INTERPROVINCIAL MIGRATION IN CHINA: THE EFFECTS OF INVESTMENT, MIGRANT NETWORKS AND THE "GO WEST" POLICY

by

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Abstract

Since the late 1980s, the Chinese government has gradually eased restrictions to internal migration. This easing, along with rapid growth of the Chinese economy, substantial increases in foreign and domestic investments, and policies encouraging development in the Western provinces, have greatly stimulated internal migration. Earlier studies have established that since the 1980s, migration patterns have been responsive to spatial differences in labor markets in China, particularly during the 1990s. However, other important economic determinants of interprovincial migration flows have not yet been examined. These include migrant networks, foreign direct and domestic fixed asset investments, and government policies designed to encourage Westward migration. We estimate an economic model of interprovincial migration in China that includes as explanatory variables regional economic conditions, human capital, domestic and foreign investments, amenities and migrant networks, using province-level data from the National Census and China Statistical Press for the 1980s and 1990s. To account for possible two-way causality between investment and migration and between the two forms of investment, we also report 3SLS estimates. Among key results, we find strong evidence that migration is influenced by the size of the pre-existing migrant community, investments and spatial differences in economic conditions. However, we find no evidence that the "Go West" policy influenced migration patterns in the late 1990s.

I. INTRODUCTION

For researchers studying internal migration in transition economies, China is a tremendously valuable natural experiment. Since the 1980s, there has been a gradual easing of restrictions on internal migration in China.[1] During the same period, comprehensive market reforms[2], the effects of globalization and large infusions of foreign direct investment have all created considerable prosperity in China, but have also contributed to significant interregional, especially rural-urban, income inequality. These conditions were ripe for internal migration and China experienced a surge in such migration between the 1980s and 1990s. Based on the 1% population sample survey of

[1] For those not familiar with the migration-related policy changes in China, between 1949 and 1978 migration within China was very strictly controlled by the government's *hukou* system, a household registration system that was designed to directly regulate population redistribution, as well as to provide the government with a mechanism for gathering population statistics and to identity personal status. Under the hukou system, households had to register with the government, the government assigned persons jobs and rationed living necessities in urban areas. If a person wanted to move, approval had to be obtained from his/her local government. Consequently, intra- and interprovincial migration were rare, except for situations involving "planned" migration from the Eastern parts of the country to the much less-populated Western areas during the Cultural Revolution period of the 1960s and 1970s. Since 1978, when the government initiated the *Comprehensive Economic Reform* (CER) program, the hukou system has been incrementally dismantled. The first step towards dismantling came with the introduction of identity cards in the late 1980s, which allowed persons to travel around China without showing an official "permission" letter from his/her local government. The next step was the abolition of grain rationing coupons in the early 1990s; these coupons were the means by which people obtained food rations and they could only be used in the place of residence. With the abolition of the coupons, individuals were free to obtain food where they wished. A third step occurred in 2001, when residency in small towns and townships was open to all rural workers who were legally employed and had a place to live. At roughly the same time, medium-sized cities and some provincial capitals eliminated ceilings on the number of rural workers who could apply for permanent residence status. Some very large cities such as Shanghai and Beijing concurrently eased restrictions on the in-migration of rural workers.

[2] There were two important economic initiatives in China that greatly encouraged internal migration. The first initative was the decollectivization of agriculture (also known as the inception of the *household responsibility system*) in rural areas. The most important aspect of this reform is that it freed workers to choose how they wanted to allocate their labor supplies. This encouraged many workers to leave the agricultural sector and seek employment in other sectors, most notably enterprises in urban areas. The second initiative consisted of a set of market-oriented reforms in the urban areas during the late 1980s. The government, in an effort to attract foreign direct investment, created favorable provisions, e.g. tax concessions and attractive terms for leasing land, to many coastal cities so they could establish economic development areas and high technology development zones. In the 1990s, the government gave special tax and regulatory treatment to certain areas (what could be called "special economic zones"), which generated large amounts of FDI. These economic reforms had the effect of creating large real income differentials between the Eastern provinces and the rest of China, encouraging Eastward migration.

1987, it is estimated that over 30 million Chinese relocated during 1982-87. Using data from the 2000 Chinese Census, researchers have estimated that the total migrating population during 1995-2000 was over 144 million, or about 12% of the Chinese population. Much of this surge in migration has involved rural residents moving to urban areas, particularly the metropolitan coastal cities and Beijing.

Prior to 1987, research on internal migration in China was severely hampered because national level data on internal migration generally did not exist. The first national data set that included questions about migration was the 1987 1% population survey, and 1990 was the first year in which the government collected data on migration in the population census. The 1990 census asked questions about both inter- and intra-provincial migration for the period 1985-90 and the 2000 census gathered information about migration during the period 1995-2000. There have also been a number of household surveys in specific areas of the country, in which questions about migration have been asked.

As a result of this relatively new data on migration patterns, a small and mostly empirical literature focusing on the determinants of internal migration in China has begun to emerge. This literature consists of a handful of studies utilizing micro-data obtained from special household surveys (see, for example, Liang (2001), Liang and White (1996,1997), Zhao (1997,1999a, 1999b, 2002, 2003), Liang, Chen and Gu (2002)) and a few studies utilizing province-level aggregate data provided by the central government (see, for example, Lin, Wang and Zhao (2004), Poncet (2006) and Bao, Hou and Shi (2006)). The primary objective of these studies has been to ascertain to what extent an individual's propensity to migrate or the strength of migration flows are driven by spatial differences in labor market conditions.

