)	0.01** (0.00)	-0.00 (0.00)	0.01** (0.00)
(MRR X scheme c)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
(MRR X scheme e)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
(MRR X scheme f)	-0.00 (0.00)	0.01*** (0.00)	-0.00 (0.00)	0.01*** (0.00)	-0.00 (0.00)	0.01*** (0.00)
Constant	-1.74*** (0.27)		-1.74*** (0.27)		-1.74*** (0.27)	
rho	-0.16 (0.18)		-0.28* (0.17)		-0.42 (0.30)	
sigma	-0.94*** (0.06)		-0.97*** (0.07)		-0.96*** (0.12)	
Number of obs	3780		3780		3780	

Heteroskedastic-consistent Standard Errors are in the parentheses.

Model 1: additional variables: GDP Per Capita Difference, log(Distance), log(Agricultural Population per Village),

Intra-provincial non-hukou to urban and rural

Model 2: additional variables: Intra-provincial hukou to urban, Intra-provincial hukou to rural

Model 3: additional variables: Inter-provincial non-hukou to urban, Inter-provincial hukou to ALL destinations

"\* p<0.10", \*\* p<0.05,\*\*\* p<0.01"

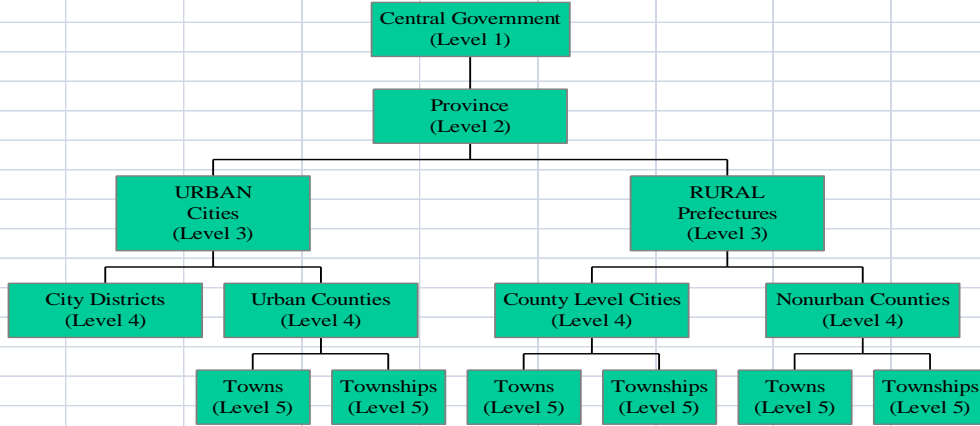
**Table 7: Heckman Regression on Production Function with Clustered Standard Errors**

