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## Abstract

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February 22, 2017

**Abstract**

This paper examines the impact of the Hoa, an ethnically Chinese, economically dominant minority, on regional economic development in Vietnam. To address the endogeneity of the geographical distribution of the Hoa, we use an important historical episode: the rapid deterioration in Sino-Vietnamese diplomatic relationship that led many ethnic Chinese to flee abroad, particularly to the refugee camps in the Guangxi province of China, in 1979. We find that the effects of proximity to the refugee camps on the share of ethnic Chinese in 1989 were more pronounced for provinces that had a larger presence of the ethnic Chinese population in 1979. We also find strong correlations between the 1989 share of ethnic Chinese (instrumented) and contemporary indicators of economic performance. The results suggest that the ethnic Chinese minority had positive economic impacts on Vietnam's regional economies and that the post-Vietnam War exodus of ethnic Chinese was likely to have had long-term negative economic impacts.

Key Words: Ethnic Minority; Vietnam; Economic Development

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## I. Introduction

Chinese have migrated to other countries for centuries. Southeast Asian countries are among their earliest destinations (Mckeown, 2001). In particular, the second half of the nineteenth century witnessed a Chinese diaspora that transformed many communities around the world, both socially and politically.[1] The historical pattern of ethnic Chinese immigration into Vietnam followed this global trend, though idiosyncratic factors were at play as well. The earliest Chinese settlers arrived in the northern part of Vietnam more than two thousand years ago, when the northern neighbor began to exert political control over Vietnam. Centuries of Chinese colonization translated into many cultural and institutional similarities between the two countries that persist to this day.[2]

Starting from the second half of the seventeenth century, there was a surge in the inflow of Chinese immigrants, mainly traders and skilled workers, into Vietnam, especially to its southern provinces. New economic opportunities, and favorable treatment from the ruling class during the feudal period and also from the French during the colonial episode attracted a large number of Chinese (Tran, 1993). During the same period, the Chinese diaspora created a global network of Chinese

[1] Mckeown (2001, p.64) maintains that "the increased European colonial penetration into Southeast Asia, the expansion of global markets and economic networks throughout the Pacific, and the displacement of the Fujianese junk trade by European sailing vessels in the first half of the century, followed by the relatively inexpensive steamship lines helped increase and channel the flows of Chinese migrants in the second half of the century."

[2] See Dell, Lane, and Querubin (2015) for a detailed account of the historical legacy of Chinese influence and its economic impacts in Vietnam.

communities, which, in turn, benefitted the ethnic Chinese population in Vietnam (Tran, 1993).

Table 1 shows the French and Chinese capital ownership in Vietnam in 1906, based on Tran (1993). The total value of capital in South Vietnam in 1906 was 224 million French francs, of which 222 million belonged to the French and Chinese. Ethnic Chinese owned 96 million French francs in capital, much of which was concentrated in the trade sector. Native Vietnamese, on the other hand, were only in possession of a negligible amount of capital (Tran, 1993). Historians argue that the ethnic Chinese continue to play a disproportionately important role in the Vietnamese economy: "the Chinese form a large segment of middle-class entrepreneurs, technical and managerial personnel, and skilled laborers… While the Chinese were only five percent of the Republic of Vietnam's (South Vietnam) population, they accounted for 25,000 to 30,000 industrial workers in the mid-1960s, accounting for one-third of the total southern industrial workers… They were better than the indigenous workforce in terms of technical ability and occupational experience" (Tran, 1993, p.72; Lechiagin, 1997, p.65). [3] Moreover, the ethnic Chinese in Vietnam had business connections with other Chinese communities in Taiwan, Hong Kong, Singapore, Thailand, Cambodia, and even those in North America and Australia (Tran, 1993). For instance, "at the end of 1987, 55 percent of Ho Chi Minh City's total Chinese population of 74,957 families (415,864 persons) had relatives living in twenty other countries in the world" (Tran, 1993, p.97, Doan Ket Newspaper, 1990, p.6).

[3] See also Vo (1990, p. 68) for an account of the favorable treatment that the Hoa received from the US government during the Vietnam War era.

In this paper, we examine whether Vietnamese provinces with a higher endowment of ethnic Chinese population experienced superior contemporary economic development after the implementation of a major economic reform, called Doi Moi, in the mid-1980s. To be specific, we use provincial level data to regress various indicators of contemporary economic performance on the share of ethnic Chinese in the population prevailing as of 1989. A crucial econometric challenge, however, is that the geographical distribution of the ethnic Chinese is unlikely to be random and might be correlated with differences in the economic environment across provinces. For instance, if Chinese migrants are drawn to more economically developed areas to begin with, it will be difficult to determine whether a positive correlation between the presence of an ethnic Chinese population and provincial economic performance is causal.

In order to overcome this identification issue, we note that there was an exodus of the ethnic Chinese from Vietnam in the late 1970s and the early 1980s. Many ethnic Chinese left Vietnam because they lost their social and economic status due to the Vietnamese Communist Party's post-war policies. Moreover, many left because they were fearful that the diplomatic rift and ensuing war between Vietnam and China would put their families in danger. Over a quarter million of these ethnic Chinese fled to Dongxing in China's Guangxi province, where the Chinese government housed the refugees in government buildings and schools (Lam, 2000).[4] Based on these historical developments, we conjecture that distance to the refugee

[4] United Nations High Commissioners of Refugees estimates that 260,000 ethnic Chinese migrated from Vietnam to China during the border war (http://www.unhcr.org/464302994.html).

camps in Dongxing is likely to be an important factor that explains the geographical distribution of ethnic Chinese in 1989, and that the impact of distance to the refugee camps is likely to be much larger for provinces that were populated with more ethnic Chinese at the time of the exodus. In constructing an instrumental variable, we follow, in spirit, Acemoglu et al. (2011), who examine the long-term impacts of the Holocaust in Russia by estimating the differential impacts of German occupation across geographical areas with varying presence of the Jewish population at the time of the occupation. In this paper, we use the interaction of the distance to Guangxi province of China with the proportion of ethnic Chinese in each province at the time of the exodus in order to capture exogenous variation in the share of remaining ethnic Chinese in the population in 1989. This interaction term captures the prediction that the difference between two provinces, one close to the refugee camp and the other further away from it, is likely to be more pronounced when they were populated with more ethnic Chinese to begin with in 1979.

To briefly summarize our main results, we find that, in the first stage regression, our instrument is a strong predictor of the share of ethnic Chinese in 1989, as anticipated. The interaction of the distance to Guangxi province of China with the initial, pre-exodus, share of ethnic Chinese has a positive and significant coefficient, suggesting that the geographical distance to the refugee camps mattered more when provinces were populated with more ethnic Chinese in 1979. In the second stage instrumental variable regression, we find that the provinces with a higher share of ethnic Chinese population in 1989 tend to exhibit higher population density, higher urbanization, higher per capita non-state industrial production, higher per capita

income, higher per capita consumption, and a lower poverty rate today. The second stage results also show that population density, urbanization rate, per capita income, and per capita industrial production in these provinces increased by a large proportion after 1989. The estimated effects are quantitatively important as well. For example, three northern provinces near the city of Dongxing in China (Ha Bac, Lang Son, and Quang Ninh) lost a large number of ethnic Chinese from 1979-1989, as these provinces are geographically close to the refugee camps in China. Our results indicate that these provinces' per capita non-state industrial production would have been larger today by more than one standard deviation if it were not for the exodus of the ethnic Chinese.

Our results are robust when controlling for geographical factors such as a dummy variable for provinces bordering with China, distance to Yunnan province of China (which borders with Vietnam), a dummy variable for class-I seaports[5], dummy variables for provinces near the Red and Mekong rivers, a dummy variable for southern provinces, a dummy variable for coastal provinces, distance to the major cities, distance to Guangxi province of China (un-interacted), and initial demographic conditions (such as population density at the end of the Vietnam War and the pre-exodus share of Chinese (un-interacted)). Our findings broadly suggest that the exodus of ethnic Chinese from Vietnam had persistent and detrimental impacts on the country's contemporary economic performance.

[5] Class-I seaports have the most important and strategic roles in facilitating and developing the country's international and regional trade (http://baochinhphu.vn/Chi-dao-quyet-dinh-cua-Chinh-phu-Thu-tuong-Chinh-phu/3-loai-cang-bien-Viet-Nam/186728.vgp).

