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Provincial Migration in China: Preliminary Insights from the 2010 Population Census

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Acronyms

CSY China Statistical Yearbook
GDP Gross Domestic Product
NBS National Bureau of Statistics
NPI Natural Population Increase
TAR Tibet Autonomous Region

Abstract

In anticipation of the forthcoming release of the 2010 national population census of China, this paper compares the limited population data that have been released so far with annual data on natural population increase since the 2000 census in order to construct a rough but robust measure of net migration for each province in China between these two censuses. The results emphasise the extent of net out-migration from much of interior and western China as well as the degree to which rapid population growth in five coastal growth poles has been due to net in-migration. In total, 15 out of 31 provinces experienced net population outflows between the two censuses according to this measure, versus only six that experienced negative population growth, leaving nine provinces that registered positive population growth at the same time as net out-migration. Three exceptions to the western pattern of net outflows were the Tibet Autonomous Region, Xinjiang and Ningxia, which had the highest average natural population increase rates in China and also continued to experience moderate net in-migration. Overall, the sheer extent and speed of these flows, which have been mostly contained within national borders, sheds light on the enormity of the developmental challenges facing the government in this context, as well as the demographic pressures placed on the coastal growth poles absorbing most of the net flows. Moreover, there appears to be little association between rates of net migration and provincial rates of economic growth or even provincial levels of per capita GDP during this period, except in the broadest interregional sense that the three coastal province-level entities exhibiting the strongest rates of net in-migration – Beijing, Shanghai and Tianjin – were by far the most affluent in China.

Keywords

China, population, provincial migration, natural population increase, census

Provincial Migration in China[1]
Preliminary Insights from the 2010 Population Census

The detailed tabulations of the 2010 national census of China have been long anticipated as the most accurate representation of the population of China to date. However, the tabulations have not been released yet (as of the time of writing in May 2012), with a delay in standing with the 2000 census, which took two years to be publicly released. While there are predictions that the tabulations will be released sometime this summer, we can nevertheless already take advantage of the limited selection of provincially-tabulated census data presented in the 2011 *China Statistical Yearbook*. By comparing the data on population growth rates between the 2000 and 2010 censuses with the rates of natural population increase (NPI) estimated by annual population surveys throughout the decade and by the 2010 census, it is possible to make rough but arguably robust measures of the patterns of net migration for each province over the same period. These measures are based on the understanding that populations change by only one of two effects – natural increase or net migration – hence, we can deduce the effect of net migration by deducting the known effect of natural increase from population growth. This approach bypasses the need to use the more precise but also more problematic data on residency status, which are the data usually used to estimate the so-called 'floating population.' It also takes advantage of the consistencies in enumerating migrants in both the 2000 and 2010 censuses, in contrast to the 1990 census, which was inconsistent with the 2000 census in certain respects, resulting in many large discrepancies. The 2010 census thereby provides the first opportunity to perform this exercise with some degree of accuracy.

The results emphasise the extent of net out-migration from much of interior and western China as well as the degree to which rapid population growth in five coastal growth poles has been due to net in-migration. Indeed, the rates of net out-migration from several of the largest provinces in China – equivalent in size to Spain, Italy, France, the UK and Germany – have been far greater than when net out-migration from Europe was at its peak in the late nineteenth century. Considering that net migration from China as a whole was negligible, it is remarkable the degree to which such huge population displacements within China in such a short period of time have been contained within national borders, unlike in previous European cases. This insight alone sheds light on the enormity of the developmental challenges facing the government in this context, as well as the demographic pressures placed on the coastal growth poles absorbing most of the net flows. Moreover, there appears to be little association between rates of net migration and provincial rates of economic growth or even provincial levels of per capita GDP, except in the broadest interregional sense, or else in the sense that the three coastal province-level entities exhibiting the strongest rates of net in-migration – Beijing, Shanghai and Tianjin – were by far the most affluent provinces in China during this period.

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[1] As usual with matters relating to population studies, I express my intellectual debts to Tim Dyson. Thanks are also due to Athar Hussain and Xizhe Peng.

More specifically, these results can be depicted in absolute and relative terms. In terms of absolute numbers, the largest net flows were out of Sichuan (-5.4 million people), Hubei (-4.8 million), Anhui (-4.1 million), Guizhou (-3.8 million) and Chongqing (-3.0 million), and into Guangdong (+10.7 million), Shanghai (+6.1 million), Beijing (+5.5 million), Zhejiang (+5.4 million) and Tianjin (+2.7 million). The leading two inflow provinces in terms of the rate of net migration from 2000 to 2010 as a proportion of the 2000 population were Beijing followed by Shanghai. In Beijing, net inflows throughout the decade were equivalent to 39.8 percent of its 2000 population and accounted for 95 percent of population growth up to the 2010 census. In Shanghai, net inflows were equivalent to 36.3 percent of its 2000 population and accounted for 97 percent of population growth. The two leading outflow provinces were Chongqing, where despite the apparent success of its now-famed 'model,' net population outflow throughout the decade was equivalent to 9.8 percent of its 2000 population and was almost fifty percent greater than the rate of population decline, followed by Guizhou in the Southwest and the poorest province of China, where net outflows were equivalent to 9.6 percent of its 2000 population and were more than five and a half times greater than the rate of population decline.