	Model 1		Model 2		Model 3		Model 4	
<b>Second Stage Model</b>	receiving	sending	receiving	sending	receiving	sending	receiving	sending
Dependent variable: <i>lumij</i>	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
log(TVE Investment)	0.62*** (0.26)	-0.37* (0.20)	0.62*** (0.24)	-0.37*** (0.14)	0.53*** (0.23)	-0.40*** (0.17)	0.53** (0.25)	-0.40*** (0.16)
log(TVE labor )	-0.15 (0.19)	0.09 (0.18)	-0.15 (0.18)	0.09 (0.14)	-0.30 (0.21)	0.14 (0.16)	-0.30 (0.22)	0.14 (0.15)
log(land )	0.17 (0.14)	-0.17 (0.15)	0.17 (0.15)	-0.17 (0.16)	0.26*** (0.11)	0.00 (0.15)	0.26* (0.14)	0.00 (0.17)
log(Expected Rural Govt. Expenditure)	-2.58*** (0.69)	1.51*** (0.47)	-2.58*** (0.59)	1.51*** (0.44)	-1.98*** (0.60)	1.10*** (0.41)	-1.98*** (0.58)	1.10*** (0.44)
Party index	-0.03 (0.05)	-0.06 (0.06)	-0.03 (0.04)	-0.06 (0.05)	-0.06 (0.05)	0.05 (0.05)	-0.06 (0.05)	0.05 (0.04)
Household Respon. Farm Ratio	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	-0.00 (0.01)	0.00 (0.00)	-0.00 (0.01)
(MRR X scheme a)	-0.01*** (0.00)	0.00 (0.00)	-0.01*** (0.00)	0.00 (0.00)	-0.01*** (0.00)	-0.00 (0.00)	-0.01** (0.00)	-0.00 (0.00)
(MRR X scheme c)	-0.01** (0.00)	0.00 (0.00)	-0.01*** (0.00)	0.00 (0.00)	-0.01*** (0.00)	-0.00 (0.00)	-0.01*** (0.00)	-0.00 (0.00)
(MRR X scheme e)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00** (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00* (0.00)
(MRR X scheme f)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
log(Road Density)	0.07 (0.12)	-0.28* (0.16)	0.07 (0.16)	-0.28** (0.13)	0.24** (0.10)	-0.16 (0.18)	0.24** (0.13)	-0.16* (0.09)
GDP Per Capita Difference	-0.00 (0.00)		-0.00 (0.00)		-0.00*** (0.00)		-0.00 (0.00)	
log(Distance)	-0.00 (0.00)		-0.00 (0.00)		-0.00** (0.00)		-0.00*** (0.00)	
log(Agricultural Population/Village)	-0.58*** (0.15)	0.11 (0.16)	-0.58** (0.27)	0.11 (0.11)	-0.44*** (0.13)	-0.05 (0.11)	-0.44** (0.19)	-0.05 (0.10)
<b>Rural in-migrant by type, hukou, and destination:</b>								
Intra-provincial non-hukou to urban					0.03*** (0.01)	0.01*** (0.00)	0.03*** (0.01)	0.01*** (0.00)
Intra-provincial non-hukou to rural					0.00 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Intra-provincial hukou to urban					-0.04*** (0.01)	-0.00 (0.01)	-0.04*** (0.01)	-0.00 (0.01)
Intra-provincial hukou to rural					-0.00 (0.01)	0.00* (0.00)	-0.00 (0.01)	0.00*** (0.00)
Inter-provincial non-hukou to urban					-0.00 (0.01)	-0.04*** (0.01)	-0.00 (0.01)	-0.04*** (0.01)
Inter-provincial hukou to ALL destinations					0.01 (0.01)	-0.02*** (0.01)	0.01 (0.01)	-0.02*** (0.01)
Constant	5.59 (3.91)		5.59 (4.35)		5.95* (3.49)		5.95 (4.12)	
<b>First Stage (decision) model:</b>								
gdp per capita	0.00** (0.00)	-0.00** (0.00)	0.00*** (0.00)	-0.00* (0.00)	0.00** (0.00)	-0.00** (0.00)	0.00*** (0.00)	-0.00* (0.00)
log(Road Density)	-0.21*** (0.09)	0.25*** (0.09)	-0.21*** (0.08)	0.25** (0.11)	-0.21*** (0.09)	0.24*** (0.09)	-0.21*** (0.08)	0.24** (0.11)
party index	0.18** (0.09)	-0.11* (0.06)	0.18*** (0.07)	-0.11 (0.08)	0.18** (0.09)	-0.11* (0.06)	0.18*** (0.07)	-0.11 (0.08)
(MRR X scheme a)	-0.00 (0.00)	0.01*** (0.00)	-0.00 (0.00)	0.01 (0.01)	-0.00 (0.00)	0.01*** (0.00)	-0.00 (0.00)	0.01 (0.01)
(MRR X scheme c)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
(MRR X scheme e)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
(MRR X scheme f)	-0.00 (0.00)	0.01** (0.00)	-0.00 (0.00)	0.01** (0.00)	-0.00 (0.00)	0.01** (0.00)	-0.00 (0.00)	0.01** (0.00)
Constant	-1.74*** (0.35)		-1.74*** (0.36)		-1.74*** (0.35)		-1.74*** (0.36)	
rho	-0.20 (0.14)		-0.20** (0.10)		-0.42 (0.38)		-0.42* (0.28)	
sigma	-0.89*** (0.09)		-0.89*** (0.07)		-0.96*** (0.16)		-0.96*** (0.13)	
Number of obs	3780		3780		3780		3780	
Model 1: Basic Heckman model with Clustered Standard Errors on labor receiving provinces in parentheses.								
Model 2: Basic Heckman model with Clustered Standard Errors on labor sending provinces in parentheses.								
Model 3: Extended Heckman model with Clustered Standard Errors on labor receiving provinces in parentheses.								
Model 4: Extended Heckman model with Clustered Standard Errors on labor sending provinces in parentheses.								
and Marginal Retention Schedule and Sharing Scheme dummies								
="* p<0.10", ** p<0.05,*** p<0.01"								



**Figures:**

**Figure 1: Government Structure in the People's Republic of China after the 1983 Reform**



Source: Cited from Wong et al (1995: 82-3)

Note:

"Sub-provincial government" = Governments below level 2.

(level 2) Includes 27 provinces and 3 municipalities including Beijing, Shanghai and Tianjin.

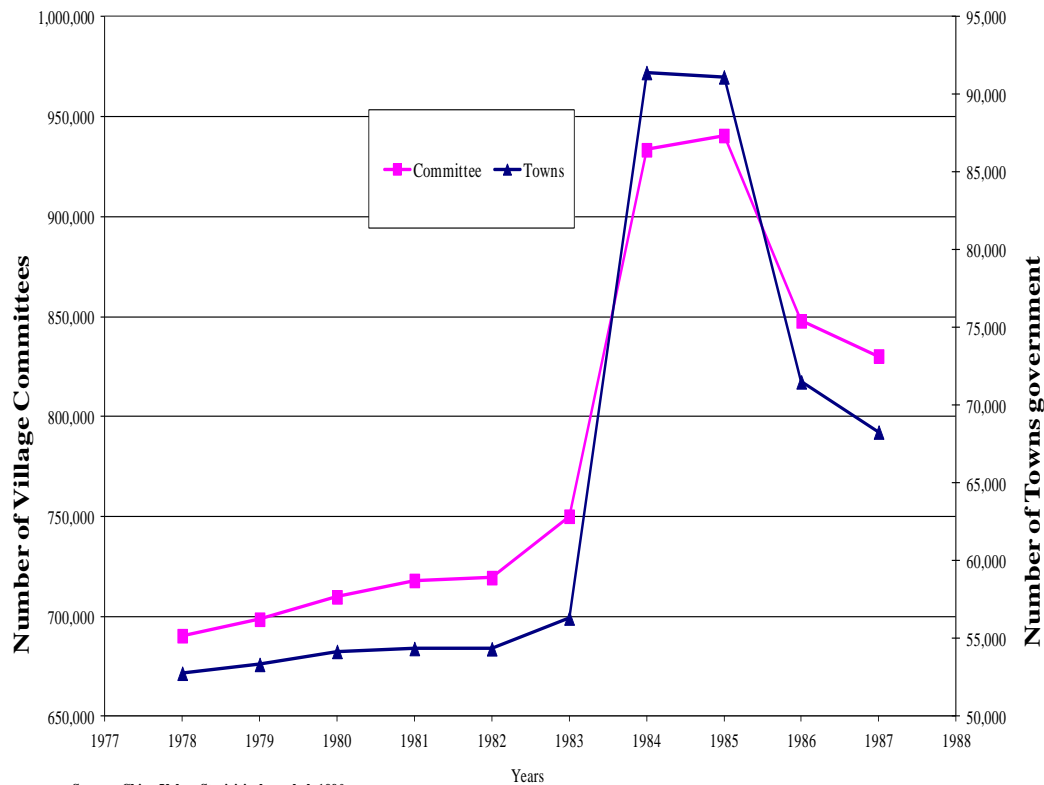
(level 3) with 151 prefectures and 185 prefectural level cities. some prefectures has been eliminated, and rural counties are directly under city administration.