Our findings are related to several strands of literature. Rauch and Trindade (2002) and Tong (2005) find that the global commercial networks of ethnic Chinese increase bilateral trade and FDI in cross-country data. In particular, Rauch and Trindade (2002) show that the quantitative effects of ethnic Chinese population on bilateral trade in Southeast Asian countries are substantial, given the extensive network that they form in this region.[6] We complement Rauch and Trindade (2002) and Tong (2005) by performing a within-country econometric analysis in the context of Vietnam, as it provides us with a useful natural experiment to address the potential endogeneity issue of the geographical distribution of ethnic Chinese. There are also historical and qualitative studies that provide detailed descriptive accounts of the ethnic Chinese in the context of the political and economic history of Vietnam (Tran, 1993; Mckeown, 2001; Tong, 2010; Ky, 1963). Our paper complements these studies by uncovering quantitative evidence from the post-Vietnam War period. Needless to say, the historical narrative highlighted in these studies is highly relevant to our paper as it serves as both the motivation for the empirical question and, perhaps more crucially, the basis for our identification strategy. Our paper is also motivated by the strand of literature that examines the impact of historical events on current socio-economic development (e.g., Tilly 1990, Bates 2014, Reid 2014, Engerman and Sokoloff 1997, 2002, La Porta et al. 1997, Acemoglu et al. 2001, 2002, Nunn and Qian, 2011, Nunn, 2008, 2011, Easterly and Levine 2012).[7]

[6] See also a recent related paper by Parsons and Vezina (2013), which show that Vietnamese migrants into the US facilitated bilateral trade between the US and Vietnam.

[7] Nunn (2013) provides a detailed account of such literature

Two papers are particularly relevant because they draw samples from Vietnam in order to answer closely related questions. First, Miguel and Roland (2011), as far as we know, is the only one that quantitatively examines the impacts of the Vietnam War on the country's subsequent economic development. Interestingly, they find that the severely bombed areas exhibit a similar level of economic development to areaswhich escaped bombing.[8] Second, McMilan and Woodruff (1999) explore the network effects in trading relationships using firm-level data from Vietnam. Although they find that the duration of trading relationships facilitates the intra-firm credit transactions, they do not find evidence that suggests that the network of ethnic Chinese plays any special role.

Finally, to be clear, we add an important caveat to our results. First, our estimates are based on cross-sectional variation across provinces and, naturally, are relevant to the historical path of regional economic development in different provinces. Therefore, the results do suggest that the regions that were once heavily populated with ethnic Chinese (e.g., some of the northern provinces near the city of Dongxing in Guangxi, China) would likely be more prosperous today if it were not for the massive emigration of ethnic Chinese out of these provinces in the late 1970s and 1980s. However, we caution against deriving a precise quantitative implication from our results about the aggregate economic effects of the exodus of ethnic Chinese in Vietnam. It is difficult to fully account for the effects of the re-allocation of

[8] Davis and Weinstein (2002) find analogous results when they evaluate the long-term effects of bombing in Japanese cities.

productive inputs across provinces that occurred through market mechanisms and/or the government's initiative as a result of the exodus.

The paper is constructed as follows. In section II, we provide a detailed description of the post-Vietnam War exodus and discuss the historical settlement of the ethnic Chinese, as well as their economic roles in Vietnam. In sections III and IV, we describe our data and methodology. Section V presents the results. Section VI concludes.

## II. Ethnic Chinese in Vietnam

Vietnam was among the earliest destinations for Chinese migrants. The country was under the direct control of China's Han dynasty for a thousand years and, more recently, under the Ming dynasty for 20 years. Its geographical proximity to China as well as its cultural similarity to China also played an important role in facilitating the migration from China to Vietnam up until 1975. However, the demographic composition of those immigrants and the economic roles that these groups played in Vietnam evolved over time. Table A1 provides a brief description of the phases of Chinese migration to Vietnam, based on the work of Tran (1993). Initially, most of these immigrants were seasonal traders who left after a few years and did not play any permanent role in Vietnam's economy. Once trade with Western economies flourished, permanent settlements of Chinese immigrants began to emerge. The ethnic Chinese also played a more active role in expanding domestic and international trade routes. Favorable treatment from the Nguyen court and later on from the French administration and the US military allowed the ethnic Chinese to thrive and extend their influence into manufacturing, transportation, and banking and

finance. By 1975, even though they were a small minority (approximately 2.5% of the population of Vietnam), they were the economically dominant group, possessing abundant wealth, having accumulated expertise and skills, and having successfully established well-connected domestic and international trading networks.

On April 30, 1975, the Democratic Republic of Vietnam (i.e., North Vietnam) captured Saigon, the capital of the Republic of Vietnam (i.e., South Vietnam), officially ending the Vietnam War. The Vietnamese Communist Party implemented various policies that led to the exodus of many Vietnamese to both neighboring countries and the West. The policies included re-education programs, the creation of new economic zones, and the nationalization of private enterprises (Tsamenyi, 1983, p.349; Tran, 1993). Re-education programs targeted people from the upper and professional classes who were "associated with the American presence" in the south (Tsamenyi, 1983, p.349). The Vietnamese Communist Party sent over a million people to re-education camps to expose them to "the duties of true Vietnamese citizens in the new stage of reconstruction" (i.e. ideological re-orientation, self-criticism) (Tsamenyi, 1983, p.350). According to Tsamenyi (1983), this program created insecurity, which, in turn, led people to emigrate from the country. Given their economic and social status the Chinese were disproportionately affected by this policy (Tsamenyi, 1983).

The establishment of new economic zones was another driving force behind the exodus. After the war, the Vietnamese Communist Party attempted to relocate approximately four million people from "overcrowded" urban regions to the new economic zones (Tsamenyi, 1983). By 1980, the government had forcefully relocated

625,000 in the north and 847,000 in the south (Tsamenyi, 1983). The living conditions in these new economic zones were poor and people who had lived their entire lives in cities could not adapt (Tran, 1993). As a result, many urban Vietnamese chose to flee as they regarded the policy as a "death sentence" (Tsamenyi, 1983, p.10). Lastly, the nationalization of private enterprises, which was implemented in the south after the war, contributed to the exodus as well. Private ownership of capital was prohibited, land and wealth were appropriated, and private entities were nationalized. These policy developments caused many people to lose their previous economic and social status (Tran, 1993). As a result, many affected people (disproportionately including the ethnically Chinese) chose to leave the country.

Diplomatic friction, which eventually led to the border war between Vietnam and China in 1979, also contributed to the exodus of the ethnic Chinese population. Moscow and Beijing had long been competing with each other to exert influence on Vietnam. After 1975, this political conflict became fierce. Eventually, the faction within the Vietnamese government that was closer to Beijing lost out to a Moscow-backed faction (Tsamenyi, 1983). The Vietnamese Communist Party's post-war policies that affected the upper-class population, among which many were ethnic Chinese, also raised the tension between Vietnam and China. Vietnam's political and military involvement in Cambodia in an attempt to overthrow Pol Pot's Khmer Rouge regime, which the Chinese government helped to create, also worsened the existing tension between Vietnam and China. In 1978, rumors of an imminent war between the two countries, as well as the general hostility toward the ethnic Chinese in

Vietnam, caused many ethnic Chinese to leave the country (Tsamenyi, 1983). War eventually broke out in February of 1979 and lasted for a month. By the time the war ended, hundreds of thousands of ethnic Chinese had fled from Vietnam. This outflow of the ethnic Chinese continued for many years after the war.

Banister (1985) compiled data on estimated emigration from Vietnam and emigrants' arrivals in foreign countries during this key period, which is re-produced in Table 2. Although Banister (1985) describes the difficulty associated with data collection (and thus the reliability of her estimates may be questioned), her overall estimates are largely consistent with historical narratives and anecdotes.[9] According to the first column in Panel A of Table 2, more than a million people left the country from 1975-1982. These emigrants chose a risky endeavor to flee Vietnam, as over 10% of these emigrants were lost at sea. Of 911,000 emigrants who successfully arrived in foreign countries, 597,000 (65%) were ethnic Chinese. Approximately half of these ethnic Chinese emigrants traveled overland to China. The subsequent columns in this table show two waves of outward emigration. The first wave took place in 1975 (toward the end of the Vietnam War) as 123,700 individuals left Vietnam, most of whom seem to have moved to the West. A large proportion of them were ethnic Chinese. The second wave, which was much larger in size, occurred in the late 1970s and the early 1980s. In particular, the two years, 1978 and 1979, alone witnessed the departure of more than 650,000 people. A vast majority of these

[9] For example, even though anecdotal evidence indicates that many emigrants were lost at sea immediately after the Vietnam War, the data on emigration and arrival were not reliable enough to report the number of emigrants who were lost at sea in in 1975 and 1976.

migrants were ethnic Chinese who ended up going overland to China. Based on multiple sources, we calculated the share of ethnic Chinese in the population over time (Figure 1). The trend of rapid decline in the proportion of ethnic Chinese in the population in the late 1970s and early 1980s is further confirmed in this figure, indicating a large effect of the exodus of the ethnic Chinese on the share of the Chinese population in Vietnam during the second wave of the emigration.

## III. Data

Since the country's independence, the Vietnamese Communist Party has carried out four Population and Housing Censuses (1979, 1989, 1999, and 2009). The censuses contain detailed province-level data on the total population and population structure. The data on ethnicity are available only at the province-level, which is the unit of observation we use in our econometric analysis. Needless to say, a drawback of the provincial-level data, relative to more disaggregated (e.g., district-level) data, is that the sample size is smaller and thus the power of statistical tests is compromised. An advantage, however, is that our analysis is less likely to miss cross-district externalities, which might be important in the context of our study if the extensive network of ethnic Chinese across smaller geographical units generates sizable economic benefits within each province.[10]

[10] To convey a sense of the geographical unit of our data set, Vietnam, as a whole, is 128,500 square miles, and the average province size is 3,500 square miles. Hence, the size of Vietnam is comparable to that of New England plus the state of New York, and a typical province is smaller than two-thirds of the state of Connecticut.