While these outliers are somewhat predicable, particularly at the net receiving end, the results also offer a revised understanding of the place of various middle ranking provinces within these flows, particularly with regard to provinces that had higher or lower than national average rates of natural increase. For instance, Qinghai Province grew 0.83 percent a year between the two censuses but given its average NPI rate of 0.98 percent a year over this same period, which was the fourth highest in the country, the province actually experienced an effective net outflow of population at 1.5 percent of its 2000 population over these ten years. Eight other provinces also registered positive population growth at the same time as net out-migration. In total, 15 out of 31 provinces experienced net population outflows between the two censuses according to this measure, versus only six that experienced negative population growth. Three exceptions to the general western pattern of net outflows were Xizang (the Tibet Autonomous Region, or TAR), Xinjiang (Uyghur Autonomous Region), and Ningxia (Hui Autonomous Region), which had the three highest average NPI rates in China and also experienced moderate net in-migration (as informal observations would suggest). Inversely, several eastern provinces that were not particularly outstanding in terms of population growth, such as Jiangsu, Liaoning and Heilongjiang, become much more evident as destinations of migration once NPI rates are accounted for given that their NPI rates were similar to Beijing and Shanghai and among lowest in China.

The analysis is discussed in three sections. The first offers a short elaboration on the method and data used for this exercise, the second presents the results of the exercise, and the third delves deeper into the case of churning in the TAR. Some concluding reflections are offered on the lack of association of these results with provincial rates of economic growth or even with provincial levels of per capita GDP, except in the broadest interregional sense as mentioned above.

1 Method

This exercise of constructing rough but arguably robust measures of the patterns of net population in- or out-migration for each province of China in the ten years between the 2000 and 2010 censuses is done by comparing population growth with natural population increase. The population growth rates already give an indication of which provinces have been growing or shrinking, although they do not indicate the full extent of net in- or out-migration because the effect of migration is mixed with the effect of natural population increase, i.e. births minus deaths (populations increase or decrease by only these two effects – net migration and natural increase). Hence, comparing the annual growth rates with the annual NPI rates allows us to distinguish annual rates of net migration as the residual. This offers a considerably revised picture of regional migration flows in China than is otherwise revealed by the aggregate population data because NPI rates vary considerably across provinces, from close to zero in the case of Shanghai to over one percent in the case of some western provinces such as Tibet Autonomous Region and Xinjiang Uyghur Autonomous Region.

Two sources of data are used for this comparison. The first is the annualised rate of population growth between the two censuses, presented in CSY (2011, table 3-12). These population growth measures include net migration, given that both censuses enumerated migrants. The 2000 population reported in this table – and generally in official sources – is the official estimated population after adjustments were made following the post-census survey, which estimated a census error of 1.9 percent, i.e. the estimate of the national population was 1.9 percent higher than the original census tabulation, as reported in Tabulation (2002), after corrections were made based on the post-census survey results. Accordingly, the results of this exercise are dependent on the accuracy of these previous corrections, particularly for the provinces where large census errors were recorded, such as Qinghai, which had a census error of 7.4 percent (see Fischer 2008, 645-47 for further discussion). However, for better or worse, we must adopt these official data because they have been used as the basis for subsequent measures and estimates – indeed, the corrections are probably explained by a more accurate estimation of migrant populations in the post-census survey than in the original census.

The second source is the rates of natural population increase (NPI) estimated by annual population surveys throughout the decade and by the 2010 census. For the purpose of comparing the NPI rates with the annualised growth rates, an average NPI rate is calculated for each province by using the NPI rate recorded in each annual survey from 2001 to 2009 (and reported in the subsequent CSY of each respective year), in addition to the NPI rate recorded in the 2010 census and reported in CSY (2011, table 3-4).

When the NPI rate is subtracted from the overall population growth rate, a significant positive discrepancy (where population growth is substantially greater than the rate of natural population increase) would imply net population inflows, whereas a significant negative discrepancy would imply the opposite. For instance, if a province grows by two percent a year but its NPI rate (births minus deaths) is only one percent a year, then this implies that the net rate of in-migration amounts to one percent of the population per year. Or,

if a province experiences no population growth but has an NPI rate of 0.5 percent a year, this effectively means that there is a net out-migration from the province of 0.5 percent of its population a year.