For example, Guangdong, Hainan, Jiangsu, and Liaoning Provinces.

(level 4) with 1903 counties and 279 county-level cities.

(level 5) with 56000 townships and towns, and city districts.

Figure 2: Number of Town Government and Village Committees (1978-1987)



<sup>1</sup> Different authors refer to factor market integration with different terminology, such as market development and market efficiency (Lin and Liu, 2000). The terminology “market development,” can be subdivided into two effects “factor market growth” and “factor market integration.” This paper concerns the regional factor market mobility and integration at the national level.

<sup>2</sup> Through personal preferences and jurisdictions’ characteristics, in terms of local public goods provisions and taxation, free labor mobility would be the key factor that attained efficient outcomes in this kind of model.

<sup>3</sup> Established in the 1950s, the *hukou* system is known as a strict household registration system that requires migration approval from both origin and destination, subject to central quotas. The objective of this system is to restrict migration into urban (city and town) sectors, in particular, the city areas. The system is a mixture of welfare and the right to migrate; only *hukou* migrants would have had entitlement to a city’s welfare and necessity assessments. In other words, it was impossible to migrate without changing to the urban *hukou* status, since no job would be found nor food provided from official supplies to any undocumented migrant. The “town” *hukou* is a kind of “urban” *hukou*; however, in reality, unlike the “city *hukou*,” peasants usually do not really regard “town *hukou*” as “urban *hukou*” because its welfare and assessment of opportunity are not much different from that in the villages; at least, they were not during the early reform period. For details of the *hukou* system and its evolutions, please see Cheng and Selden (1994).

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In this paper, I broadly define the terms “rural” to describe the “sub-provincial” level governments - town/township governments at the lowest level of the government structure and its agencies, village administration committees, as opposed to the “urban” governance structure. This is an administrative definition for different levels of governments that is different from the household registration status (*hukou*) definition, according to the second definition of urban and rural population (by the permanent residence), which has been used by the National Bureau of Statistics of China for census from 1982 to 1999, classifies “town *hukou*” as a kind of “urban” *hukou* only if the resident’s *hukou* is registered at resident-committees in a town and “village” *hukou* as “rural” *hukou* (Mallee, 2000). In reality, peasants usually do not regard a town as “urban” (Kirby 1985, 233-37). Even peasants who were granted “town *hukou*” status did not find this type of *hukou* very attractive as it did not provide them with any real benefit similar to that enjoyed by people who were real urban *hukou* residents. Some of them even regarded it as a “fake urban *hukou*” (Cheng and Selden, 1994). Given this background, one of the focuses of this paper is on TVEs relations with rural undocumented labor migration and some of the factories in TVEs are located in townships under the administration of towns; we, therefore, broadly define the “rural in-migrant” by including both village and town in-migrant, although town in-migrants’ sizes are very small, as shown in Table 3. Please see Cheng and Selden (1994) for the origins and social consequences of China’s *hukou* system and also Fig. 1 for the government structure.

5 I define the term “undocumented” in labor migration as *non-hukou* migrant in China, as in Roberts (1997) in order to connect the migration literature in general; in other words, the term “undocumented” and “*non-hukou*” is interchangeable in this paper. The official definition of migration status in Chinese Census before year 2000 is as follows: A migrant aged five years or older who, on the date of enumeration, resides in a city or county different from that five years ago and has lived in the place of enumeration for more than one year or left his or her *hukou* location for more than one year. Migrants who have changed their *hukou* to the place of enumeration are considered permanent (*hukou*) migrants; *non-hukou* migrants are those who did not pass through the approvals from their origin and destination governments’ *hukou* transfer procedures and are not entitled to the destinations’ welfare and benefits, regardless of how long they have stayed (Sun and Fan, 2011). Furthermore, *non-hukou* migration has been rapidly emerging; their numbers increased from 11 million in the 1982 census to 18 million in the 1990 census (Liang, 2001, p. 503.). The 1987 census also revealed that 59.9 percent of *non-hukou* migrants were from rural areas. See also Chan, Liu, and Yang (1999, Table 1) for comparisons of characteristics of *hukou* and *non-hukou* migrants and endnote number 4 for the definition of “rural” in this paper.