Among the studies that have utilized province-level aggregate data on migration flows, the general finding has been that the flows were responsive to regional differences in income and unemployment rates during the 1980s and 1990s, controlling for other factors, but the responsiveness of migration to income and unemployment was generally greater during the 1990s.[3] These studies also found that migration flows are inversely related and very sensitive to distance between origin and destination (Lin, Wang and Zhao (2004), Poncet (2006), Bao, Hou and Shi (2006)) and domestic trade barriers (Poncet (2006)), positively related to the destination population's level of educational attainment[4] (Lin, Wang and Zhao (2004)), responsive to regional differences in climate (Lin, Wang and Zhao (2004)) and to the agricultural industry's share of provincial employment (Bao, Hou and Shi (2006)). However, there are other potential determinants of interprovincial migration that have not been included in these analyses, hence a need for more research.

In this study, we contribute to ongoing research on the determinants of interprovincial migration flows in China by examining three additional determinants not examined in earlier studies: (1) *Migrant networks*. Many studies on both internal and international migration have shown that current flows of migrants from place i to place j are often strongly influenced by the number of persons residing in j who previously migrated from

[3] For example, Lin, Wang and Zhao (2004), using 1990 and 2000 Census data on interprovincial migrant flows, found that, after controlling for distance, relative educational attainment, relative unemployment rates, the relative degree of urbanization and climatic differences, migration did not respond to income differences during 1985-90, but was relatively sensitive to these differences during 1995-2000. Poncet (2006), utilizing both Chinese Census data from 1990 and 2000 and 1995 National Population Survey data, found that migration was responsive to regional income differences during both the 1980s and 1990s, but the responsiveness was greater in the later period. Both studies attribute the greater sensitivity of interprovincial migration to spatial differences in income during the later period to the significant reduction in migration barriers that occurred during that period. Both these studies measured income as mean per capita income in each province, obtained from the National Bureau of Statistics. In contrast, however, Bao, Hou and Shi (2006), using data on per capita GDP to proxy provincial income per capita, found that during the 1990s there was actually no relationship between income and interprovincial migration flows.

[4] Only for the 1990s, however.

i. These are often called “kinship” or “network” effects on migration; the presence of friends, family and other contacts already at the destination tends to lower the psychic and information costs generated by migration. Zhao (2003) examined the influence of migrant networks on Chinese internal migration using household survey data from rural China and found that experienced migrants have a positive and significant effect on subsequent migration, but return migrants have no effect. One of the goals of our study is to determine whether a migrant network effect can be observed on a national level using data on interprovincial migrant flows.

The second determinant of interprovincial migrant flows is investment spending in the province, specifically residential and commercial construction spending (domestic fixed asset investment) and foreign direct investment (FDI). Between the 1980s and 1990s, there has been a very sharp increase in both types of investment spending in many of the provinces. According to the China Statistical Press, mean annual per capita FDI in each province increased from US$3.14 during 1985-90 to US$44.62 during 1995-2000. Much of this increase went to specific areas in the country designated by the government to receive special treatment with respect to economic development. According to the same source, mean annual fixed asset investment per capita in each province rose from 395 Yuan during 1985-90 to 2,546 Yuan during 1995-2000. Higher investment spending in a province may induce “demand-pull” migration; greater spending on infrastructure, for example, will increase the demand for labor, including migrant labor. However, the causation may also be in the reverse direction – increased migration (resulting from easing of restrictions on migration) may induce more investment spending as provinces must spend more to accommodate the greater demand for housing. Liang and White

(1997) tested for effects of province-level foreign investment on the likelihood of an individual migrating from the province using data taken from a 10% random sample of the China 2/1,000 Fertility and Birth Control Survey, and found no evidence of such effects. We contend that any effects of FDI or domestic fixed asset investment spending on migration decisions are much more likely to be observed in aggregate data, as opposed to micro-data sets obtained from household surveys in very small parts of the country.

The third determinant is the central government's late-1990s initiative to encourage migration of labor and capital to the Western provinces, what is often called the "Xibu Da Kaifa" ("Go West") policy[5]. An important question is: did the policy *ceteris paribus* heighten rates of migration to the Western provinces? Or, would Westward migration have occurred anyway as a natural response by the economy to spatial disequilibrium in labor markets?

The remainder of this paper is organized as follows. In the next section, we present a regression model of interprovincial migration flows, followed by a discussion of our data set and then empirical results obtained from both OLS and three-stage least squares estimation. The final section discusses implications for future research.

II. THE DETERMINANTS OF INTERPROVINCIAL MIGRATION; THEORY and EMPIRICAL SPECIFICATION

[5] To counter the East-West income disparities and the flood of Eastward migrants resulting from the relaxation of the Hukou system and the comprehensive economic reforms, the government shifted its strategy in the late 1990s to "Xibu Da Kaifa," which means "Go West." This policy offered incentives for enterprises to move to the Western provinces, which led to increased job opportunities in the Western part of the country and resulting return migration, as well as Westward flows of first-time migrants. Consequently, according to Bao, *et al* (2006), some Western provinces such as Xinjiang, Qinghai, Tibet, Yunnan and Ningxia have actually experienced net-inmigration since the new millennium.

We estimate an extended and modified version of the regression model of interprovincial migration used by Lin, Wang and Zhao (2004, page 596). The dependent variable is the log of the gross interprovincial emigration rate $\log(M_{ij})$, calculated as the volume of out-migration from province i to province j divided by the population of province i.[6] Our particular specification is the following:

(1) $\log M_{ijt} = \alpha_0 + \alpha_1 \log D_{ij} + \alpha_2 \log Network_{ijt} + \alpha_3 \log FDI_{it} + \alpha_4 \log FDI_{jt} + \alpha_5 \log INV_{it} + \alpha_6 \log INV_{jt} + \alpha_7 \log Y_{ijt} + \alpha_8 \log E_{it} + \alpha_9 \log E_{jt} + \alpha_{10} \log U_{it} + \alpha_{11} \log U_{jt} + \alpha_{12} \log R_{ijt} + \alpha_{13} \log Agr_{ijt} + \alpha_{14} \log T_{ij} + \alpha_{15} West_j + \alpha_{16} Period_t + \alpha_{17} (West_j)(Period_t) + \varepsilon_{ijt}$

where

D_{ij}: railway distance (in kilometers) between the capital city of province i and that of province j;
$Network_{ij}$: the size of the migrant community residing in j that hails from i, measured as the ratio of the stock of migrant residents to population;
FDI_i, FDI_j: the amount of foreign direct investment per capita (FDI divided by population) spent in province i and j, respectively;
INV_i, INV_j; the amount of domestic fixed asset investment per capita (investment divided by population) spent in province i and j, respectively;
Y_{ij}: per capita invome in province j divided by per capita income in province I (1985 incomes for the 1985-90 migration function, 1995 incomes for the 1995-2000 migration function);
E_i, E_j: mean number of years of schooling completed by residents of province i and j, respectively, 25 years of age and above, beginning of the period;
U_i, U_j: unemployment rates of the week preceding the implementation of the census in province i and j, respectively;
R_{ij}: the ratio of percent of population residing in urban areas of province j relative to that in province i in the census year;
$West_j$: dummy variable equaling one if the destination province is one of the 10 Western provinces;
$Period_t$: dummy equaling one if the observation is from the 1995-2000 period;
Agr_{ij}: the proportion of employed persons in province j comprising the agricultural sector relative to that in province i;
T_{ij}: mean yearly temperature in the capital city of province j divided by mean yearly temperature in the capital city of province i;
$\varepsilon_{ij:}$ random error term.

[6] Lin, Wang and Zhao calculated the migration rate out of total emigration from i, whereas we chose to calculate it out of population. Both approaches have been used in the internal migration literature and they are related because the volume of emigration tends to be proportional to population.

Railway distance and the migration rate are hypothesized to be inversely related; the greater is distance, the greater will be the direct costs of migration (train or bus fare, food and lodging expenses en route and upon arrival, for example) and the indirect costs of immigration (lost income due to down time between employment in the origin and employment in the destination, as well as the psychic costs of migration).

We hypothesize that the migration rate from province i to province j will be positively related to the size of the pre-existing migrant community in j that hails from i (the Network variable). The greater is the size of the migrant community already in the destination, the greater will be the benefits accruing to a prospective migrant from having access to information about employment opportunities provided by the community. Furthermore, the prospective migrant will tend to have stronger ties to family and friends in the destination when there's a larger migrant community already there, which will lead to greater psychological benefits from migrating.

The two investment variables, FDI and INV, are likely to have a two-way causal relationship, both with the migration rate, and with one another. One the one hand, greater FDI or domestic fixed asset investment in the destination (origin) should create a greater (lesser) incentive to migrate. Higher investment in the destination leads to increased demand for migrant labor and higher wage rates paid to migrant workers, resulting in a higher level of "demand-pull" migration. On this basis, destination FDI and INV will be positively related to the migration rate. We would hypothesize an inverse relationship between origin FDI or INV and the migration rate, as higher investment at home results in higher labor demand and wages there,

which would discourage prospective migrants from leaving. On the other hand, in-migration should encourage more investment; when there is a large influx of migrants to urban from rural areas, for example, the increased demand for housing should encourage more construction spending. Furthermore, the increased number of migrant consumers should lead to more commercial investment, both foreign and domestic. Finally, FDI may be functionally related to INV, and *vice versa*. If there is greater domestic fixed investment in a city, this could induce more foreign investment (especially if local authorities offer to match foreign investment) or less foreign investment (if foreign investment is viewed as a substitute for domestic investment). Because of the possible simultaneity between the two forms of investment and migration, one part of our econometric work will involve simultaneous equations estimation.

The agricultural employment share variable (Agr) is included as a control for industry/occupational mix in one province relative to another. The relationship between this variable and the migration rate could be positive or negative. For example, a higher ratio could be associated with greater rates of migration because in relatively agricultural provinces, the quality of jobs and income opportunities for workers tend to be lower. Residents of those provinces may have a greater propensity to migrate to other provinces where there are more attractive employment opportunities, especially opportunities where there is potential for skill-enhancement and long term job security. On the other hand, migration from agricultural provinces could be lower, all other things equal, because agricultural workers, due to earning lower wages and have lower skills on average, may have fewer resources to migrate.

The West, Period and West x Period interaction are included in the regression equations to account for regional and period differences in migration, as well as the possible effects of the central government's efforts during the late 1990s to encourage Westward migration. During the 1980s and part of the 1990s, Eastern China, particularly the coastal cities, experienced considerable prosperity relative to the West. This has been cited as a major factor for substantial Eastward migration during that period. Accordingly, the West variable is included as a control for any *ceteris paribus* regional bias against migration to the ten Western provinces.[7] The period variable is included as a general control for increased deregulation of migration during the later period. By including the interaction of West and Period, we control for the possible effects that the central government's "Xibu da Kaifa" policy may have had on migration during 1995-2000. If the policy did have the intended effect of inducing greater Westward migration, ceteris paribus, the coefficient on this interaction term will be positive.

Following the earlier literature on internal migration, we hypothesize that migration rates will be positively related to relative income in the destination (Y) because the returns to migrating will be higher the greater is the relative rate of return to supplying one's labor services in the destination. The migration rate is hypothesized to be positively related to the average level of educational attainment in the destination (E_j) because the existence of a better educated labor force there usually means a distribution of higher quality employment opportunities. However, using the same type of argument, greater educational attainment in the origin (a

[7] These provinces are Inner Mongolia, Sichuan, Guizhou, Yunnan, Guangxi, Shaanxi, Gansu, Qinghai, Ningxiz and Xinjiang.

higher value of E_i) is hypothesized to be inversely related to the migration rate. A higher relative unemployment rate in the destination (a higher value of U_j) is expected to discourage migration, but a higher unemployment rate in the origin is expected to encourage migration. Relative mean yearly temperature in the destination (T) is included as a control for amenities. It is presumed that migrants prefer warmer provinces, all other things equal, hence migration rates to warmer provinces should be higher. The relative urban population share variable (U) is included as a control for potential differences in the propensity to migrate between urban and rural residents, as well as the various amenities other than climate that may be associated with living in more urban provinces.