We cannot necessarily perform this exercise between the 1990 and 2000 censuses – at least not with the same accuracy – because definitions and methods of measuring migrant populations changed between these two earlier censuses (e.g. see Yixing and Ma 2003). In contrast, the same standard as the 2000 census was apparently maintained in the 2010 census of including all *de facto* residents in the census enumeration, including those with the most temporary residency status. Annual population surveys in the 1990s also appear to have been far less accurate than those of the 2000s, resulting in often large discrepancies between the estimates of the 1999 population survey and the 2000 census. The discrepancies between the 2009 survey and the 2010 census appear to be much less, at least from the perspective of NPI rates and estimates of population size, and hence for the purposes of this exercise. The increased accuracy would be explained by the regular adjustments that were made to population estimates throughout the decade based on more accurate and sophisticated surveying techniques. In particular, the 2005 one-percent survey apparently made careful consideration of 'floating populations' and thereby allowed for more accurate estimates of population dynamics between the two censuses. As a result of these advances in population science in China, this is perhaps the first pair of censuses that can be used for making somewhat standardized and reliable comparisons over time with respect to migration.

Indeed, the rough and indirect approach presented here might prove to be more accurate for indicating net flows at a provincial level than the more precise tabulations on residency status, which are the sources usually used to estimate the number of migrants residing in a location, such as the so-called 'floating population.' The data on residency status are beset by a variety of complications, the first being that residency registration in China follows a *de jure* rather than *de facto* practice, such that a person might be residing in a location for twenty years but still be registered as 'temporary.' Such a person might be counted as a migrant even if they migrated before the 2000 census. Residency data also do not indicate outflows and hence they are insufficient for indicating overall net migration. This is a particularly crucial consideration in provinces where migration might be characterised by considerable degrees of churning, such as in many western provinces, in particular the Tibet Autonomous Region where much in-migration is temporary if not seasonal (see Fischer 2008). While outflows from one province can be presumably matched with the inflows from that province into the other 30 provinces, thereby accounting for out-migration for that province, such calculations are liable to large margins of error. They are also complicated by the fact that the one-off results from the census do not necessarily account for out-migrants who might have succeeded in changing their residency status before the census enumeration (or conversely for in-migrants).

The indirect method presented here arguably overrides these various problems because the rough estimates of net migration are derived without relying on the residency data but, instead, on the natural population increase data, with the understanding that populations can only change through natural increase or migration. Obviously, one possible source of error in this method

would be that the annual population surveys from which natural increase rates are measured in the intercensal years are generally only based on samples of residents registered as permanently-residing (except in the case of the 2005 survey, as mentioned above). However, in most cases this does not seem to have altered the broad trend of declining NPI rates, particularly between the 2009 survey and the 2010 census, and the effect of this possible source of discrepancy is also moderated by the averaging of NPI rates through the decade. Besides this one possible qualification, the method offers an example of how fairly rigorous albeit approximate observations can be obtained from comparisons of different sources of aggregated data without recourse to more detailed tabulations.

2 Results

The results are presented in a series of three tables. Table One presents the basic statistics as reported in CSY (2011, table 3-12), organised by regions. The first three columns present the total population enumeration in the 2000 and 2010 censuses and the change in thousands of persons. The fourth column presents the growth in the population between the two censuses as a percentage of the 2000 population, also as reported in CSY (2011, table 3-12). The final column gives that rank of each province in terms of its descending order of population growth (calculated by the author). The rank of the national total is in parenthesis so as to indicate where it would be positioned if it were treated as a province.

The results of this table are predictable. The strongest population growth rates were observed in the coastal growth poles, e.g. Beijing (41.9%), Shanghai (37.5%), Tianjin (29.3%), Guangdong (20.7%), and Zhejiang (16.4%). Population growth was also strong in three sparsely populated and heavily subsidised western 'autonomous regions' that are known to have the highest NPI rates in the country in combination with substantial degrees of in-migration, namely Tibet (14.6%), Xinjiang (13.3%) and Ningxia (12.1%). There was moderate population growth ranging from one to ten percent in most other provinces, with faster growth occurring in the more eastern (or coastal) parts of each region, and slower growth in the more interior (or western) parts of each region. There were six cases of population decline. Again, these were predictable, including the major engines of population outflow located in southwest and south central China, namely Chongqing (-6.6%), Hubei (-5%), Sichuan (-3.4%) and Guizhou (-1.4%), as well as two smaller cases from east and northwest China, namely Anhui (-0.6%) and Gansu (-0.2%). In terms of absolute numbers, the largest growth occurred in Guangdong (17.88 million people) whereas the largest decline occurred in Hubei (-3.04 million people).