6 I use the term “jurisdiction” to describe a government administration unit, such as town, county or village, with spatial dimensions, such as the size and number of governments in a territory. According to Li and An (2009), the definition of towns (*Jianzhizhen*) has been changing over the time. The urban component, the percentage of the population that works in non-agricultural sectors, in a town has been reduced from around half in 1964 to around 10 percent in the 1984 definition. In this sense, a large component of rural activities is still retained in a town. See also Martin (1992) for the changing definition of “Rural Population” in China.

7 1982-87 is an important historical episode for China’s initial reform, which highlights the emergence of Township and Village Enterprises (TVEs) development that generates many important academic researches and policy debates on rural and regional development (Alpermann, 2009; Feltenstein and Iwata, 2004; Lin and Liu, 2000; Qian and Weingast, 1997; Young, 2001; Zhou, 2001).

8 Most of the TVEs were converged from the “rural collective industries” before the reform. Under the fiscal decentralization, TVEs have their profit-sharing scheme contracts with the rural governments and were allowed to re-invest a significant amount of their incomes to strengthen their factories. See also Byrd and Gelb (1990) for the historical development of TVEs and Che and Qian (1998), Oi (1999), and Parish (1994) for the incentive of rural governments to promote TVEs as their major governments’ incomes during the 1980s-90s.

9 I broadly define the term “inter-provincial rural-rural undocumented in-migrants” as those who migrate from a village/town to another village/town without changing their *hukou* statuses. The reasons are as follows: as has been discussed in footnotes above, since it is the beginning of reform, town *hukou* was not strictly regarded as urban *hukou*; moreover, this research examines the TVEs effects on labor mobility, as TVEs are located not only in villages, but in townships and towns; thus, it makes little sense to exclude town in-migrants in this study, although the number of town migrants was very small, as is shown in Table 3.

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<sup>10</sup> The term “village” is a self-governance unit that extends from towns, at the lowest level of government hierarchy in China, and could refer to two kinds of villages: natural village (*zirancun*) or administrative village (*xingzhengcun*), which is a bureaucratic entity and may consist of several natural villages. See, for example, Alpermann (2009) for the development and institutionalization of village governance and Figure 1 for the government hierarchical structure in China.

<sup>11</sup> Measured by the number of “village administrative committees” (thereafter village) and “number of towns and townships” (thereafter town)

<sup>12</sup> The HRS replaced the old “communal system” and redistributed a portion of the farmland to the peasants according to household unit. In return, the government obtained a certain amount of agricultural production with predetermined (low) prices as a tax collected from the peasants. The aim of this policy was to keep rural societies stable by assuring enough food and agricultural production. See Riskin (1987) for a detailed description of the operations of and transformations in this work-point system and the labor-monitoring system in communes; see also Perkins 1988, p. 607 for the original objective of the HRS.

<sup>13</sup> The commune system had embodied Mao’s theory of political economy by “integrating government administration with commune management” (*zhengshe heyi*), but it was left hollow by the sweeping de-collectivization of the rural economy between 1979 and 1984. See also Table 1 and Appendix 1 for the descriptions and measures of the fiscal decentralization indices.

<sup>14</sup> See Zweig (1992) and Li and An (2009) for the historical definitions and development of sub-provincial-level government and towns. See also Alpermann (2009) for the state regulations in governing towns and villages.

<sup>15</sup> While no comprehensive account of the change of government at the provincial-level during 1983 to 1984 is available, White (1990, Table 1) demonstrates that the overall change was finished within the two year period.

<sup>16</sup> For example, by 1986, Guangdong province had moved to reduce the number of local government units by replacing rural administrative districts (*qu*) with town and township governments and creating administrative villages at the level of the pre-reform production brigade. This move resulted in a precipitous drop in the number of township and village-level units nationwide and a sudden increase in the number of towns.

<sup>17</sup> For example, the village committee, the governance body of a village, consists of at least three members (one officer, one deputy officer, and one committee member) and up to seven members (one officer, one deputy officer, and with several committee members), according to Hu (2010) article 6. Also, Hu (2010) clearly defined the roles of village committees as: conflict resolution, security and defense, public health, and family planning. Although these members are not considered as official government officers *per se*, their expenditures can count towards village administration expenses.

<sup>18</sup> There are three basic variations: fixed rate remittance, fixed quota remittance, and incremental contracting, in which the remittance is set to grow at a fixed rate (Li, 2002).

<sup>19</sup> In particular, villages that rely primarily on agriculture are most likely to have experienced a decline of the collective in both fiscal and organizational terms; whereas, those with nonagricultural enterprises, in contrast, are able to exert considerable administrative and fiscal control (p. 18).

<sup>20</sup> In fact, research during the late 1990’s also demonstrates that county government policy can play an important role in guiding the TVEs’ development in areas, such as ownership, labor allocation, and mobility (Svejnar and Woo, 1990).

<sup>21</sup> See Oi, 1990 Table 1 for dropping share of agriculture in total rural income and Table 2 for a breakdown of non-agricultural production as a percentage of total rural income from 1980 – 7.

<sup>22</sup> However, later on, the TVEs have been drastically reduced as the fiscal recentralization occurred afterward. For example, the retrenchment policy begun after the Third Plenum in September 1988, and rural industries encountered hard times. As funding shortages increase by early 1990, three million enterprises were closed and 13 million farmers returned to the land, found new jobs, or joined the 50–60 million migrant workers (Zweig, 1992). This is why the period of 1982 to 1987 could be arguably be a good time period to study the relationship between TVEs development and labor mobility.