III. DESCRIPTION OF DATA

The data set used in this study is essentially an extension and modification of the data set used by Lin, Wang and Zhao (2004), in their study of migration between 29 Chinese provinces during the 1980s and 1990s. Lin, Wang and Zhao graciously agreed to share their data set with us and we used most of their data without any modifications. However, there are four variables included in our data set not found in Lin, Wang and Zhao's data set. These include measures of migrant network effects, foreign direct investment in each province, domestic fixed asset investment in each province and the agricultural industry's share of the provincial labor market.

Our data set consists of a total of 1,589 observations at the province level for the period 1985-2000. There are 29 provinces in our data set; as with Lin, Wang and Zhao, we exclude Tibet because of missing observations and treat Chongqing as part of Sichuan. Each of the 29 provinces was a prospective destination and a point of

origin for migration flows. Slightly less than half of the observations (777) are for the period 1985-90 and the remaining observations are for the period 1995-2000. In our regression analysis for the 1995-2000 sub-sample, we utilize data on interprovincial migrant flows during 1990-95. Tables 1 and 2 show summary statistics for all variables used in our regressions for the 1980s and 1990s sub-samples. Starting from the top of each table, we describe each variable, the data source from which the variable is drawn and the trends apparent in the data between the two periods:

(i) Out-migration – (gross interprovincial emigration). This is the number of persons migrating from province i to province j. These numbers are calculated from 1% of the 1990 population census and 0.95% of the 2000 population census[8], both sets of numbers published by the China Statistical Press. The volume of migration more than doubled from 405,000 during 1985-90 to nearly 900,000 during 1995-2000, or approximately 1.18% of population in the origin province to approximately 2%. The surge in migration can generally be attributed to market reforms, deregulation of the hukou system and generally rising prosperity across the country. Provincial population data, which were used to calculate migration rates, are from the 1990 (for the 1985-90 period) and 2000 (for the 1995-2000) censuses, published by the China Statistical Press. Note that between periods, mean provincial population rose 9.44%.

[8] As pointed out by Lin, Wang and Zhao, there is a small difference between the 1990 and 2000 censuses with respect to how migration is defined. If a person is observed to change residence *and* to change their household registration (a situation called *hukou* migration), then this movement as classified as "migration" in both censuses. If, however, the person is observed to change residence without changing registration (the case of *non-hukou* migration), then the movement is classified as "migration" only if the migrant has been away from the place of registration for a minimum period of time. In the 2000 census, this period is 6 months, but in the 1990 census it is one year. To account for this change in classification between the two periods, the migration numbers in both periods were standardized by discounting the 2000 numbers by a small amount, approximately 5%. For further details, see Lin, Wang and Zhao (2004, page 593).

Sichuan province experienced the highest volume of interprovincial emigration, Ningxia province the lowest. For both periods, Guangdong province had the lowest migration rate (less than ½ of 1%), compared to Qinghai and Jiangxi, who had the highest rates during 1985-90 and 1995-2000, respectively. It is also important to note that the variation in migration rates across provinces rose appreciably between the two periods; the coefficient of variation was approximately 38% during 1985-90 and rose to approximately 64% during 1995-90;

(ii) The size of the migrant network originally from province i that resides in province j (NETWORK). The ideal measure of the size of a migrant network is with a stock variable, specifically the stock of previous migrants residing in the destination province at one point in time. Unfortunately, unlike data sets in the USA and many European countries, such a stock measure is not available in Chinese data sets. Therefore, we had to measure the size of the migrant community using data on past migrant *flows*. There are no data on interprovincial migrant flows prior to 1985, so our regression analyses for the 1985-90 period could not include a control for migrant network effects. However, in our regression analyses for the 1995-2000 period, pre-1995 migrant flows could be used to proxy the size of the migrant network. Consequently, we estimated the size of the migrant community residing in province j that hails from province i in 2000 by taking the ratio of migration from i to j during 1985-95 to j's population in 2000. The implicit assumption underlying these calculations is that the stock of previous migrants is proportional to the size of the previous flow of migrants. While not an ideal measure, we believe that by using data on flows over a longer (10-year) period, it should be relatively accurate. Based on our

calculations, the mean value of the migrant community in the destination province is 0.08% of population, with a maximum value of 2.51% and a minimum value of approximately 0;

(iii) Annual FDI per capita in the province. FDI data were obtained from the China Statistical Press and are measured on an annual basis in U.S. dollars. For each period, we used the mean of annual FDI. For most of the provinces, FDI numbers were available for each of the 5 years in each period, but for some there would be missing years. Comparing Tables 1 and 2, there was a dramatic increase in FDI between the two periods, reflecting the surge in interest by international investors in the Chinese economy during the 1990s. In both periods, the places receiving the highest levels of FDI on a per-person basis tended to be the main cities in China. During 1985-90, Beijing received the most FDI ($27.04 per capita), followed by Shanghai and Guangdong province. In contrast, Inner Mongolia received nearly zero FDI during 1985-90, followed by Gansu and Anhui provinces. During 1995-2000, however, it was Tianjin that was the largest recipient of FDI ($230.96 per capita), followed by Shanghai and Beijing, whereas during 1995-2000 the lowest amount was experienced by Guizhou province ($1.18), followed by Xinjiang and Gansu provinces;

(iv) Domestic annual fixed investment per capita. The Chinese provinces experienced over a six-fold increase in per capita domestic annual fixed investment between 1985-90 and 1995-2000, reflecting a boom in residential and commercial construction. However, there is great disparity across provinces with respect to the level of construction spending. During 1985-90, Beijing experienced the highest level of fixed investment (1,236 Yuan per capita), whereas Guizhou province experienced the

lowest (129.09). However, during 1995-2000, Shanghai experienced the highest level (approximately 11,400 Yuan per capita), whereas Guizhou again experienced the lowest level (approximately 800 Yuan). The large differences in investment across the provinces is evident in the relatively high coefficients of variation – 79% during 1985-90 and 98% in the later period. Data ib fixed asset investment were obtained from the China Statistical Press;

(v) The agricultural industry's share of employed persons in the province. These data were obtained from the China Statistical Yearbooks. Technically, agriculture is classified as the "Primary" industry in China and it includes farming, forestry, animal husbandry and fisheries. There is considerable variation in the dominance of the agricultural sector across China. In both periods, Yunnan province had the highest agricultural share, whereas the lowest shares were Shanghai (1985-90) and Beijing (1995-2000).