TABLE 1
Overview of Population Change between the 2000 and 2010 censuses

Region	Population in 1,000 persons			Percent change	Rank
	2000 census	2010 census	Growth		
National Total	**1,265,830**	**1,339,720**	**73,890**	**5.8%**	**(16)**
North Region					
Beijing	13,820	19,610	5,790	41.9%	1
Tianjin	10,010	12,940	2,930	29.3%	3
Hebei	67,440	71,850	4,410	6.5%	14
Shanxi	32,970	35,710	2,740	8.3%	11
Inner Mongolia	23,760	24,710	950	4.0%	18
Northeast Region					
Liaoning	42,380	43,750	1,370	3.2%	21
Jilin	27,280	27,460	180	0.7%	25
Heilongjiang	36,890	38,310	1,420	3.9%	19
East Region					
Shanghai	16,740	23,020	6,280	37.5%	2
Jiangsu	74,380	78,660	4,280	5.8%	16
Zhejiang	46,770	54,430	7,660	16.4%	5
Anhui	59,860	59,500	-360	-0.6%	27
Fujian	34,710	36,890	2,180	6.3%	15
Jiangxi	41,400	44,570	3,170	7.7%	12
Shandong	90,790	95,790	5,000	5.5%	17
South Central Region					
Henan	92,560	94,020	1,460	1.6%	24
Hubei	60,280	57,240	-3,040	-5.0%	30
Hunan	64,400	65,680	1,280	2.0%	23
Guangdong	86,420	104,300	17,880	20.7%	4
Guangxi	44,890	46,030	1,140	2.5%	22
Hainan	7,870	8,670	800	10.2%	9
Southwest Region					
Chongqing	30,900	28,850	-2,050	-6.6%	31
Sichuan	83,290	80,420	-2,870	-3.4%	29
Guizhou	35,250	34,750	-500	-1.4%	28
Yunnan	42,880	45,970	3,090	7.2%	13
Tibet A.R.	2,620	3,000	380	14.6%	6
Northwest Region					
Shaanxi	36,050	37,330	1,280	3.5%	20
Gansu	25,620	25,580	-40	-0.2%	26
Qinghai	5,180	5,630	450	8.6%	10
Ningxia	5,620	6,300	680	12.1%	8
Xinjiang	19,250	21,810	2,560	13.3%	7

Source: CSY (2011, table 3-12).

Against this backdrop, the results of the analysis of this paper are presented in table two. The annualised population growth rate between the two censuses, as cited in CSY (2011, table 3-12), is listed in column A. The average NPI rate from 2001 to 2010 is listed in column B. The residual of the

growth rate minus the NPI rate in presented in column C, which reflects the degree to which a province is a net inflow or outflow province, as discussed above. This is referred to as the net migration rate, indicating the average annual increase (or decrease) in population from 2001 to 2010 that can be attributed to net migration flows according to this method of measurement. Column D shows the proportion of growth that is accounted for by net in-migration (or out-migration, if negative). Column E shows the absolute increase in population over the ten year period, as reported in table 1, and column F shows the absolute number of net in (or out) migrants over the ten year period implied by this exercise (i.e. column D multiplied by column E). Column G shows the proportion of such net in (or out) migrants as a share of the 2000 population.

A summary of these results is presented in table 3, ordered from the highest rates of net inflow to the highest rates of net outflow. The provinces are accordingly grouped into strong and moderate net inflow, stable, and moderate and strong net outflow provinces, based on the average net migration rate per year. The provinces are also ranked by this descending order and this rank is compared to the population growth rates and rank orders from Table 1. The last column shows the change in rank order that occurs once NPI rates are accounted for in the population growth rates, i.e. the degree to which a province falls (or gains) in rank on the basis of net migration flows alone. The results of tables 2 and 3 should be read together and are discussed together below.

As a first note, the population growth rate (table 2, column A) and the average NPI rate (table 2, column B) for the national total are essentially the same. This is an encouraging robustness check for this exercise given that it indicates that the NPI rates measured on the basis of the annual population surveys from 2001 to 2009 were accurate in predicting population growth at the national level, as discussed above. Moreover, we would expect that net migration to and from China would be negligible in comparison to the overall size of the population, particularly given the sheer population size of the country. The slight difference between these two for national total, at less than 0.005 percent per year, amounts to 464,000 people over ten years, which could represent measurement errors or else net immigration from abroad. This result gives some measure of confidence in using these data for provincial comparisons.

In terms of our changed perception of the ranking of provinces as either net inflow or net outflow in comparison to population growth, we can observe two broad patterns. The provinces with low NPI rates and moderate population growth gain substantially in rank as net inflow provinces. Those with higher NPI rates mostly fall in rank, although the fall is moderated in the case of Tibet and Xinjiang, and to a lesser extent in Ningxia and Hainan, because their high NPI rates (the highest in the country) were combined with moderate net inflows, which was against the trend of most other western and central provinces. Otherwise, provinces where the difference between the population growth and NPI rates is proportional to national average (whether increasing or decreasing) roughly maintained their rank order position.