<sup>23</sup> Village and township government corporatism prevailed during the reform period. Research on village governments found they are not only actively involved in seeking cooperative relations for TVEs, but also translated this administrative power into fiscal control through different mechanisms, such as manipulating the amount of bonuses and benefits (*fuli*) and the profit targets kept by the contractor, as well

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as the ratio of profit share divided between contractors and the village or township government (Oi, 1990 p. 26-7).

<sup>24</sup> Even in the coastal provinces as a whole, including provinces such as Guangdong, Fujian, Jiangsu, Shandong, and Liaoning, the TVEs employed only 27.6% of the total rural labor force. In contrast, in the most highly developed villages and town areas, such as Wuxi, Suzhou, Changzhou, Zhujiang Delta, and Yantai in Shandong, 70 - 80% of the rural labor force is employed in TVEs (Oi, 1990: 19). The reason behind this interesting different may be because that rural resident at coastal areas are inclined to work at urban areas where higher expected income could be found, while TVEs works at their localities are largely taken up by in-migrants. However, at the highly developed villages, relatively high income jobs could be found and more local rural labor force at their local TVEs.

<sup>25</sup> Zweig (1992) shows cases in western provinces in which peasant migration could make county-town governments less dependent on county financial assistance. That implies that labor mobility is urged at the local level.

<sup>26</sup> A local survey at that time also demonstrates that labor markets are already freer in the towns of southern China (Nanhai and Jieshou), where industries are well developed, than those in the east (Wuxi and Shangrao), where workers are less likely to have been allocated to their firm (Siu, 1990: 72). That means the strategy's effects to restraint labor could be very different from place to place, depending on the TVEs development.

<sup>27</sup> Since the reform in 1978, labor migration has reemerged as the government has instituted policy changes, such as the Household Responsibility System (HRS), that relaxes labor control rights from communes back to peasants' households (Chen, 2012).

<sup>28</sup> For example, the percentage of non-*hukou* village in-migrant in total intra-provincial in-migrants and inter-provincial in-migrants are 37.29 percent and 51.53 percent, respectively. While the total number of town migrants is much smaller than the village migrants, the inter-provincial non-*hukou* in-migrant percentage is high, at 61.39 percent of the total migrants.

<sup>29</sup> Moreover, while the self-supporting village-town (*Zililiang hu*) migration policy, that allows peasants to look for jobs in nearby townships within their provinces, was launched in 1983 (Fei, 1985), no significant increase is found in intra-provincial village/town *hukou* migration, as shown in the first section of Table 2. In fact, the total number of inter-provincial *hukou* town-town in-migrant is just only 18 in this period, a sharp contrast with the intra-provincial *hukou* town-town in-migrant number, 424. This suggests that the *Zililiang hu* only work within the province to restrain labor mobility.

<sup>30</sup> During the mid-80's, labor mobility was only restricted to intra-provincial village/town *hukou* migration (State Council's Document No. 1 in 1985) (Fei, 1985).

<sup>31</sup> Shi (1993) reviewed the system of rural health and found that, first, the township health centers are general health institutions operated by the township government and supervised by the county department of public health. Village clinics represent the grass-roots level of the health care system, and are run by the village resident committees and supervised by the township health center. Second, he also discussed the disintegration of the rural cooperative medical system and that the sharp reductions in the number of "barefoot doctors" were crucial to health status in rural China population. Third, while the average size of township health centers appeared to increase when measured by the number of beds per health center and the number of nurses per health center, the number of doctors per health center decreased. This is because, under fiscal decentralization, few public funds were leftover for collective public health services, and some doctors became fee-for-service practitioners and private practitioners. Meng et al. (2000) revealed that a large number of rural clinics have been closed since 1980, due to a lack of funding. The rural clinics usually provide poor quality services and over-charged treatments, no matter whether they are public or private. In this regard, rural health systems have been under-supplied even for local residents and are subject to crowding, since migrants also need health services. See also, Liu et al. (1995) for the needs to reform the rural health finance.

<sup>32</sup> Connelly and Zheng (2003) show the difference in school attainment of Chinese youth aged 10-18, between 1978-1986; while only 0.5% of urban youth (both boys and girls) never attended school, rural boys and rural girls' figures were 3% and 8.5%, respectively. Moreover, of those who began school, 74% of urban boys and 72% of the urban girls are currently in school, compared to 56% of rural boys and 47% of rural girls. Certainly, there are many reasons for this result; one of them is the rural public schools' lacking of funding. One of the findings in their study, using the 1990 census, is connected to public funding, in which the effects of county income levels are conducive to initial enrollment in primary school

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and middle school. This effect is larger for girls than boys for initial enrollment in primary school. Brown and Park (2002) also revealed that fiscal decentralization might have created public finance difficulties in some poor countries and led to differences in public funding for schooling and teachers. Wang and Moll (2010), using a panel of 300 permanent observation sites in rural China from 1986 to 2003 by the Agriculture Department of China, show from the rural schooling demand side that financing children's education is a major concern of rural households. Furthermore, the major sources of the education funding are: rural households' private savings and loans from relatives and friends, and liquidation of non-financial assets. While the demand is strong and supply is reducing, rural education may also be subject to public goods crowding, and even the migrants would like to pay a higher price.

<sup>33</sup> These problems are especially serious in the poor regions where their service provisions were below the targets made by the state policy. In government hierarchy, county and lower level agencies' expenditure burdens have been increasing; whereas, the higher level governments were not able to increasingly subsidize these services.