The census records the population of over 60 different ethnic minority groups, which comprise approximately 15% of the population. The Hoa, the San Diu (mountain Chinese), and the Ngai are all classified as Chinese-speaking groups. The Ngai and the San Diu are mainly concentrated in the northern mountainous areas of Vietnam, while the Hoa predominantly live in urban areas. We do not include the San Diu and the Ngai under the ethnic Chinese umbrella. Historically, they have lived in the rural areas and have mainly engaged in the agricultural sector. They are not an economically dominant minority like the Hoa, and the Vietnamese Communist Party's discriminatory policies did not target the Ngai or the San Diu (Amer, 1993). As such, the Hoa was the only group that experienced a decline in population share during the exodus period; i.e., from 1979 to 1999, the share of the Hoa population declined from 1.8 to 1.1%, while the shares of the Ngai and San Diu populations increased from 0.0025 to 0.0092% and 0.125 to 0.239% respectively.

We use the 1979 census province-level data on the total population and the ethnic Chinese population to construct the share of Chinese population in 1979.[11] The

[11] Before 1979, the population data of the North and South Vietnam had been collected separately. The differences in methodology make these earlier data unreliable. In addition, there had been many major shifts in the division of administrative units in both regimes. As newly established governments, both the Democratic Republic of Vietnam (North Vietnam) and the Republic of Vietnam (South Vietnam) attempted to redraw borders between provinces to fit their respective economic development agendas. Some provinces were combined, while others were broken down to smaller units. In many cases, some districts were moved from one province to another. This makes merging pre-1975 data with more recent data extremely challenging. Different estimates of pre-1975 Chinese population in Vietnam are also inconsistent. In particular, in the Republic of Vietnam (South Vietnam), the term "ethnic Chinese" could indicate both naturalized and non-naturalized Chinese at some point but could also just include non-naturalized Chinese in some other time.

data on the ethnic Chinese population in 1979 is missing for five of 40 provinces (Vinh Phu, Son La, Thai Binh, Ha Nam Ninh, Nghe Tinh), all of which have a small number of Hoa. We estimate ethnic Chinese population of these five provinces in 1979 based on the growth rate of the ethnic Chinese population in the other provinces in the same region where the data are available in both 1979 and 1989, as done in Acemoglu et. al. (2011) who encounter a similar missing data issue with respect to the population of Jews in some of the Russian oblasts in their paper.[12] The share of Chinese population in 1989 captures the presence of remaining ethnic Chinese after the exodus and is constructed from the data on total and ethnic Chinese populations from the 1989 census. The 1989 censuses also provide province-level data on the structure of the workforce, which allows us to construct the share of population working in state-owned enterprises in 1989.[13]

The General Statistics Office of Vietnam (GSO) publishes statistical yearbooks, which provide information about the economic and social performance of different sectors, provinces and labor groups. They also provide estimates of populations. The initial (1976) population density is computed based on the population data in the 1976 yearbook. The 1992 and 2005 volumes contain detailed data on the provinces' non-state industrial outputs in 1990 and 2005. We use these data to construct per capita non-state industrial production in order to capture the strength of the private sector. We draw data on the 2010 poverty rate and the 2010 per

[12] Vietnam is divided into 8 regions: Northwest, Northeast, Red River Delta, North Central Coast, South Central Coast, Central Highlands, Southeast, and Mekong River Delta.

[13] Data on Vietnamese provinces' land areas are retrieved from the 1979 Population Census.

capita income from the 2012 Vietnam household living standards survey. Data on 1996 and 1999 per capita incomes are collected from the 1999 Vietnam poverty survey.

We also utilize district-level data on the central government's annual investment from 1976 to 1985, per capita consumption expenditures in 1999, and climatic data on average temperature and average level of precipitation. These data are from Miguel and Roland (2011), but originally from Minot et al. (2003).[14] To obtain province-level data, we take their district population weighted averages. Distances to the closest major city (Ho Chi Minh City or Hanoi) are from Malesky et al. (2015). Distances from Vietnamese provinces to the Guangxi and Yunnan provinces of China are measured from the provinces' main post offices to Mong Cai and Lao Cai international border-checkpoints, respectively using google maps.

The borders between provinces did not remain constant throughout the sample period. In 1979, there were 40 provinces. The number increased to 44 in 1989, 61 in 1999, and finally to 63 in 2009. Some were broken down into smaller provinces while others were merged together. Moreover, some districts were also moved from one province to another during this period. In order to generate a dataset that is consistent throughout the studied period, we merged provinces that had been parts of the same province at any point between 1979 and 2009, and also merged provinces between

[14] These data are originally from a report by Minot et al. (2003), based on the Vietnamese Ministry of Agriculture and Rural Development and the 1978-1997 Vietnam Living Standards Survey (VLSS), the United States Geological Survey, Vietnam statistical yearbooks, and the 1999 Population and Housing Census. Furthermore, the original sources of the provincial investment data are the 1976-1985 Vietnam statistical yearbooks.

which districts were moved.[15] At the end of this process, we are left with a total of 37 provinces in our dataset. Table 3 provides the descriptive statistics for all the variables used in the paper.

Figure 2 displays the geographical distribution of ethnic Chinese (i.e., the share of ethnic Chinese, the Hoa, in the total population) across Vietnamese provinces in 1979 and 1989. There are some similarities between the two time periods. Most notably, the share of ethnic Chinese is largest near Ho Chi Minh City in 1979 and also in 1989. Similarly, the share of ethnic Chinese is relatively high at the northern end of the country by the border with China in both 1979 and 1989. However, a close inspection reveals that there was a dramatic decline in the ethnic Chinese population in some of the northern provinces. To be specific, the share of the ethnic Chinese population declined noticeably in those provinces that are close to Mong Cai Border Station, which over a quarter million ethnic Chinese crossed to find a safe heaven in the city of Dongxing, where the Chinese government set up refugee camps to shelter ethnic Chinese refugees from Vietnam.

## IV. Econometric Methodology

When examining whether provinces with a higher share of ethnic Chinese in 1989 have exhibited a higher level of contemporary development, care needs to be taken. The data on the geographical distribution of ethnic Chinese come from the historical census. Given the Vietnamese government's inexperience with collecting

[15] See Table A2 for the information about which provinces are merged in the final data set.

such data at the time, one can question the reliability of these figures. Hence, measurement error, if severe in the original data, will cause attenuation bias in the estimated economic impact of the share of Chinese population in 1989. Moreover, we need to address the endogeneity bias. Many of the ethnic Chinese might have settled in economically developed regions to begin with (e.g., Saigon (HCM City) and Hanoi). Ethnic Chinese who emigrated might also share some latent characteristics that are relevant to regional economic performance.[16] Our instrumental variable approach helps to resolve these two potential problems.

We estimate the following two equations:

First stage:

$$ln(Chin_{89_i}) = \beta_0 + \beta_1 ln(Dist_{GUANGXI_i}) * ln(Chin_{79_i}) + \beta X_i + \mathcal{E}_i$$

Second stage:

$$ln(Y_i) = \gamma_0 + \gamma_1 ln(Chin_{89_i}) + \gamma X_i + \mu_i$$

where subscript *i* indicates province, $Y_i$ is an indicator of economic development, $Chin79_i$ and $Chin89_i$ are the share of ethnic Chinese population in 1979 and 1989, respectively; $Dist_{GUANGXIi}$ is the land distance (km) from a given province to Guangxi province, China (the city of Dongxing in Guangxi to be precise); $X_i$ is a vector of other provincial control variables.

For the second stage dependent variable $Y_i$, we use income per capita in 2010, non-state industrial production per capita in 2005, consumption expenditure per capita in 1999, the share of the population living in poverty in 2010, and population

[16] A number of anecdotal accounts indicate that the ethnic Chinese had to pay exorbitant price for logistical assistance and also bribes in order to flee Vietnam, which some just could not afford (Banister, 1985).

densities and shares of urban populations in 2009 (all in natural logs). The hypothesis is that ceteris paribus, provinces with higher shares of Chinese population exhibit a higher level of economic development; i.e., the coefficients on $ln(Chin89_i)$ are expected to be positive for all of the dependent variables with the exception of poverty rate, for which negative coefficients are expected.