TABLE 2
Net Population Inflow or Outflow from 2000 to 2010

	A	B	C	D	E	F	G
	Percent change per year			% share	1,000 persons		share
Region	Pop. growth rate	Avg. NPIR	Net migr. rate (A-B)	Net migr./ growth (C/A)	10-year growth (Table 1)	10-yr net migr. (D*E)	Net migr./ 2000 pop.
National	**0.57**	**0.57**	**0.00**	**0.6**	**73,890**	**464**	**0.0%**
North Region							
Beijing	3.56	0.18	3.38	94.9	5,790	5,498	39.8%
Tianjin	2.60	0.18	2.42	93.1	2,930	2,725	27.2%
Hebei	0.64	0.60	0.04	5.8	4,410	254	0.4%
Shanxi	0.80	0.59	0.21	26.5	2,740	726	2.2%
In. Mong.	0.39	0.40	-0.01	-3.1	950	-29	-0.1%
Northeast Region							
Liaoning	0.32	0.11	0.21	65.2	1,370	891	2.1%
Jilin	0.07	0.23	-0.17	-249.3	180	-454	-1.7%
Heilongj.	0.38	0.24	0.14	37.9	1,420	538	1.5%
East Region							
Shanghai	3.24	0.10	3.14	96.9	6,280	6,082	36.3%
Jiangsu	0.56	0.23	0.33	58.4	4,280	2,498	3.4%
Zhejiang	1.53	0.44	1.08	70.9	7,660	5,430	11.6%
Anhui	-0.06	0.63	-0.69	1151.5	-360	-4,133	-6.9%
Fujian	0.61	0.60	0.01	1.2	2,180	26	0.1%
Jiangxi	0.74	0.81	-0.07	-9.1	3,170	-289	-0.7%
Shandong	0.54	0.53	0.01	2.1	5,000	105	0.1%
South Central Region							
Henan	0.16	0.54	-0.39	-245.4	1,460	-3,591	-3.9%
Hubei	-0.52	0.29	-0.81	156.7	-3,040	-4,768	-7.9%
Hunan	0.20	0.53	-0.34	-170.7	1,280	-2,191	-3.4%
Guangd/g	1.90	0.76	1.13	59.7	17,880	10,678	12.4%
Guangxi	0.25	0.80	-0.55	-218.7	1,140	-2,486	-5.5%
Hainan	0.97	0.91	0.07	6.9	800	55	0.7%
Southwest Region							
Chongq/g	-0.69	0.32	-1.01	146.8	-2,050	-3,015	-9.8%
Sichuan	-0.35	0.30	-0.65	186.4	-2,870	-5,352	-6.4%
Guizhou	-0.14	0.82	-0.97	672.2	-500	-3,384	-9.6%
Yunnan	0.70	0.81	-0.11	-16.2	3,090	-498	-1.2%
Tibet	1.37	1.12	0.25	18.5	380	70	2.7%
Northwest Region							
Shaanxi	0.35	0.41	-0.06	-16.8	1,280	-214	-0.6%
Gansu	-0.02	0.64	-0.66	3751.2	-40	-1,678	-6.6%
Qinghai	0.83	0.98	-0.15	-17.5	450	-78	-1.5%
Ningxia	1.15	1.05	0.10	8.6	680	58	1.0%
Xinjiang	1.26	1.10	0.16	12.6	2,560	323	1.7%

Source: CSY (2011, table 3-12).

TABLE 3
Net Migration and Population Growth Rate Rank Orders Compared

Region	Net migr. p.a. (%)	10-yr net migr./ 2000 pop.	Migr. Rank	Pop. Growth	Growth Rank	Rank chng
Strong net inflow (net migration p.a. higher than 1%)						
Beijing	3.38	39.8%	1	41.9%	1	0
Shanghai	3.14	36.3%	2	37.5%	2	0
Tianjin	2.42	27.2%	3	29.3%	3	0
Guangd/g	1.13	12.4%	4	20.7%	4	0
Zhejiang	1.08	11.6%	5	16.4%	5	0
Moderate net inflow (net migration p.a. between 0.1% and 1%)						
Jiangsu	0.33	3.4%	6	5.8%	16	10
Tibet	0.25	2.7%	7	14.6%	6	-1
Shanxi	0.21	2.2%	8	8.3%	11	3
Liaoning	0.21	2.1%	9	3.2%	21	12
Xinjiang	0.16	1.7%	10	13.3%	7	-3
Heilongj/g	0.14	1.5%	11	3.9%	19	8
Ningxia	0.10	1.0%	12	12.1%	8	-4
Stable (net migration p.a. between -0.05% and 0.1%)						
Hainan	0.07	0.7%	13	10.2%	9	-4
Hebei	0.04	0.4%	14	6.5%	14	0
Fujian	0.01	0.1%	15	6.3%	15	0
Shandong	0.01	0.1%	16	5.5%	17	1
In. Mong.	-0.01	-0.1%	17	4.0%	18	1
Moderate net outflow (net migration p.a. between -0.25% and -0.5%)						
Shaanxi	-0.06	-0.6%	18	3.5%	20	2
Jiangxi	-0.07	-0.7%	19	7.7%	12	-7
Yunnan	-0.11	-1.2%	20	7.2%	13	-7
Qinghai	-0.15	-1.5%	21	8.6%	10	-11
Jilin	-0.17	-1.7%	22	0.7%	25	3
Strong net outflows (net migration p.a. lower than -0.25%)						
Hunan	-0.34	-3.4%	23	2.0%	23	0
Henan	-0.39	-3.9%	24	1.6%	24	0
Guangxi	-0.55	-5.5%	25	2.5%	22	-3
Sichuan	-0.65	-6.4%	26	-3.4%	29	3
Gansu	-0.66	-6.6%	27	-0.2%	26	-1
Anhui	-0.69	-6.9%	28	-0.6%	27	-1
Hubei	-0.81	-7.9%	29	-5.0%	30	1
Guizhou	-0.97	-9.6%	30	-1.4%	28	-2
Chongq/g	-1.01	-9.8%	31	-6.6%	31	0