<sup>34</sup> Zwiig (1992), has documented the state laws that allow local governments' cadres to redirect rural migrants away from the county seat and into lower-status market towns and county-towns during the 1980's. Migrants must have: (1) a permanent place to live in the town; (2) management skills or longtime jobs in a town enterprise or unit; (3) a license from the local Industrial and Commercial Bureau; (4) a sublease on their contracted farmland to another peasant (so that land is not abandoned); and (5) an independent source of food. To ensure that migrants meet these criteria, local officials in larger towns lacking public security offices (*paichusuo*) were to set up "registration offices" (*huqi dengji bangongshi*) to control population flows. After migrants arrive in a town, Industrial and Commercial Bureau officials still control the permits needed for access to marketing opportunities.

<sup>35</sup> Zwiig (1992) has also cited cases from Guangdong and Sichuan in which migrants have been rejected from entering towns. One of his examples is an interview of an officer in Zhujiang town in Jiangpu county, Jiangsu province in 1988. He found that the reason for blocking in-migration was largely due to economic reasons; during an interview, the officer said "*Most people who want to come in, get in. We turn them down only if they want to work in some field that is already quite full. Anyway, if it's very full, they'll go back on their own.*" This means that the rural governments would block or deport migrants if additional migrants could not contribute to the local economic development any longer.

<sup>36</sup> Zwiig (1992) also recorded in his fieldwork in Jiangpu that, until May 1986, only 268 peasants had moved into Zhujiang town and none of them had changed their residence status, receiving only "residence permits" (*chang zhu hukou*); this means that they are all "undocumented migrants." A similar case has been found in Xingdian town, west of Tangquan in Jiangpu county, in which only 110 peasant families had moved to town in 1983–85, and the local government began a housing project in 1986 to move 200 peasant households into town.

<sup>37</sup> This is a term that is often used interchangeably with 'floating population' (Li and An, 2009).

<sup>38</sup> The government regards migrants as "rootless" people and are inclined towards being "antisocial" or engaging in criminal activities because their mobility is perceived to be "blind" (*mianlou*) "spontaneous" (*zifa*), "disorderly" (*wuxu*), or "chaotic" (*luan*) by the public security department in China (Mallee, 2000).

<sup>39</sup> In Guangdong province, town officials kept peasants from the surrounding countryside out of county-town-owned enterprises, which paid higher wages, pressuring them instead to work in township-owned factories. The numbers of outsiders in county-town-owned factories was under 3 percent, and peasants had internalized the idea that county-town enterprises were part of a system that was beyond their reach (Siu, 1990).

<sup>40</sup> Limited free labor mobility was allowed until the policy of self-sufficient peasants (*zili kouliang hu*) was extended to allow village peasants to migrate to nearby towns within the province in 1983 (Perkins, 1990).

<sup>41</sup> Roberts (1997) has shown some cases regarding this issue; for example, in a "Sichuan Village" outside Guangzhou, migrants who do not pay the police a fee of five *yuan* per month are "either driven out or beaten up and sent to the 'blind migrants' repatriation center. The repatriation center demands a fine of 300 *yuan*. Those who cannot pay are beaten up before repatriation" (Zhou and Zhang, 1995:59).

<sup>42</sup> Again, the term "market development" means not only market growth, but also market integration. See also Figure 1 and Figure 2 for the changing sub-provincial-level governments

<sup>43</sup> For example, Qian and Weingast (1997) argue that the interaction between the fiscal decentralization system and market development may reinforce each other and develop "market-preserving

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federalism.” One assumption of the theory is a common market with no barrier of trade, which does not exist in our period of study since local capital and local labor was largely immobile at that time (Bardhan, 2002). For other critical reviews of the assumptions of “market-preserving federalism,” please see Oates (2005) and Bardhan (2002). Lin and Liu (2000) showed that fiscal decentralization leads to economic growth. Feltenstein and Iwata (2004) use long time series Chinese data to show that decentralization is positively linked to real growth since the post-war period and inflation during the 70s in China. Please see also the Central Government’s major policy, documentation, and mandates related to rural government structural change and public finance from the *Chinese Public Finance in Past 50 Years* (Xiang, 1999).

<sup>44</sup> Che and Qian (1998) also found that local governments’ promotion of TVE development as an organizational response to an “imperfect” institutional environment for investment helps overcome the central government’s predation and under-financing of private enterprises.

<sup>45</sup> Young (2001) demonstrates that fiscal decentralization may lead to blockage of factor mobility and duplication of infrastructure development. In a more specific case, Zhou (2001) shows that the tobacco industry enjoyed impressive growth in the 1980s and early 1990s with the support of local governments under fiscal decentralization; whereas, it witnessed inter-provincial protectionism in the mid-1990s when the market became saturated.

<sup>46</sup> See Table 2, Table 3, section 2 for the development in labor migration during the period of 1982-87 and the disparity of TVE development and labor mobility.

<sup>47</sup> See Section 2.5 for the limited supplies of local public goods under fiscal decentralization and the measures that rural governments employed to block labor migration during the period.

<sup>48</sup> Furthermore, the number of governments within a region may also affect the volume of trade and factor mobility. Bolton, Roland, and Spolare (1996: 700) also demonstrate that when two nations unite, the average trading costs are reduced as the transaction cost of international trade is internalized. In this sense, when two jurisdictions merged, we should expect a positive effect on trade.