Data on the remaining variables are from Lin, Wang and Zhao; please refer to their paper for details on data sources and measurement of these variables;

(vi) Mean per capita income. Note that income data for the earlier period are for 1989, whereas for the later period are for 1999. For both periods, the highest income area was Shanghai and the lowest was Gansu province;

(vii) Mean years of schooling. During both periods, the most well-educated population was Beijing, whereas the lowest was Guizhou province. Note that educational attainment rose by nearly 25% between periods, despite secondary education not being free in China;

(viii) Unemployment rates. There are considerable differences between periods in the behavior of the unemployment rate. The unemployment rate increased dramatically in the later period. The highest unemployment rates occurred in the metropolitan areas (Beijing during 1985-90 and Shanghai during 1995-2000), whereas the lowest unemployment rates were in Shandong (1985-90) and Yunnan (1995-2000).

IV. EMPIRICAL RESULTS

We estimate six versions of equation (1). In the first three versions, we use OLS and in the second three, we use three-stage least squares (3SLS) estimation techniques. Table 3 shows the results of OLS estimation and Table 4 the results of 3SLS estimation. For each type of estimation technique, we first estimate equation (1) for the full sample (migrant flows for 1985-90 and 1995-2000 combined). This was done in order to test for any *ceteris paribus* effects of the "Xibu Da Kaifa" policy on interprovincial migration trends during the later period (captured by the Period x West interaction), as well as other factors that may have resulted in differences in migration patterns between periods (the "Period" variable). After eliminating observations where province-to-province migration was zero (due to the log-linear specification), a total of 1,481 observations were used for the full sample regressions. Equation (1) was then estimated for the 1985-90 period only. In that version, the control for past migrant flows (Network), the Period variable and the Period x West interaction were not included. Estimation of equation (1) for 1985-90 utilized 777 observations. Then, we estimated equation (1) for the 1995-2000 period only. Estimation of this version allowed for us to test for the effects of past migration. After eliminating observations where interprovincial migration was zero during 1995-2000, as well as during 1985-95, a total of 696 observations were used.

We turn our attention first to Table 3. We find strong evidence of a migrant network effect; the coefficient on past migrant flows for the later period is positive and significant at better than 1%. Specifically, the coefficient predicts that when the size of the migrant community from province i residing in province j rises by 1%, the rate of migration from i to j rises by just under one-half of one percent. This supports the general hypothesis advanced in other studies that larger migrant networks encourage migration because they lead to lower psychic costs of migration, as well as lower costs of job search in the destination.

It is important to interpret the estimated coefficient on the migrant network measure in conjunction with the estimated coefficients on railway distance for all three regressions, as well as in the context of the results on railway distance obtained in Lin, Wang and Zhao's (2004, page 597) study. First, note that the distance coefficient is negative and significant at better than 1% for all three regressions. This is entirely consistent with theory; greater distance raises the costs of migration, direct and indirect, and deters migration. Lin, Wang and Zhao also found that distance was inversely related to the migration rate and their results were significant at better than 1%. Second, observe that the distance coefficient in Table 3 is less negative in the later period regression. Furthermore, when we estimated the regression for the later period without a migrant network variable, the coefficient on distance was more negative (-1.01) compared to the regression reported in Table 3. In fact, our coefficients for distance are quite similar to the coefficients obtained by Lin, Wang and Zhao (who did not control for migrant networks); Lin, Wang and Zhao obtained a coefficient of -1.27 for the early period and -0.9 for the later period. Both studies demonstrate that migration is generally less sensitive

to distance in the later period, but our study further demonstrates that the sensitivity is much lower when a control for past migration is included.

We contend that distance and the size of the migrant network are linked by the psychic costs of migration; greater distance tends to increase psychic costs, whereas a larger migrant community in the destination tends to reduce them. We concur with Lin, Wang and Zhao (page 596) that the reason their distance coefficient was less negative in the later period is because, and we quote them, "…it is also possible that the psychic costs of migration are declining due to the expansion of migrant networks in destinations so that long-distance migration is less intimidating." Lin, Wang and Zhao's results for the distance variable between periods likely reflect the growth in the size of the migrant network in the later period, but also omitted variables bias; the distance variable in their regressions are likely capturing the effects on the migration rate of an omitted migrant networks variable. Furthermore, the reason our distance coefficient in the later period regression was much more negative when a migrant network control was excluded is because that coefficient reflects omitted variables bias. All this underscores the importance of including a control for past migration when studying the determinants of interprovincial migration in China.

The results in Table 3 for the estimated effects of domestic fixed asset investment and foreign direct investment on interprovincial migration rates are generally mixed. For the full sample and for the early period, there appears to be no relationship between fixed asset investment spending in the destination and migration rates. However, in the later period, an increase in this type of investment spending in the destination appears, at the 1% significance level, to *deter* migration there. This is not consistent with what theory

would predict; higher levels of construction spending in the destination should encourage demand-pull migration. Instead, according to the later period regression, a 1% increase in investment is predicted to cause the migration rate to fall by approximately 0.4%. On the other hand, higher fixed asset investment in the origin is predicted, according to all three regressions, to encourage more out-migration. On the one hand, theory would predict that more investment spending in the origin should discourage migration. On the other, more investment spending, by creating greater overall prosperity, could encourage migration because it is now more affordable than before. The latter explanation could be the rationale behind the consistently positive coefficient across all three regressions.[9]

The coefficient estimates on the FDI variable are generally more supportive of theory. For the combined period and earlier period regressions, higher per capita FDI in the destination encourages in-migration. According to the full sample regression, a 1% increase in FDI raises the migration rate by approximately 0.06%, whereas in the early period regression the migration rate is predicted to rise by approximately 0.1%. There appears to be no relationship between FDI per capita in the origin and out-migration from there, however.