Our instrument in the first stage regression is the interaction term between the log of the distance from the provinces to Guangxi, China, and the log of the initial proportion of Chinese. A large volume of refugees fled to the refugee camps in the Guangxi province of China (Lam, 2000), suggesting that, ceteris paribus, the ethnic Chinese population share should be larger for provinces located further away from this refugee camp, given travel costs and the risk associated with traveling by boat. More importantly, this interaction term captures the notion that the difference in the share of ethnic Chinese in the population as of 1989 between two provinces, one close to the refugee camp and the other further away from it, is likely to be more pronounced when those provinces were populated with more ethnic Chinese to begin with in 1979. Hence, the coefficient on this interaction term should be positive. To understand this interaction term, consider two provinces with different distances to Guangxi. If both provinces had only a small number of ethnic Chinese in 1979, even though the exodus would have disproportionately affected provinces closer to Guangxi, its impact on either province would have been negligible; consequently, we expect to observe little difference in the shares of Chinese population between these provinces in 1989. However, if these two provinces were heavily populated with ethnic Chinese before the exodus, there would likely be a large difference in the

shares of the ethnic Chinese between the two provinces in 1989, as the Chinese population that resided near the refugee settlements faced smaller transportation costs and did not need to travel by boat, which was deemed to be risky at the time.

In $X_i$, we include potential correlates of economic development. We include both distance to the refugee camp and the initial share of the Chinese population as of 1979 (un-interacted). A concern to address here is that these factors might also have direct effects on regional economic development or might be correlated with it through some other mechanisms, thereby violating the exclusion restrictions. For example, the ethnic Chinese might have been concentrated in more (or less) developed areas even before the shock, and distance to the refugee camp might end up capturing latent geographical factors that correlated with development (e.g., the cost of trade with China). By controlling for these two variables directly in the second stage regression, our identification comes only from the differential impacts of geographical distance to the refugee camps across provinces with varying presence of the ethnic Chinese minority at the time of the exodus.

Other relevant factors that we control for are: a dummy variable for southern provinces formally in the South Vietnam, a dummy variable for coastal provinces, weather (temperature and precipitation), distance to the closest major city (Hanoi or Ho Chi Minh City), initial level of development (captured by population density as of 1976), total government investment from 1976 to 1985, and proportion of the workforce in state-owned enterprises in 1989. A dummy for coastal provinces captures important differences in trade costs across provinces. A dummy for provinces formally belonging to South Vietnam captures institutional differences that

exist between the southern and northern provinces; e.g., the Vietnamese government's nationalization policy and relocation program were implemented mostly in the south immediately after the Vietnam War, which might still have direct and persistent effects on regional economies in the south. Satellite provinces of Ho Chi Minh City and Hanoi are historically more developed than those located further away. We control for the initial population density (1976), as a proxy for the initial level of economic development of provinces to address a common concern that current economic performance is correlated with initial level of economic development. It also captures the long-term effects of the relocation program that are likely to have disproportionately affected provinces that were densely populated, historically. We control for the average temperature and average level of precipitation to capture variation in agricultural productivity (Miguel and Roland, 2011). Government redistribution policies could also affect the variation in economic performance. We use two proxies to control for this factor. The first variable is the total per capita investment of the central government from 1976 to 1985. The second variable is the share of the population that worked in state-owned enterprises in 1989.[17]

## V. Results

[17] In some specifications, we control for US bombings using the data from Miguel and Roland (2011). As found in Miguel and Roland (2011), the results are not significant and thus dropped from the regression analysis. We also include a dummy variable for provinces that were the battle ground in the Sino-Vietnamese War (Cao Bang, Ha Tuyen, Lang Son, Lai Chau, Hoang Lien Son, and Quang Ninh). Our results remain robust to the inclusion of this dummy variable. These results are available upon request.

Table 4 shows the first stage regressions for the baseline specification (column 1) and additional specifications where we control for potential confounding factors in robustness checks (columns 2 and 3). As expected, the coefficient on the interaction term between initial share of Chinese and the distance to Guangxi province in the first stage regressions is positive and statistically significant, with t-statistics well above 2; i.e., distance is a more important factor in the first stage regression for provinces that were heavily populated with ethnic Chinese in 1979. Nonetheless, the first stage partial F-statistics are relatively small, around 5-6 in part because we have a limited sample size (37 provinces). Therefore, the results must be interpreted with caution, given the presence of a well-known weak instrument problem (Stock and Yogo, 2005). The coefficients on the central government investment per capita during the period from 1976 to 1985 and the share of population that worked in the state-sector in 1989 are negative and statistically significant in the first stage regressions (column 1). This might indicate that, ceteris paribus, the Vietnamese Communist Government invested less in provinces with a larger presence of the ethnic Chinese minority where they are relatively more prosperous.

Tables 5 and 6 show the reduced-form regressions in which we directly include our instrument in the main equation (columns 1, 3, and 5), and the instrumental variable regressions (columns 2, 4, and 6), which are based on the first stage specification in column 1 of Table 4. The dependent variables in Table 5 are population density in natural log (columns 1 and 2), urbanization rate in natural log (columns 3 and 4), and per capita non-state industrial production in natural log

(columns 5 and 6). The dependent variables in Table 6 are income per capita in natural log (columns 1 and 2), consumption per capita in natural log (columns 3 and 4), and poverty rate in natural log (columns 5 and 6).

In the reduced form regressions, the coefficients on the interaction of initial share of Chinese with the distance to Guangxi province are positive and statistically significant for all of the dependent variables except for poverty rate. These results show that, ceteris paribus, the positive effect of distance to the refugee camps on the population density, urbanization rate, per capita non-state industrial production, and per capita income and consumption is larger in a province with a larger presence of the ethnic Chinese minority at the time of the exodus. To put it differently, the results suggest that the positive effects of the initial share of ethnic Chinese population are attenuated in the provinces that are close to the refugee camps. For poverty rate, the interaction term has a negative and statistically significant coefficient, which suggests that the negative effects of the initial share of ethnic Chinese on the poverty rate are smaller when a province is closer to the refugee camp. These results are consistent with the view that the exodus of ethnic Chinese has had long-term effects on regional economic development in Vietnam, especially in those provinces that are close to the refugee camps. The instrumental variable regression results show that the coefficients on the share of ethnic Chinese in 1989 are positive and significant for population density, urbanization rate, per capita non-state industrial production, per capita income, and per capita consumption, while they are negative and significant for poverty rate, indicating that the ethnic Chinese minority has had positive effects on regional development in Vietnam.

The coefficient on the initial population density is positive as expected for population density, urbanization rate, per capita non-state industrial production, per capita income, and per capita consumption, and it is negative for poverty rate. These results suggest that, ceteris paribus, the contemporary economic performance of provinces that were densely populated at the end of the Vietnam War (1976) is superior to that of those which were sparsely populated (i.e., the initial economic conditions tend to persist). The coefficients on the proxies for the central government's redistribution effort (the central government's investment per capita during the period from 1976 to 1985 and the share of the population working in the state-sector in 1989) have the expected signs (i.e., positive for all of the variables except for poverty rate, which is negative as expected). These results are consistent with the view that public investment stimulated regional growth in Vietnam. Taken together, Tables 5 and 6 suggest that the exodus of ethnic Chinese had negative effects on regional economic development.

We evaluate the magnitude of these effects by considering the counterfactuals for three northern provinces near the city of Dongxing in China, based on the coefficients on the share of ethnic Chinese reported in Tables 5-6. These provinces, Ha Bac, Lang Son, and Quang Ninh, lost a large number of ethnic Chinese from 1979-1989, given that they are geographically close to the refugee camps in China. The estimated magnitude of the impact of the loss of the Chinese population (in proportion to the cross-sectional standard deviation) is reported in Table 7. The magnitude varies, depending on the indicator of development. The indicators that are highly sensitive to the share of ethnic Chinese, and thus are likely to have changed

most dramatically due to the exodus of ethnic Chinese, are urbanization rate, non-state industrial production, and poverty rate. According to our calculation, these provinces' urbanization rates and private industrial production would have been 1.2 standard deviations larger while the poverty rate would have been 1.4 standard deviations lower today if it were not for the exodus of the ethnic Chinese during the late 1970s and 1980s.

Finally, to measure the robustness of these results, we perform three sensitivity checks. First, one econometric concern might be that the results capture unobservable differences between the northern Hoa who settled near the Red River and the southern Hoa who settled near the Mekong River. The historical narrative of the northern Hoa and the southern Hoa indicate some distinctive differences. As described in Section 2, earlier Chinese settlers in Vietnam were largely merchants, political refugees, Chinese soldiers, and officials who decided to remain in Vietnam. The Chinese communities in both regions were similar in their statuses and economic roles during the pre-colonial period (Amer, 1991) However, when the French started to colonize Vietnam, the ethnic Chinese communities began to reshape in response to labor demand by the French colonial government. Many Chinese traders moved to the southern provinces and cities where retail and commerce were most developed, whereas the demand for miners and construction workers drew more Chinese to migrate from China to the northern provinces of Vietnam.[18]

[18] By the end of the nineteenth century, "it is estimated that Chinese operated most of the 124 mines in northern Vietnam in the late nineteenth century." (Han, 2009, p.5).