<sup>49</sup> Duration and Puga (2003) show that the efficient size of a city is the result of a tradeoff between urban agglomeration economies and urban crowding.

<sup>50</sup> In addition to Marshallian externalities, an agglomeration could be counted towards a “snowball effect,” in that increasing numbers of agents congregate in a place for diversity of activities and specialization (Fujita and Thisse, 2002: 8).

<sup>51</sup> Hu (2010) also reconfirm the observations of Zhang (2006) that the staffing of Village Committees and Village Small Group are fixed by the government.

<sup>52</sup> See section 2, Table 2, and Table 3.

<sup>53</sup> See section 2.1 and Figure 1 for the changes in village committees and county-level governments.

<sup>54</sup> Specifically, the data are extracted from State Statistical Bureau (1988), State Statistical Bureau, urban social economic survey team (1999), and State Statistical Bureau, urban social economic survey team (1991).

<sup>55</sup> This is an extended version of the Sjaastad (1962) and Greenwood (1975) model that explicitly considers political and institutional factors of the reduced supply and demand function at receiving and sending provinces (Greenwood, 1975; Schultz, 1982; Borjas, 1987, 1989).

<sup>56</sup> There are 28 provinces included in the present study, excluding Tibet, and Hainan province was previously a part of Guangdong province.

<sup>57</sup> Please see Appendix 1 and Table 4 for measures and detailed description of variables.

<sup>58</sup> Fafchamps and Shilpi (2013), using two rounds of Nepal Living Standard Surveys and a Population Census, find that migrants move primarily to nearby, high population density areas where many people share their language and ethnic background.

<sup>59</sup> Note that the last in-migrant flow variable that I use is:  $I_{huterall} = ALL$  Inter-provincial hukou rural in-migrant of the year  $t$ . I use this aggregated destination variable because the Heckman Maximum Likelihood Model does not converge with further decomposition of in-migration flow variables by more detailed destinations, such as Inter-provincial hukou rural in-migrant to urban and Inter-provincial hukou rural in-migrant to rural.

<sup>60</sup> Ranking the GDP per capita from low to high, we have seven provincial groups in this analysis. Anhui, Guangxi, Guizhou, Yunnan = 1; Fujian, Jiangxi, Henan, Sichuan = 2, Inner Mongolia, Hunan, Shanxi, Gansu = 3; Shanxi, Shandong, Ningxia, Xinjiang = 4; Hebei, Hubei, Guangdong, Qinghai = 5; Jilin, Heilongjiang, Jiangsu, Zhejiang = 6; Beijing, Tianjing, Liaoning, Shanghai = 7.

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<sup>61</sup> For detailed discussions about this issue and alternative methods, please see Gómez-Herrera (2013), Martínez-Zarzoso (2013), Silva and Tenreyro (2006), and Tran, Wilson, and Hite (2012).

<sup>62</sup> Helpman et al. (2008) dropped the zero trade observation in their gravity models when around half of the bilateral trade matrix is filled with zeros. In the robustness check, they then use the Heckman Two-Step approach, a less robust version than the Maximum Likelihood, to deal with the problem.

<sup>63</sup> Recent reviews of zero trade issues and recommendations to use Heckman models are, for example, Martin and Pham (2008); Tran, Wilson, and Hite (2012); United Nations Conference on Trade and Development and the Secretariat of the World Trade Organization (UNCTAD and WTO) (2012). Will Martin, a lead economist at the Development Economic Research Group at the World Bank, suggests that Heckman Maximum Likelihood estimators perform well when the issues of heteroscedasticity and zero bilateral trade flow in the data (Martin and Pham, 2008).

<sup>64</sup> In other words, a “zero” is recorded when no rural-rural undocumented migration occurs between a pair of provinces in one particular year, while “one” represents that migration has taken place.

<sup>65</sup> As GDP per capita is not a strictly exclusion restriction at the first stage of regression, eventually, the model’s identification is relied on the non-linearity of the first stage of regression.

<sup>66</sup> In Table 5: some may think that certain variables, for example TVE output, are more naturally expressed in per capita terms. However, in this setting, the paper considers the size of provincial impact on rural-rural non-*hukou* migration; therefore, we need to use the provincial data instead of per capita.

<sup>67</sup> This result is also consistent with Che and Qian’s (1998) finding that through TVE development, local governments increased their revenues, rural employment, and income.

<sup>68</sup> As in the classic case of the emergence of factor mobility and factor market development, labor-abundant places trade their labor with capital-abundant places.

<sup>69</sup> This finding is consistent with Byrd and Gelb’s observations from their fieldwork in the early 1980s that capital is immobile across rural communities, especially townships (Byrd and Gelb, 1990: 359).

<sup>70</sup> This finding is consistent with Helen Siu’s field study in a town government in the Pearl River Delta, Nanxi Town in which only rural residents who had immediate families in town were to register to be the as *zili kouliang hu* (households who supply their own grain) (Siu, 1990: 72).