We find generally no evidence that the "Xibu Da Kaifa" policy induced any *ceteris paribus* effects on migration, particularly to the Western provinces. One possible reason is that the policy itself may have been much more politically motivated than economically motivated. Therefore, a full explanation of the effects of the policy may

[9] In our regressions, the migration rate during 1985-90 (1995-2000) is regressed on the average annual level of fixed asset investment per capita during 1985-90 (1995-2000). However, given the nature of residential and commercial construction, new spending may only induce effects on migration until much later. Therefore, a more appropriate test might be to regress migration rates on *lagged* investment.

require the inclusion of variables that measure political, as opposed to economic, conditions in the Western provinces. Thus, this particular finding deserves further study.

For the full sample and early period regressions, *ceteris paribus*, migration rates to the Western provinces were higher than to the rest of the country. For both regressions, migration rates were between approximately 0.35% and 0.4% higher than to other parts of the country. The reason, therefore, that the "West" dummy is significant in the full sample regression is because of its significance in the earlier period. There were, however, no differences in migration rates between the two sample periods, all other things equal. We interpret these results as suggesting that government policies, either during the 1990s or over the whole period, neither encouraged nor discouraged interprovincial migration. Instead, the observed bias in favor of Westward migration may simply reflect the natural adjustment of the national Chinese labor market to spatial disequilibrium that resulted from the rapid prosperity that occurred in the Eastern part of the country, particularly in the large coastal cities, during the 1980s. It may be that this adjustment had been completed by the start of the 1990s.

For all three OLS equations, the coefficient estimates for educational attainment, unemployment rates and relative temperatures are all consistent with theory, significant at 5% or better and robust. Note how sensitive migration rates are to schooling in both the origin and destination. For example, for the full sample regression, when mean schooling is higher by a year in the origin, the out-migration rate falls by 1.5%; when mean schooling in the destination rises by one year, the in-migration rate rises by nearly 2%. The effects of schooling are the greatest during the later period. These results may be taken as strong evidence of the social externalities that come with higher education, e.g.

better quality jobs, higher returns to all economic activities in the province and a higher quality of life. As hypothesized, higher unemployment rates in the origin encourage out-migration; for the full sample, a 1% increase in the origin's unemployment rate induces a 0.2% increase in out-migration, whereas a 1% increase in the destination's unemployment rate induces about a 0.6% drop in the in-migration rate. As with the schooling variable, the effects of unemployment on interprovincial migration are the highest in the later period. The greater sensitivity of migration to changes in educational endowments and job market conditions may be due to the greater ability of migrants to make adjustments, due to lower transportation costs and greater supply of job market information during the 1990s. Finally, provinces with warmer temperatures clearly offer migrants a preferred amenity; in the full sample regression, provinces that are warmer by one degree Celsius will have migration rates that are just under 0.2% higher than other provinces, all other things equal. This generally supports the hypothesis advanced by many regional economists that migrants respond not only to spatial differences in real incomes, but also to spatial differences in amenities such as climate.

We also estimated a version of equation (1) using 3SLS to account for possible two-way causality between the two forms of provincial investment and the endogeneity of either form of investment to migration. To simplify the estimation procedure, we: (a) consolidated the two fixed asset investment variables by calculating the log ratio of fixed asset investment per capita in the destination to the same in the origin ($\log(INV_{jt}/INV_{it})$); (b) consolidated the two FDI variables by calculating the log ratio of FDI per capita in the destination to the same in the origin ($\log(FDI_{jt}/FDI_{it})$); (c) included the log ratio of destination to origin urban population shares variable R as an instrument in the fixed

asset investment equation; and (d) included the log ratio of destination to origin agricultural employment shares variable (Agr) as an instrument in the FDI equation. The resulting three-equation model was then estimated:

(2) $\log(INV_{jt}/INV_{it}) = \lambda_0 + \lambda_1 \log(FDI_{jt}/FDI_{it})) + \lambda_2 \log M_{ijt} + \lambda_3 \log R_{ijt} + \Omega_{1ijt}$

(3) $\log(FDI_{jt}/FDI_{it})) = \theta_0 + \theta_1 \log(INV_{jt}/INV_{it}) + \theta_2 \log M_{ijt} + \theta_3 \log Agr_{ijt}$

(4) $\log M_{ijt} = \rho_0 + \rho_1 \log D_{ij} + \rho_2 \log NETWORK_{ijt} + \rho_3(\log(FDI_{jt}/FDI_{it})) + \Omega_{2ijt}$

$\rho_4(\log(INV_{jt}/INV_{it})) + \rho_5 \log Y_{ijt} + \rho_6 \log E_{it} + \rho_7 \log E_{jt} + \rho_8 \log U_{it} + \rho_9 \log U_{jt} + \rho_{10} \log T_{ij} +$

$\rho_{11} West_j + \rho_{12} Period_t + \rho_{13}(West_j)(Period_t) + \Omega_{3ijt}$,

where Ω_1, Ω_2 and Ω_3 are random error terms.