From 1954-1976, the differences between the ethnic Chinese in northern and southern Vietnam deepened, largely due to the division of Vietnam. Under the socialist economic system, the ethnic Chinese in the north played much less of a role and had less economic power and influence than their southern counterparts did. They were "mainly workers or technicians in the urban areas, or fishermen, foresters, and craftsmen in Quang Ninh province" (Ungar, 1987, p.598). In contrast, "the southern Chinese population maintained a dominant position in the local economy, controlling the rice trade and other markets" (Ungar, 1987, p.598).[19] However, it is important not to overstate the aforementioned differences. According to Han (2009), ethnic Chinese enjoyed more freedom than Vietnamese and played an instrumental role in commercial activities even in the centrally planned economy of the north.[20] After the country was reunited, even though the gap between the two ethnic Chinese communities was still significant, they both thrived economically, given the global network of the Chinese community that they were able to exploit.

To address this issue, we control for two dummy variables: one for provinces around the Mekong river (namely, An Giang, Long An, Tien Giang, Cuu Long, Hau Giang, Dong Thap, Kien Giang, Minh Hai, and Ben Tre) and another for those around

[19] Another important source of the differences is simply that the Chinese Communist Party (CCP) and the Guomindang (GMD) both had competed for allegiance among the Chinese in Vietnam even before 1954 (Ungar, 1987). After 1954, this division within the ethnic Chinese community in Vietnam deepened, with those who lived in the north being under the influence of the CCP and their southern counterparts under the Guomingdang (Ungar, 1987).

[20] For example, the Chinese has a special privilege to travel to China, giving them opportunities to smuggle in from China goods such as perfume, powder, liquor, and herbs (Han, 2009). The ethnic Chinese were believed to control the black market in North Vietnam (Han, 2009).

the Red river (namely, Ha Bac, Ha Nam Ninh, Ha Noi, Hai Hung, Hai Phong, Vinh Phu, and Thai Binh). These dummy variables capture differences that might exist between these two economically important regions, both of which are heavily populated by the Hoa. The results are displayed in Table 8. Our main results are qualitatively robust. The coefficient on the share of Chinese is still positive for population density, urbanization rate, non-state industrial production, income per capita, and consumption per capita, and it is still negative for poverty rate. These results give us some confidence that our results are not driven entirely by the long run economic impact of the North-South divide.

Secondly, Vietnam and China began to open their border for bilateral trade as their diplomatic relation gradually normalized in the 1990s. The transportation infrastructure which had existed before the border war was also restored. As a result, trade between the two countries began to increase in volume (Xiaosong and Womack, 2000). Given their geographical locations, the Vietnamese provinces near Guangxi province and, in particular, those where a large number of ethnic Chinese originally settled but chose to flee during the border war, are likely to have reaped economic benefits from trade liberalization between the two countries. If this mechanism is at play, then the estimated impact of the ethnic Chinese population on provincial economic performance might be biased downward since those ethnic Chinese that fled these northern provinces might have facilitated trade between Guangxi and the provinces that they left behind. In order to capture some of these trade effects, we construct three additional variables and control for them in robustness checks. First, we measure geographical distance to Yunnan province, another Chinese province that

borders Vietnam alongside Guangxi, and is considered to be an important route for Sino-Vietnamese trade. Second, we use a dummy variable for provinces that border China and another dummy variable for provinces that have class-I seaports. The results are displayed in Table 9. Our main results are again robust to the inclusion of these additional control variables.

Finally, we examine the growth rates of population density and urbanization rate from 1989-2009, the growth rate of per capita non-state industrial production from 1990-2005, and the growth rate of per capita income from 1996-2010. The results are displayed in Table 10. The coefficient on the share of ethnic Chinese is positive and statistically significant in all specifications, suggesting that provinces with more Chinese as of 1989 tended to have more positive changes in these measures of economic development.

## VI. Conclusion

This paper empirically explores the economic roles of the ethnic Chinese minority in Vietnam in the context of post-war development. In order to address the endogeneity of the geographical distribution of this ethnic group, we note an important historical episode: the Vietnamese Communist Party's policies to transform South Vietnam to a centrally planned economy and the resulting deterioration in Sino-Vietnamese diplomatic relations caused a disproportionately large number of the ethnic Chinese population to seek a safe haven in the refugee camp in the Guangxi province of China and elsewhere for a nearly decade following the Vietnam War. We find positive correlations between the share of the Chinese population in 1989 and

economic indicators such as population density, urbanization rate, per capita non-state industrial production, per capita income, and per capita consumption. We also find strong evidence suggesting that, ceteris paribus, provinces with a higher share of Chinese in the population in 1989 had a lower portion of the population living in poverty. These results suggest that the ethnic Chinese minority fostered the development of the private sector and raised the overall standard of living in Vietnam.

Our results are particularly relevant to Miguel and Roland (2011), whose results contrast somewhat with ours. Miguel and Roland (2011) show that the infrastructure damage from severe bombing during the Vietnam War had negligible effects on long-term economic development in Vietnam, whereas we find that the change in population structure that occurred after the Vietnam War had important long-term economic effects. Though it is outside the scope of this paper to investigate the reason for this discrepancy, we speculate that the type of shocks Miguel and Roland (2011) examine have different economic implications from the ones that we examine. Physical capital that was destroyed due to bombing could be rebuilt (in particular, the Vietnamese government made concerted efforts to restore the infrastructure in the post-war period), whereas the exodus of the ethnic Chinese is likely harder to reverse. Those who left might have found much better economic opportunities in destination countries, for example. In addition, our results have little to say about the political economy question of the large presence of the ethnic Chinese minority who possess a disproportionate amount of assets in Vietnam (as in its neighboring countries in Southeast Asia). The question of whether and to what

extent this economically dominant group affects the allocation of resources through political processes in contemporary Vietnam might be relevant as well.

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## Appendix

**Table A1: Phases of Chinese immigration to Vietnam**

| Period | Chinese immigrants | Economic role |
|---|---|---|
| Before the first half of the 17th century | -Seasonal traders or political refugees<br>-Clustered in some trading hubs in Vietnam (e.g. Hoi An)<br>-Slow and stable inflow | -Were mostly seasonal traders who did not settle down in any one place for a long time<br>-Had no perpetual role in the Vietnamese economy |
| Second half of the 17th century – second half of the 19th century | -Traders, miners and workers<br>-Settled down mostly in South Vietnam.<br>-Increased in the volume of inflow due to the increase in trade opportunities brought about by the influx of Western traders to Vietnam | -Helped with establishment of villages and towns, fostering the circulation of goods and people for the Vietnamese domestic market<br>-Dominated internal and external trades<br>-Became a permanent component of the Vietnamese population |
| Second half of the 19th century – 1955 (French colonization of Vietnam, Chinese diaspora) | -Traders, workers and middlemen<br>-Settled down mostly in South Vietnam<br>-Increased in volume due to favorable treatment from the French and high demand of the French administration for skilled labors. | -Dominated trade<br>-Expanded external trade thanks to the global Chinese network created by the earlier Chinese diaspora.<br>-Economic roles extended to ownership and administration of plantations, finance, transportation, and manufacturing. |
| 1955-1975 | -Traders, high-skilled labors<br>-Stable inflow | -Dominated trade, manufacturing, finance, and transportation<br>-Gained influence in technical and managerial professions |
| 1975-1986 | -Exodus | -Lost status and economic dominance due to the Vietnamese Communist Party's post-war policies. |

| | | |
|---|---|---|
| 1986-present | -Slow and stable outflow | -Allowed to do business again<br>-Played a crucial role in the development of the country |

Source: Tran (1993)

**Table A2: Merged Provinces in Final Data**

| Merged Province | Province in 1979 | Province in 1989 | Province in 1999 | Province in 2009 |
|---|---|---|---|---|
| **Hanoi** | Hanoi | Hanoi | Hanoi | Hanoi |
| | Ha Son Binh | Ha Son Binh | Hoa Binh | Hoa Binh |
| | | | Ha Tay | |
| **Ho Chi Minh City** | Ho Chi Minh City | Ho Chi Minh City | Ho Chi Minh City | Ho Chi Minh City |
| **Hai Phong** | Hai Phong | Hai Phong | Hai Phong | Hai Phong |
| **Cao Bang** | Cao Bang | Cao Bang | Cao Bang | Cao Bang |
| | Bac Thai | Bac Thai | Bac Kan | Bac Kan |
| | | | Thai Nguyen | Thai Nguyen |
| **Ha Tuyen** | Ha Tuyen | Ha Tuyen | Ha Giang | Ha Giang |
| | | | Tuyen Quang | Tuyen Quang |
| **Lang Son** | Lang Son | Lang Son | Lang Son | Lang Son |
| **Lai Chau** | Lai Chau | Lai Chau | Lai Chau | Lai Chau |
| | | | | Dien Bien |
| **Hoang Lien Son** | Hoang Lien Son | Hoang Lien Son | Lao Cai | Lao Cai |