Source: compiled from tables 1 and 2.

Within these patterns, there is no change in rank among the top five inflow provinces (Beijing, Shanghai, Tianjin, Guangdong and Zhejiang). The first three are characterised by very low NPI rates (or even negative for some years in the case of Shanghai), such that almost all population growth was due to net in-migration (95 percent of growth in Beijing, 97 percent in Shanghai, and 93 percent in Tianjin). Guangdong and Zhejiang both had higher NPI

rates (higher than national average in the case of Guangdong), but net in-migration was nonetheless so strong in these two provinces that, even after accounting for natural increase, they both still had the fourth and fifth highest rates of net in-migration over the decade, and migrants accounted for 60 percent of population growth in Guangdong and 71 percent in Zhejiang. In terms of absolute numbers the order is slightly rearranged among these top five. Guangdong received the largest net number of migrants over the decade according to this measure (+10.7 million people), followed by Shanghai (+6.1 million), Beijing (+5.5 million), Zhejiang (+5.4 million) and Tianjin (+2.7 million). None of these results are surprising, although they do emphasise the degree to which migration rather than population increase was driving population growth in these coastal economic growth poles.

In contrast, major rank changes are apparent among the middle ranking provinces. Several coastal or near-coastal provinces jumped strongly in rank. The demographic characteristics of these provinces were very similar to Beijing and Shanghai, such that a large proportion of their population growth was due to net in-migration, much more so than other provinces with even faster rates of population growth but also faster NPI rates. Jiangsu, coastal neighbour to Shanghai and Zhejiang, jumped ten positions, from the national average population growth rate to the 6th strongest rate of net in-migration over the decade, at 3.4 percent of its 2000 population and accounting for 58 percent of its population growth over the decade. Similarly, Liaoning, also coastal and near Beijing and Tianjin, registered sluggish below-average population growth but, once accounting for natural increase, jumped eleven positions to the 9th strongest rate of net in-migration, at 2.1 percent of its 2000 population and accounting for 65 percent of its population growth over the decade. Heilongjiang, which is not coastal but bordering Russia in the far northeast, also jumped eight places to the 11th strongest rate of net in-migration.

Conversely, sharp reductions in rank are apparent in several central or western provinces for the opposite reason that higher NPI rates underestimate the degree of net out-migration. Nine provinces in total had positive population growth throughout the decade but, according to this measure, actually experienced net out-migration, and hence population growth was due to the fact that the NPI rate was faster than the rate of net out-migration. The provinces falling into this category are Inner Mongolia, Shaanxi, Jiangsu, Yunnan, Qinghai, Jilin, Hunan, Henan and Guangxi. The contrast between population growth and net out-migration is especially striking in several western provinces with high NPI rates. Qinghai grew at an above-average rate of 8.6 percent over the decade, but once accounting for the NPI rate, which was the fourth highest in China, had a rate of net population outflow of 1.5 percent of its 2000 population, thereby falling in rank by eleven positions. Similarly, Yunnan grew by 7.2 percent despite a rate of net out-migration of 1.2 percent, thereby falling seven positions. Jiangxi grew by 7.7 percent with a net out-migration rate of 0.7 percent and fell seven positions, while Guangxi grew by 2.5 percent with a net out-migration rate of 5.5 percent, thereby falling three positions (it did not fall by as much as the others because it was already at a fairly low rank in terms of population growth). In the cases of Qinghai, Yunnan and Jiangxi, all three had above-average rates of population growth despite having below-average rates of net migration.

The rank changes are not striking at the lower end largely because the provinces in question were already at the bottom in terms of population growth, experiencing negligible or negative population growth. In this respect, Sichuan actually rose in rank because its very low NPI rate, at 0.3 percent per year on average, was well below the national average and even that of many eastern provinces. As a result, it rose in rank by three positions, albeit still remaining among the provinces with strong net outflows. Hubei had an even lower average NPI rate at 0.29 percent per year, thereby rising in rank by one position, although still among the provinces with the greatest net outflow rates.