<sup>71</sup> Certainly, the average size of towns are usually bigger than villages, this interpretation is solely based on comparison of coefficient. That is one percent increase in towns areas is usually bigger than one percent increase in village size. Therefore, a lower effect on in-migration is a direct interpretation of a larger geographical size increment, such as comparing different in increment of actual geographical areas between towns and villages, with lower in-migrant percentage increase. Similar interpretation will also be shown at the comparison between towns’ and provincials’ fiscal decentralization coefficients

<sup>72</sup> While the argument may be that the HRS relaxed the labor rights and induced the intra-province rural-urban migration, we also noticed the short period of change from zero to 100 percent from 1980 to 1984, during which the project was essentially fully completed. HRS has been covered at about 70 percent and 93.6 percent in 1982 and 1983, respectively; it is reasonable not to expect HRS to contribute too much to the variation of the dependent variable.

<sup>73</sup> Decomposing the MRR X Sharing Scheme effects rural-rural undocumented migrant mobility in this regression may add to the understanding of the dichotomy between Lin and Liu (2000) and Jin, Qian, and Weingast (2001), in their views about the contributions of fiscal decentralization on TVE development, as discussed previously.

<sup>74</sup> The interaction term of scheme *c* (remitting a fixed amount yearly) and scheme *e* (receiving a fixed amount yearly) also show slight significant negative effects to labor migration at the labor receiving provinces. However, as will be shown in Table 6, only the interaction term of scheme *a* and *c* show significant negative effects. That means only remitting a share of local revenues and a fixed amount of revenue could have incentive effects at the provincial level.

<sup>75</sup> In the first stage of the selection model, I hypothesize that the selection is due to the GDP levels at the origin and destination, road density, provincial governor’s party index, and the provincial level fiscal decentralization index are matters for the rural-rural migration decision in different models in Table 5. The second stage is the original gravity model.

<sup>76</sup> With regards to geographical variables, the roads’ density, while not being significant as an index of accessibility, shows that the more accessible the place is, the less the transaction-cost of moving. This is similar to the history of Taiwan’s industrialization during the 1960s and 1970s, where because of the high



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quality of roads, labor could easily move back and forth without necessarily migrating to one destination and this caused slower urbanization (Parish, 1994).

<sup>77</sup> As you will see in Table 6's model 2, when other control variables and in-migration variables are added to the model, the Rho is significant at 10% level. However, in general, the selection bias problem does not affect the original results significantly. The reason why selection bias does not affect the original model may be as follows. Theoretically, rural surplus labor will go anywhere in which expected wages are higher than their rural income. Given the low income from the peasant economy in China, the incentive of rural residents to migrate to other rural non-farm jobs that pay higher than rural works is clear. Many labor researches in China have already showed that there is a lot of surplus rural labor at the beginning of the reform ready to migrate. However, the *hukou* system makes these migrants unlikely to work at destinations where local authorities prohibit it. Thus, consistent with other researches (Meng, 1990; Oi, 1990), the selection problem/power may be more driven by the demand side at the local government level.

<sup>78</sup> This finding makes logical sense because the "outputs volumes" are the sum of all of the investments, inputs, and the make-up margins; therefore, the labor share in the outputs is lower than its share in investments, as the denominator is large in the TVEs' output variables.

<sup>79</sup> As shown in the theoretical discussions before, it is a way to connect the two variables with government budget concerns.

<sup>80</sup> Let the variable "lgextot" be the log of provincial government budget. The robust OLS regression result is:  $lgextot = 0.5 lviltown + 0.26 lcoun.gov$ . Both of the coefficients are significant at  $P < 0.001$  in t-statistics. The R-squared is 0.32, which means that 32 percent of the variations in provincial governments' budgets could be explained by the variations in village in town and town in a province. Since provinces' matrix is symmetric, the results are identical on both the labor-receiving and labor-sending sides. The regression results are available upon request.

<sup>81</sup> Table 6 also added a set of control variables, GDP per capita difference, distance, and agricultural population per village, in the original Heckman Model. Table 6's model 1 shows that it makes sense that the GDP per capita difference between the sending province and the receiving province is increasing, and the labor demand is reducing, as there is expected income benefit to migrate in general if the sending province has a higher GDP. In addition, the longer the distance between the two provinces, the less likely is migration to occur. However, they are not very significant in determining the labor migration in this model. Instead, the agricultural population per village might have an effect on labor-receiving provinces, in which its one percent increase will result in 0.44 percent reduction in migrant labor demand; however, there is no significant effect on labor-sending provinces. Consistent with the literature review, the labor-receiving provinces are inclined to use their own labor rather than migrant workers, i.e., the "outsiders" (Siu, 1990).

<sup>82</sup> Please see Appendix 1 and Table 4 for the descriptions and measures of the two concepts.

<sup>83</sup> As has been shown in the first stage of the Heckman Model at the model specification section, I use the variable "gdp per capita" at the labor sending and receiving provinces to identify the regression, but do not have strictly exclusion restrictions. Thus, I regress the model using maximum likelihood suggested by Wooldridge (2002, section 17.4.1). Results in Table 6 also corrected for heteroskedasticity with robust standard errors. Certainly, I still rely on the normality assumption for the proper identification of the selection effect in the model. Since there is no direct test for the normality assumption, and as Winship and Mare (1992) suggest the Heckman model is very sensitive to bivariate normality, I alternatively evaluate the robustness of the normality assumptions by clustering the regressions. The intuition is that if the normality assumptions do not hold in the model, the estimates will likely be sensitive to alternative error distribution assumptions. Of course, this is a very weak test of normality when absent of real exclusion criterion, but it can at least identify some problems and when I do other checks, the results hold.

<sup>84</sup> Perhaps this have produced two side-effects on these models: the land variable turns no significance at the labor-receiving side and the party index at the labor-sending province is significant now.