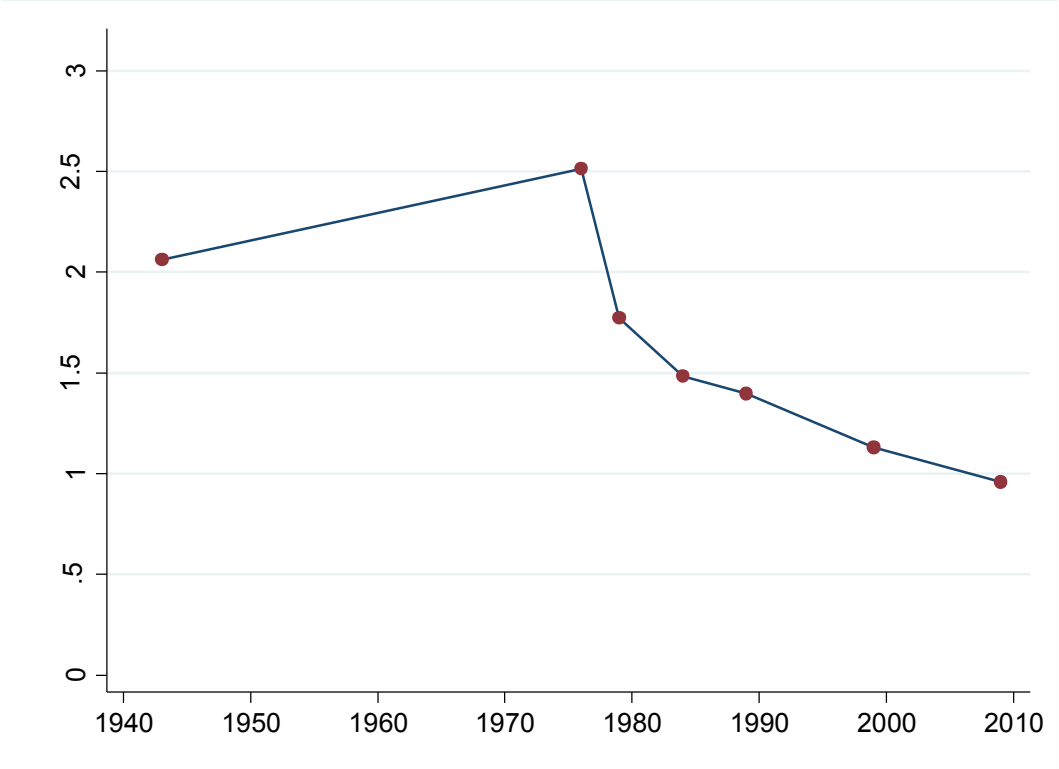
| | | | | |
|---|---|---|---|---|
| | | | Yen Bai | Yen Bai |
| **Son La** | Son La | Son La | Son La | Son La |
| **Vinh Phu** | Vinh Phu | Vinh Phu | Vinh Phuc | Vinh Phuc |
| | | | Phu Tho | Phu Tho |
| **Ha Bac** | Ha Bac | Ha Bac | Bac Ninh | Bac Ninh |
| | | | Bac Giang | Bac Giang |
| **Quang Ninh** | Quang Ninh | Quang Ninh | Quang Ninh | Quang Ninh |
| **Hai Hung** | Hai Hung | Hai Hung | Hai Duong | Hai Duong |
| | | | Hung Yen | Hung Yen |
| **Thai Binh** | Thai Binh | Thai Binh | Thai Binh | Thai Binh |
| **Ha Nam Ninh** | Ha Nam Ninh | Ha Nam Ninh | Ha Nam | Ha Nam |
| | | | Nam Dinh | Nam Dinh |
| | | | Ninh Binh | Ninh Binh |
| **Thanh Hoa** | Thanh Hoa | Thanh Hoa | Thanh Hoa | Thanh Hoa |
| **Nghe Tinh** | Nghe Tinh | Nghe Tinh | Nghe An | Nghe An |
| | | | Ha Tinh | Ha Tinh |

| | | | | |
|---|---|---|---|---|
| **Binh Tri Thien** | Binh Tri Thien | Quang Binh | Quang Binh | Quang Binh |
| | | Quang Tri | Quang Tri | Quang Tri |
| | | Thua Thien - Hue | Thua Thien - Hue | Thua Thien - Hue |
| **Quang Nam-Da Nang** | Quang Nam-Da Nang | Quang Nam-Da Nang | Da Nang | Da Nang |
| | | | Quang Nam | Quang Nam |
| **Nghia Binh** | Nghia Binh | Quang Ngai | Quang Ngai | Quang Ngai |
| | | Binh Dinh | Binh Dinh | Binh Dinh |
| **Phu Khanh** | Phu Khanh | Phu Yen | Phu Yen | Phu Yen |
| | | Khanh Hoa | Khanh Hoa | Khanh Hoa |
| **Thuan Hai** | Thuan Hai | Thuan Hai | Ninh Thuan | Ninh Thuan |
| | | | Binh Thuan | Binh Thuan |
| **Gia Lai - Kom Tum** | Gia Lai - Kom Tum | Gia Lai - Kom Tum | Gia Lai | Gia Lai |
| | | | Kon Tum | Kon Tum |
| **Dak Lak** | Dak Lak | Dak Lak | Dak Lak | Dak Lak |
| | | | | Dak Nong |

| | | | | |
|---|---|---|---|---|
| **Lam Dong** | Lam Dong | Lam Dong | Lam Dong | Lam Dong |
| **Song Be** | Song Be | Song Be | Binh Duong | Binh Duong |
| | | | Binh Phuoc | Binh Phuoc |
| **Tay Ninh** | Tay Ninh | Tay Ninh | Tay Ninh | Tay Ninh |
| **Long An** | Long An | Long An | Long An | Long An |
| **Dong Thap** | Dong Thap | Dong Thap | Dong Thap | Dong Thap |
| **An Giang** | An Giang | An Giang | An Giang | An Giang |
| **Tien Giang** | Tien Giang | Tien Giang | Tien Giang | Tien Giang |
| **Ben Tre** | Ben Tre | Ben Tre | Ben Tre | Ben Tre |
| **Cuu Long** | Cuu Long | Cuu Long | Vinh Long | Vinh Long |
| | | | Tra Vinh | Tra Vinh |
| **Hau Giang** | Hau Giang | Hau Giang | Soc Trang | Soc Trang |
| | | | Can Tho | Can Tho |
| | | | | Hau Giang |
| **Kien Giang** | Kien Giang | Kien Giang | Kien Giang | Kien Giang |

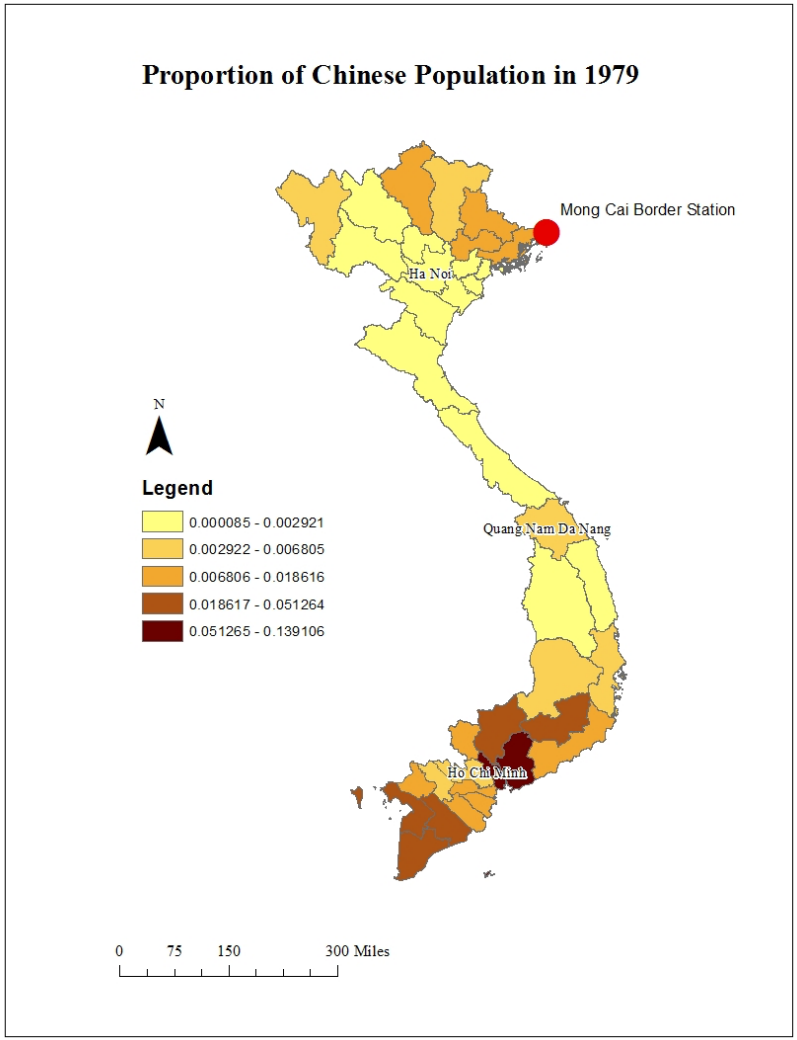
| | | | | |
|---|---|---|---|---|
| **Minh Hai** | Minh Hai | Minh Hai | Bac Lieu | Bac Lieu |
| | | | Ca Mau | Ca Mau |
| **Dong Nai** | Dong Nai | Dong Nai | Dong Nai | Dong Nai |
| | Ba Ria-Vung Tau | Ba Ria-Vung Tau | Ba Ria-Vung Tau | Ba Ria-Vung Tau |

**Figure 1: Ethnic Chinese population as a percentage of total population (%)**




Source: 1959, 1960 Statistical Yearbooks of South Vietnam; International Population Reports, Series P-95, No. 77, U.S. Department of Commerce; 1979, 1989, 1999, and 2009 Vietnam Population and Housing Census.