Despite the lack of substantial rank changes at the lower end, the measure used here nonetheless gives a more accurate picture of the sheer degree of out-migration that occurred over the decade in these central and western provinces once natural increase is considered, particularly in several western provinces. This amplifies our appreciation of the extent of effective population decline in these provinces because aggregate population decline nonetheless includes positive net population replacements (i.e. more births than deaths even if the NPI rate is low). Hence, according to this measure, there was net out-migration from Sichuan over the decade at a rate of 6.4 percent of its 2000 population, versus population decline of only 3.4 percent. The population of Gansu only declined by 0.2 percent between the two censuses, but given an above average NPI rate, the province registered a net out-migration rate over the decade of 6.6 percent of its 2000 population. Net out-migration from Anhui was 6.9 percent of its 2000 population, 7.9 percent from Hubei, 9.6 percent from Guizhou, and 9.8 percent from Chongqing. Indeed, despite the often-cited 'Chongqing model,' now famous due to the downfall of Bo Xilai in March 2012, the success of this inland model appears to have been predicated on the fastest rate of out-migration observed across the provinces in China over this decade, as well as the fastest rate of overall population decline at 6.6 percent of the 2000 population of Chongqing.

Indeed, the sheer speed of outflow from these strong outflow provinces is worth emphasising, particularly that these are not small populations. In 2010, they ranged in size from 25.6 million people (Gansu) and 28.9 million people (Chongqing) to 59.5 million people (Anhui) and 80.4 million people (Sichuan), or roughly in the size range of Spain, France, the United Kingdom, Italy and Germany. In these European cases, it is often cited that almost one fifth of total natural population increase in Europe between 1880 and 1910 – when European out-migration was at its peak – migrated abroad, largely to its so-called 'offshoots' (e.g. see Dyson 2010, 117). While this international comparison might not be the most appropriate for China because China is, after all, one nation, and intra-national migration within various countries of Europe might have been much greater than out-migration abroad during this earlier period, the comparison is salient nonetheless because the size of units are roughly comparable, i.e. Chinese provinces with European nations. Accordingly, net out-migration from Chongqinq between 2000 and 2010 was equivalent to more than three times its natural population increase over the same period. Net out-migration was 2.8 times natural increase in Hubei, 2.2 times in Sichuan, and over one time in Guizhou, Anhui and Gansu. Considering that net migration from China as a whole was negligible, it is amazing the degree to which such huge population displacements in China

within such a short period of time were contained within national borders, unlike in previous European cases.

2.1 The Case of the Tibet Autonomous Region

The Tibet Autonomous Region (TAR), despite its exceptional particularities and political sensitivity and prioritisation, nonetheless provides an interesting case to unpack some of the dynamics of churning between inflows and outflows that underlie these net balances. Notably, according to the above measure, the number of net in-migrants to the TAR between the two censuses is estimated at about 70,000 people, or about 18.5 percent of total population growth in the TAR over these ten years. At first sight this would seem to be a huge underestimate given all of the contentions and informal and qualitative observations of large-scale in-migration of Han Chinese into Tibet since 2000. Indeed, as implied by the data presented by Xinhua (2011a), the Han population alone increased by approximately 86,707 people between the two censuses, to 245,277 people, rising in share of the population from 6.1 percent in 2000 to 8.2 percent in 2010. Most of the additional Han were presumably migrants, whether they were registered as temporary or permanent residents,[2] given that the NPI rate of the Han in the TAR is probably negligible if not negative (see Fischer 2008). Net in-migration would have also included other nationalities as well, notably Chinese Muslims and Tibetans from outside the TAR (although many of the latter might have been forced to leave the TAR following the protests in 2008).

Hence, if the measure in table 2 is relatively accurate, the only plausible explanation for this discrepancy (and for a rising Han share of the population in the face of a relatively rapid NPI rate among Tibetans) is that the net inflow of Han Chinese was compensated by a net outflow of local Tibetans – whether to exile or else to other parts of China, including students being sent to 'inland' high schools, or else graduates working in other provinces. For instance, CTIC (2010a) reports that '1,900 graduates (10% of the graduates) from Tibet found jobs in inland areas [in 2009], and in the past two years, the proportion is about 8% to 9%.' This latter trend took off in 2006 with the reform of the employment system in the TAR. Similarly, according to CTIC (2010b), the total enrolment of Tibetan students in inland high schools was 20,000 in 2010. Xinhua (2011b) indicates that about one quarter of these students return to the

[2] Xinhua (2011a) reported that these population data represent permanent residents, not temporary migrants, although we have reasons to believe that this assertion is erroneous and that the numbers do include temporary migrants, as has been the standard method of census reporting since at least 2000 and as reported in CSY (2011). This can only be confirmed once the detailed tabulation is released. However, as further evidence, the Public Security Department (PSD) data reported in TSY (2009, table 3-4; this table was not reported in TSY 2010) show a slight increase in the Han population count after 2000, from 72,122 in 2000, to 105,379 in 2003, 93,306 in 2004, and then 123,558 by 2008. Given that these PSD data generally only refer to permanent and other forms of long-term registered residents and that the increase of around 50,000 Han in these data is far below the increase implied in Xinhua (2011a) of 86,707 Han, we can presume that the 2010 census data reported by Xinhua (2011a) must include temporary migrants.