We present 3SLS results for equation (4) only in Table 4.[10] Generally, these results are mixed. There is no evidence of a migrant network effect, although the effect of distance is significant and in the hypothesized direction for the full sample and early period regressions. Note that the estimated coefficients on the distance variable in the full sample and early period regressions are not too different from the coefficients obtained from OLS estimation. For the full sample, the FDI ratio is positive and significant at better than 1%, confirming what theory would predict. In fact, the sensitivity of the migration rate to the FDI ratio is very large; when the ratio rises by 1%, the migration rate rises by nearly 5.5%. However, the migration rate and the fixed asset investment ratio are inversely related (significant at better than 1%) for the full sample, which is not

[10] Results from the estimation of equations (2) and (3) are available from the authors upon request. We found for equation (2) that the fixed asset investment ratio was positively and significantly related to the FDI ratio, but there was no relationship between the fixed asset investment ratio and the migration rate. However, the fixed asset investment ratio was positively related to the urban population share ratio (significant at better than 1%), which is consistent with intuition; construction spending per capita should be higher in more urban areas. We found for equation (3) that the FDI spending ratio was positively and significantly related to the fixed asset investment ratio and positively related to the migration rate, both consistent with intuition. The FDI spending ratio was positively related to the agricultural employment share ratio, implying that FDI spending in the destination relative to the origin is higher when the agricultural sector has a higher presence in the destination (significant at better than 1%).

in the expected direction. Furthermore, there appears to be no relationship between the migration rate and this ratio for the other regressions.

We do find strong evidence from 3SLS estimation of a "Xibu Da Kaifa" policy effect: the policy *discouraged* Westward migration, completely opposite to its intended effect! Specifically, migration rates to the Western provinces were approximately 2.7% lower during the 1990s than they were to other provinces in either period. Again, this may suggest that the policy was more politically motivated than economically motivated. As with the OLS estimation, we find strong evidence for the full sample that migration to the Western provinces was higher, all other things equal, and that *ceteris paribus* migration was higher during the 1990s. The results for the income variable are not supportive of theory, whereas some of the results for schooling are. Perhaps the strongest results are for the unemployment rate in the destination province; for the full sample, when the unemployment rate in the destination rises by 1%, the migration rate falls by over 4%.

V. CONCLUDING REMARKS

We have established in this study that, in addition to spatial differences in labor market conditions, climate, human capital endowments and climate, there are other important determinants of migration flows within China. The most important of these are migrant networks; migration during 1995-2000 appears to have been strongly influenced by migration flows during the previous decade. We found that when we controlled for network effects in our regressions, the marginal effect of distance on migration flows fell appreciably, thus the very strong effects of distance on migration found in previous studies were likely to be upwardly biased due to the omission of a migrant network

control. Thus, in any study of internal migration in China, it is important to control for past migration. We find some evidence that destination FDI encourages migration, but that is not the case for fixed asset investment in the destination. Higher levels of fixed asset in the origin were found to be associated with higher levels of migration, a result that requires further investigation. Further investigation of two-way causality between investment and migration (and between the two types of investment) is needed in future research. We find no evidence that the "Go West" policy necessarily encouraged Westward migration, controlling for other factors. Finally, most of our results for the variables used in previous studies of interprovincial migrant flows generally replicate the findings of previous researchers.

For internal migration researchers, China is and will continue to be a significant natural experiment in deregulation of migration, coinciding with national economic prosperity, market-oriented reforms, foreign direct investment and globalization. There is great need for future research on this subject, as interregional labor mobility will be a prime contributor to China's success in completing its transition to a market economy.

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TABLE 1
Summary Statistics for Provinces
in 1980s Sub-sample

Variable	Mean	Standard Deviation	Maximum	Minimum
Migration (during 1985-90)	405,000 (out of total of 11,745,000)	284,820	1,352,700 (Sichuan)	76,800 (Ningxia)
Population (as of 1990)	38,108,360	24,088,870	86,490,000 (Henan)	4,656,800 (Ningxia)
Migration rate out of population	1.1757%	0.4504%	2.1802% (Qinghai)	0.4134% (Guangdong)
Annual Foreign Direct Investment Per Capita (Between 1985 and 1990)	US$3.14	US$6.33	US$27.04	US$0.01
Annual Fixed Asset Investment Per Capita (Between 1985 and 1990)	394.86 Yuan	311.01 Yuan	1,479.81 Yuan	129.09 Yuan
Railway distance between capital cities of origin and destination provinces	1,630.76 Kilometers	1.87 Kilometers	6,313.21 Kilometers	137 Kilometers
Mean per capita income (as of 1989); in 1985 prices	507.82 Yuan	184.91 Yuan	1,084.53 Yuan	340.53 Yuan
Mean years of schooling (as of 1990)	6.426	1.248	9.463	4.379
Unemployment rate (as of 1990)	1.214%	0.767%	4.11%	0.28%
Urban share of population (as of 1990)	30.8%	16.4%	73.4%	14.9%
Mean yearly temperature	14.113 C	5.176 C	24.517 C	4.608 C
Agricultural industry's share of employed persons (as of 1990)	56.61%	17.95%	79.98%	11.08%

TABLE 2
Summary Statistics for Provinces in 1990s sub-sample

Variable	Mean	Standard Deviation	Maximum	Minimum
Migration (during 1995-2000)	898,130 (out of total of 26,045,780)	952,582	4,125,322 (Sichuan)	61,776 (Ningxia)
Population (as of 2000)	41,706,310	26,018,930	91,236,900 (Henan)	4,823,000 (Qinghai)
Migration rate out of population	2.008%	1.2931%	5.2425% (Jiangxi)	0.4259% (Guangdong)
Annual Foreign Direct Investment Per Capita (Between 1995 and 2000)	US$44.62	US$65.88	US$230.96	US$1.18
Annual Fixed Asset Investment Per Capita (Between 1995 and 2000)	2,536.24 Yuan	2,217.99 Yuan	11,399.83 Yuan	789.33 Yuan
Railway distance between capital cities of origin and destination provinces	1,630.76 Kilometers	1.87 Kilometers	6,313.21 Kilometers	137 Kilometers
Mean per capita income (as of 1999); in 1985 prices	1,062.61 Yuan	447.27 Yuan	2,451.51 Yuan	605.26 Yuan
Mean years of schooling (as of 2000)	7.976	1.038	10.558	5.974
Unemployment rate (as of 2000)	4.392%	2.445%	9.64%	1.36%
Urban share of population (as of 2000)	40.0%	18.7%	90.7%	18.6%
Mean yearly temperature	14.113 C	5.176 C	24.517 C	4.608 C
Agricultural industry's share of employed persons (as of 2000)	48.77%	15.41%	73.88%	11.77%