**Figure 2: Geographical Distribution of Ethnic Chinese (Share of Ethnic Chinese)**



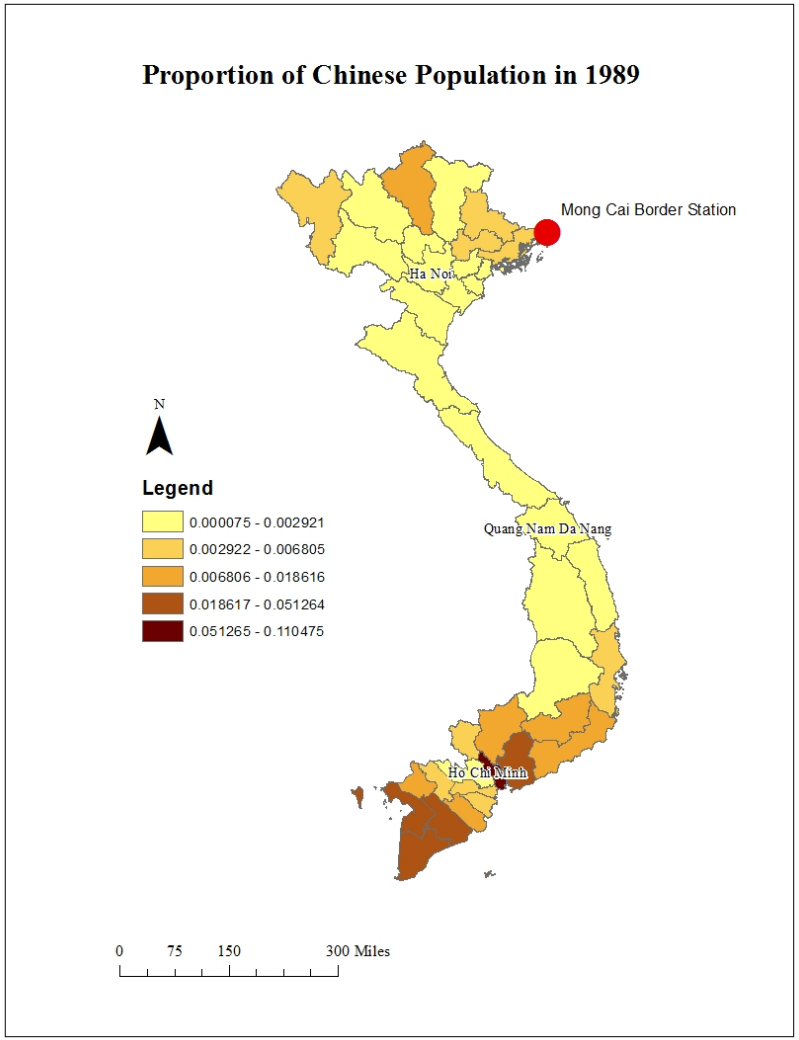



**Table 1: French and Chinese capital in Vietnam in 1906 (million French francs):**

| Sector | French capital | Chinese capital | Total | Percentage | |
|---|---|---|---|---|---|
| | | | | French | Chinese |
| Agriculture | 13 | 6 | 19 | 70 | 30 |
| Industry | 72 | 24 | 96 | 76 | 24 |
| Trade | 41 | 66 | 107 | 38 | 62 |
| Total | 126 | 96 | 222 | 57 | 43 |

Source: Tran (1993), p.46 (original source: Dao (1924), p.19.)

**Table 2: Estimated Emigration from Vietnam: 1975 to Midyear 1982**

**Pane A: Total Emigration**

| Categories | Total (1975-1982) | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 (first half) |
|---|---|---|---|---|---|---|---|---|---|
| Total emigrants (thousands) | 1,052.79 | 123.7 | 12.5 | 34.4 | 320.93 | 332.74 | 101.04 | 90.64 | 36.84 |
| Total arrivals (thousands) | 910.64 | 123.7 | 12.5 | 27.3 | 277.8 | 265 | 87.8 | 83.9 | 32.64 |
| Estimated lost at sea (thousands) | 142.15 | - | - | 7.1 | 43.13 | 67.74 | 13.24 | 6.74 | 4.2 |

**Panel B: Ethnic Chinese Emigration**

| Categories | Total (1975-1982) | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 (first half) |
|---|---|---|---|---|---|---|---|---|---|
| Chinese arrivals (thousands) | 596.6 | 45 | 6.3 | 18.7 | 260 | 222.8 | 21.5 | 15.5 | 6.8 |
| Chinese arrivals as % of total (%) | 65.5 | 36.4 | 50.4 | 68.5 | 93.6 | 84.1 | 24.5 | 18.5 | 20.8 |
| Overland to China (thousands) | 265 | - | - | 10 | 190 | 57 | 8 | - | - |

Source: International Population Reports, Series P-95, No. 77, U.S. Department of Commerce, p.13.

Table 3: Descriptive Statistics

| Variables | Obs. | Mean | Std. dev. | Min. | Max. |
|---|---|---|---|---|---|
| *Dependent Variables* | | | | | |
| Population density 2009 (ln) | 37 | 5.69 | 0.96 | 3.92 | 8.17 |
| Share of urban population 2009 (ln) | 37 | 3.10 | 0.51 | 2.27 | 4.42 |
| Per capita cons. exp. 1999 (ln) | 37 | 7.79 | 0.30 | 6.96 | 8.60 |
| Share of pop. living in poverty 2010 (ln) | 37 | 2.57 | 0.87 | -1.20 | 3.92 |
| Per capita non-state ind. prod. 2005 (ln) | 37 | 6.74 | 0.77 | 4.48 | 8.37 |
| Per capita income 2010 (ln) | 37 | 7.09 | 0.30 | 6.38 | 7.91 |
| Change in population density 89-09 (Δln) | 37 | 0.32 | 0.21 | 0.03 | 0.92 |
| Change in share of urban population 89-09 (Δln) | 37 | 0.43 | 0.33 | 0.05 | 1.67 |
| Change in per capita non-state ind. prod. 90-05 (Δln) | 37 | 3.00 | 0.65 | 1.68 | 4.42 |
| Change in per capita income 96-10 (Δln) | 37 | 1.66 | 0.19 | 1.23 | 2.07 |
| *Independent Variables* | | | | | |
| Share of Chinese population 1989 (ln) | 37 | -1.24 | 1.88 | -4.89 | 2.40 |
| Share of Chinese population 1979 (ln) | 37 | -0.84 | 1.80 | -4.77 | 2.63 |
| Share of pop. in state sector 1989 (ln) | 37 | 1.71 | 0.53 | 0.81 | 3.00 |
| Share of urban population 1989 (ln) | 37 | 2.67 | 0.64 | 1.54 | 4.30 |
| Population density 1976 (ln) | 37 | 5.07 | 1.17 | 2.77 | 7.48 |
| Distance to Guangxi province, China (ln) | 37 | 6.75 | 0.86 | 5.04 | 7.67 |
| Distance to Yunnan province, China (ln) | 37 | 6.71 | 0.94 | 4.40 | 7.69 |
| Distance to closest major city (HCM or Hanoi) | 37 | 234.99 | 205.00 | 0.00 | 790.00 |
| Southern provinces | 37 | 0.54 | 0.51 | 0 | 1 |
| Coastal provinces | 37 | 0.51 | 0.51 | 0 | 1 |
| Mekong river provinces | 37 | 0.24 | 0.43 | 0 | 1 |
| Red river provinces | 37 | 0.19 | 0.40 | 0 | 1 |
| Share border with China | 37 | 0.16 | 0.37 | 0 | 1 |
| Provinces with class-I seaports | 37 | 0.30 | 0.46 | 0 | 1 |
| Per capita govt's invest. 1976-85 (ln) | 37 | 6.40 | 1.55 | -2.30 | 7.68 |
| Per capita non-state ind. prod. 1990 (ln) | 37 | 3.74 | 0.93 | 1.51 | 5.70 |
| Per capita income 1996 (ln) | 37 | 5.43 | 0.33 | 4.83 | 6.38 |
| Average precipitation (ln) | 37 | 5.02 | 0.16 | 4.79 | 5.51 |
| Average temperature (ln) | 37 | 3.19 | 0.08 | 3.03 | 3.30 |