TAR after graduation (i.e. 10,000 out of a total of 40,000 since the project started in 1985). If we assume that the 20,000 enrolment in 2010 was divided equally over the three years of high school and that the annual intake was thus about 6,667 students a year in 2010, although less in previous years given the intensification of the program over the decade, and that one quarter of these students return to the TAR after graduation, in addition to a net outflow of Tibetans into exile in Nepal and India of about 1,000 people per year, we can speculate that these two channels of outflow of local Tibetans from the TAR could have amounted to at least 40,000 thousand people between 2000 and 2010, or more than twelve percent of the natural increase in the TAR during this period. Given the magnitude of the numbers of Han Chinese involved, this explanation for the discrepancy between the higher increase in the Han population than the number of net in-migrants is quite plausible and would confirm the suggestion made in Fischer (2008) that migration flows in the TAR involve considerable churning, with outflows including previous in-migrants as well as substantial numbers of young and educated Tibetans relative to the local population and to the numbers of natural population increase.

Obviously, the 2010 headcount of Han Chinese in the TAR – at approximately 245,277 people as per the data provided by Xinhua (2011a) – would also appear to be hugely underreported, even more so than in the 2000 census. This is partly due to the fact that the census was taken on 1 November 2010, at which time many Han migrants would have already returned home for the winter. Hence, the Han headcount needs to be understood as referring to the number of non-military non-tourist Han who were actually residing year-round in the TAR in 2010, or at least residing into the off-peak tourist season, rather than the boom-time population of the tourist season when most observers visit the TAR. Along these lines, the Han headcount might well have been reasonable for the period of the year, or at least not hugely underestimated. Even if underestimated, it is nonetheless interesting that the TAR does show up through these indirect measures in tables 2 and 3 as having experienced a moderate degree of net inflow over the decade, stronger than all provinces besides the strongest poles of economic growth in the coastal areas, as would be expected from the developments and numerous qualitative observations during this period in this autonomous region. Moreover, although this share of Han is small relative to the total TAR population, considering that most of the Han in the TAR are urban and working, this share accounts for a very large share of the urban employment, hence explaining its sensitivity for locals.

3 Conclusion

Without repeating the findings of this exercise, it is notable that these rates of net migration are not necessarily associated to rates of economic growth and hence, presumably, to rates of employment generation, give or take the employment elasticity of growth in each case. Net migration does not even appear to be related to levels of per capita GDP, except in the broadest sense that two of the poorest provinces in China in terms of per capita GDP – Guizhou and Gansu – were both among the group of provinces with strong

rates of net out-migration and three of provinces with the strongest rates of in-migration – Beijing, Shanghai and Tianjin – were by far the richest provinces in China throughout this period. However, economic growth in Yunnan lagged behind that of even other western provinces over this decade with the result that the province became the second poorest in China for the first time in 2007 and then again 2010, between Guizhou (the poorest) and Gansu. Nonetheless, Yunnan registered only a moderate rate of net out-migration according to this measure. Conversely, Inner Mongolia registered a very slight rate of net out-migration despite growing at a very fast pace throughout the decade and rising remarkably from below the national average per capita GDP in 2000 to one of the highest in China by 2010, close to that of Zhejiang and Jiangsu and higher than that of Guangdong. Similarly, Sichuan registered strong above-average rates of economic growth since the early 2000s and significantly caught up to the national average per capita GDP by 2010 and yet it remained as a strong net outflow province and the largest single source of out-migration in absolute terms. And as noted above, despite the apparent success of the 'Chongqing model,' with the highest per capita GDP in western China and very close to the national average, this province-level administrative entity experienced the highest rate of net out-migration in China over the decade, significantly higher than other, much poorer western provinces. The only province with close to the same rate of out-migration was Guizhou, the poorest province in China with a per capita GDP of less than half the value of Chongqing.[3]

These incongruencies obviously suggest that there is much more driving migration flows than either levels of affluence or rates of economic growth (at least, as measured by the simplistic indice of per capita GDP). The ways that production, consumption, wealth and incomes are structured within the economies and throughout the labour forces of each province need to be considered, in combination with a wide variety of other structural, political, social and cultural considerations. Further research is needed on these issues. Indeed, further exploration of the 2010 census data from China once the detailed tabulations are released, in combination with structural economic analysis of national accounting and household survey data and other findings from sociological, demographic and anthropological studies, promises to provide very valuable insights into our understanding of processes of migration in China and elsewhere.

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