TABLE 3
OLS REGRESSION RESULTS
Dependent Variable = Gross Interprovincial Migration Rate
(Standard Errors in Parentheses; * denotes significant at 1%, ** at 5%, * at 10%)**

REGRESSOR	FULL SAMPLE (1985-90 AND 1995-2000)	EARLY PERIOD ONLY (1985-90)	LATER PERIOD ONLY (1995-2000)
Log (past migrant flow (during 1985-95) to destination population in 2000)			0.46428*** (0.02619)
Log (railway distance between capitals of the provinces in kilometers)	-1.1052*** (0.05081)	-1.2535*** (0.07613)	-0.4113*** (0.06504)
Log (ratio of mean per capita incomes)	1.2018*** (0.1744)	0.19598 (0.3339)	2.0118*** (0.1836)
Log (schooling years in origin province)	-1.5097*** (0.2831)	-1.1193*** (0.3581)	-3.3368*** (0.4496)
Log (schooling years in destination province)	1.9314*** (0.3159)	2.0494*** (0.3971)	2.1061*** (0.4843)
Log (unemployment rate in origin province)	0.19735*** (0.07164)	0.33322*** (0.0973)	0.76924*** (0.1183)
Log (unemployment rate in destination province)	-0.62238*** (0.07858)	-0.77416*** (0.1029)	-0.80262*** (0.1162)
Log (ratio of destination to origin urban population shares)	-0.34086*** (0.1327)	0.17966 (0.2439)	0.011318 (0.1524)
Log(ratio of agricultural employment share in destination to share in origin)	0.036794 (0.1214)	-0.037251 (0.1759)	0.53396*** (0.1406)
Log (ratio of mean destination to mean origin mean yearly temperatures)	0.17953*** (0.07988)	0.36507*** (0.1454)	0.14804** (0.08452)

Log (fixed asset investment per capita in destination)	0.09523 (0.11152)	-0.046507 (0.1899)	-0.40641*** (0.136)
Log(fixed asset investment per capita in origin)	0.41181*** (0.1149)	0.34743** (0.1887)	0.64534*** (0.1243)
Log (FDI per capita in destination)	0.059657** (0.03104)	0.10635*** (0.03878)	-0.0090354 (0.05448)
Log (FDI per capita in origin)	0.02685 (0.03035)	0.014949 (0.03841)	0.084033* (0.05168)
Xibu da kaifa policy control (= 1 if migration flow to Western province during 1995-2000)	-0.088415 (0.1445)		
Control for migration flows to Western provinces (= 1 if migration flow to Western province)	0.35475*** (0.1110)	0.38189*** (0.1226)	-0.0091367 (0.1073))
Period control (= 1 if flow took place during 1995-2000)	-0.22557 (0.1826)		
Constant	-4.3906*** (0.9681)	-3.0311*** (1.247)	-0.072681 (1.487)
Adjusted R-squared	0.4386	0.446	0.6003
SSE	1888.1	1071.4	506.14
Sample Size	1,481	777	696

TABLE 4
3SLS REGRESSION RESULTS

Dependent Variable = Gross Interprovincial Migration Rate
(Standard Errors in Parentheses; * denotes significant at 1%, ** at 5%, * at 10%)**

REGRESSOR	FULL SAMPLE (1985-90 AND 1990-95)	EARLY PERIOD ONLY (1985-90)	LATER PERIOD ONLY (1995-2000)
Log (past migrant flow (during 1985-90) to destination population in 2000)			-3.6438 (3.846)
Log (railway distance between capitals of the provinces in kilometers)	-0.97683*** (0.0794)	-1.2958*** (0.08609)	-7.7251 (3.846)
Log (ratio of mean per capita incomes)	-8.362*** (1.629)	-0.55142 (0.8665)	-90.983 (87.3)
Log (schooling years in origin province)	9.8944*** (2.038)	0.10143 (0.8508)	52.034 (52.59)
Log (schooling years in destination province)	-4.5892*** (1.301)	2.4108*** (0.5451)	-41.248 (41.52)
Log (unemployment rate in origin province)	3.4829*** (0.6318)	0.69242* (0.473)	23.641 (21.50)
Log (unemployment rate in destination province)	-4.3476*** (0.7487)	-1.1255*** (0.5473)	-41.248 (16.19)
Log (ratio of mean destination to mean origin mean yearly temperatures)	-6.7822*** (1.457)	-0.36709 (1.289)	-30.606 (29.66)
Log (ratio of fixed asset investment in destination to fixed asset investment in origin)	-3.8827*** (0.6189)	-0.0029061 (0.7871)	9.2496 (31.86)
Log (ratio of FDI in destination to FDI in origin)	5.4666*** (0.9248)	0.28635 (0.5577)	31.374 (31.86)

Xibu da kaifa policy control (= 1 if migration flow to Western province during 1995-2000)	-2.6915*** (0.507)		
Control for migration flows to Western provinces (= 1 if migration flow to Western province)	3.0204*** (0.5704)	0.47653* (0.2655)	13.146 (12.91)
Period control (= 1 if flow took place during 1995-2000)	1.4206*** (0.2726)		
Constant	-12.474*** (1.821)	-4.0021** (1.315)	-17.021 (18.48)
System R-Square	0.5898	0.9369	n/a
Sample Size	1,481	777	696