Table 4: First Stage Results

| | Share of Chinese population in 1989 (ln) | | |
|---|---|---|---|
| VARIABLES | (1) | (2) | (3) |
| Distance Guangxi*Init. share of Chinese | 0.0979** | 0.111** | 0.108** |
| | -0.0436 | -0.0449 | -0.0483 |
| Share of Chinese population 1979 (ln) | 0.415 | 0.343 | 0.361 |
| | -0.278 | -0.297 | -0.313 |
| Share of pop. in state sector 1989 (ln) | -0.174* | -0.0134 | -0.0698 |
| | -0.0881 | -0.127 | -0.106 |
| Population density 1976 (ln) | 0.0882 | 0.0191 | 0.0585 |
| | -0.061 | -0.0463 | -0.0711 |
| Distance to Guangxi province, China (ln) | 0.00943 | 0.0325 | -0.0414 |
| | -0.167 | -0.158 | -0.169 |
| Distance to closest major city | 0.000424 | 0.000799* | 0.000831 |
| | -0.000483 | -0.000458 | -0.000516 |
| Southern provinces | 0.201 | 0.145 | 0.201 |
| | -0.221 | -0.191 | -0.213 |
| Coastal provinces | -0.112 | -0.0641 | -0.0226 |
| | -0.109 | -0.111 | -0.132 |
| Per capita govt's invest. 1976-85 (ln) | -0.0395*** | -0.0551*** | -0.0333* |
| | -0.0139 | -0.0129 | -0.0184 |
| Average precipitation (ln) | -0.346 | -0.667* | -0.638 |
| | -0.391 | -0.385 | -0.411 |
| Average temperature (ln) | -1.449 | -1.097 | 0.633 |
| | -1.853 | -1.475 | -2.173 |
| Mekong river provinces | | 0.276* | |
| | | -0.144 | |
| Red river provinces | | 0.309* | |
| | | -0.162 | |
| Share border with China | | | -0.06 |
| | | | -0.222 |
| Provinces with class-I seaports | | | -0.166 |
| | | | -0.123 |
| Distance to Yunnan province, China (ln) | | | -0.147 |
| | | | -0.171 |
| Constant | 5.829 | 6.125* | 1.829 |
| | -4.156 | -3.192 | -4.663 |
| Observations | 37 | 37 | 37 |
| R-squared | 0.991 | 0.993 | 0.992 |
| F-test | 5.031 | 6.057 | 5.022 |
| Prob > F | 0.034 | 0.0218 | 0.0354 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: The Impacts of Ethnic Chinese Minority on Population Density, Urbanization, and Per Capita Non-state Industrial Production

| | Population density 2009 (ln) | | Share of urban population 2009 (ln) | | Per capita non-state ind. prod. 2005 (ln) | |
|---|---|---|---|---|---|---|
| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) |
| Share of Chinese population 1989 (ln) | | 1.000*** | | 1.516* | | 2.443* |
| | | (0.360) | | (0.856) | | (1.390) |
| Distance Guangxi*Init. share of Chinese | 0.0978** | | 0.148* | | 0.239** | |
| | (0.0373) | | (0.0764) | | (0.110) | |
| Share of Chinese population 1979 (ln) | -0.640** | -1.055*** | -0.794 | -1.424 | -1.445* | -2.460* |
| | (0.248) | (0.378) | (0.494) | (0.896) | (0.724) | (1.449) |
| Share of pop. in state sector 1989 (ln) | 0.285*** | 0.458*** | 0.680*** | 0.944*** | 0.309 | 0.734* |
| | (0.0904) | (0.0791) | (0.116) | (0.226) | (0.268) | (0.401) |
| Population density 1976 (ln) | 0.828*** | 0.740*** | 0.140* | 0.00581 | 0.369** | 0.153 |
| | (0.0494) | (0.0584) | (0.0792) | (0.133) | (0.160) | (0.227) |
| Distance to Guangxi province, China (ln) | 0.177** | 0.168 | -0.138 | -0.152 | -0.293 | -0.316 |
| | (0.0847) | (0.129) | (0.168) | (0.247) | (0.265) | (0.438) |
| Distance to closest major city | 1.91e-05 | -0.000405 | 0.00225*** | 0.00161** | 0.000748 | -0.000288 |
| | (0.000343) | (0.000260) | (0.000686) | (0.000690) | (0.00122) | (0.00127) |
| Southern provinces | 0.239 | 0.0380 | -0.0694 | -0.374 | 0.472 | -0.0186 |
| | (0.160) | (0.156) | (0.365) | (0.572) | (0.315) | (0.650) |
| Coastal provinces | -0.176*** | -0.0632 | -0.166 | 0.00428 | -0.215 | 0.0593 |
| | (0.0511) | (0.0837) | (0.156) | (0.154) | (0.222) | (0.300) |
| Per capita govt's invest. 1976-85 (ln) | -0.0128 | 0.0267** | 0.0530** | 0.113*** | 0.0560 | 0.153*** |
| | (0.0145) | (0.0126) | (0.0240) | (0.0378) | (0.0341) | (0.0511) |
| Average precipitation (ln) | -0.179 | 0.167 | -0.816 | -0.291 | 0.488 | 1.334 |
| | (0.307) | (0.238) | (0.602) | (0.600) | (1.195) | (1.272) |
| Average temperature (ln) | -0.780 | 0.669 | 3.101 | 5.299 | 3.462 | 7.004 |
| | (1.436) | (1.439) | (2.378) | (3.983) | (3.489) | (5.721) |
| Constant | 3.163 | -2.664 | -4.341 | -13.18 | -7.923 | -22.17 |
| | (3.385) | (3.521) | (6.893) | (10.51) | (9.779) | (14.82) |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 |
| R-squared | 0.981 | 0.971 | 0.788 | 0.534 | 0.779 | 0.345 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: The Impacts of Ethnic Chinese Minority on Per Capita Income, Per Capita Consumption Expenditure, and Poverty Rate

| | Per capita income 2010 (ln) | | Per capita cons. exp. 1999 (ln) | | Share of pop. living in poverty 2010 (ln) | |
|---|---|---|---|---|---|---|
| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) |
| Share of Chinese population 1989 (ln) | | 0.455** | | 0.488* | | -3.016** |
| | | (0.224) | | (0.265) | | (1.274) |
| Distance Guangxi*Init. share of Chinese | 0.0446* | | 0.0477* | | -0.295*** | |
| | (0.0255) | | (0.0244) | | (0.0805) | |
| Share of Chinese population 1979 (ln) | -0.263 | -0.452* | -0.325* | -0.527* | 1.793*** | 3.046** |
| | (0.172) | (0.233) | (0.162) | (0.273) | (0.507) | (1.286) |
| Share of pop. in state sector 1989 (ln) | 0.336*** | 0.415*** | 0.318*** | 0.403*** | -1.145*** | -1.670*** |
| | (0.0624) | (0.0713) | (0.0553) | (0.0711) | (0.197) | (0.361) |
| Population density 1976 (ln) | 0.0908** | 0.0506 | 0.0651* | 0.0220 | -0.372*** | -0.105 |
| | (0.0365) | (0.0420) | (0.0322) | (0.0481) | (0.108) | (0.206) |
| Distance to Guangxi province, China (ln) | -0.128** | -0.132** | -0.0812 | -0.0858 | -0.146 | -0.117 |
| | (0.0612) | (0.0645) | (0.0768) | (0.119) | (0.144) | (0.442) |
| Distance to closest major city | -5.72e-05 | -0.000250 | -3.25e-05 | -0.000239 | -0.00165** | -0.000367 |
| | (0.000208) | (0.000209) | (0.000251) | (0.000301) | (0.000641) | (0.00109) |
| Southern provinces | 0.176* | 0.0843 | 0.270 | 0.172 | 0.293 | 0.899 |
| | (0.100) | (0.161) | (0.166) | (0.231) | (0.297) | (0.794) |
| Coastal provinces | -0.103** | -0.0520 | -0.0166 | 0.0382 | 0.380*** | 0.0415 |
| | (0.0426) | (0.0467) | (0.0397) | (0.0628) | (0.105) | (0.300) |
| Per capita govt's invest. 1976-85 (ln) | 0.0316*** | 0.0496*** | 0.0353*** | 0.0546*** | -0.0293 | -0.148*** |
| | (0.00825) | (0.0105) | (0.00964) | (0.0146) | (0.0208) | (0.0564) |
| Average precipitation (ln) | 0.158 | 0.316 | 0.0184 | 0.187 | 1.343** | 0.298 |
| | (0.204) | (0.195) | (0.202) | (0.251) | (0.571) | (0.954) |
| Average temperature (ln) | 2.411*** | 3.071*** | 2.327** | 3.034** | -7.373*** | -11.74** |
| | (0.845) | (1.060) | (1.093) | (1.521) | (1.813) | (5.554) |
| Constant | -1.808 | -4.461 | -0.456 | -3.298 | 24.50*** | 42.08*** |
| | (2.394) | (2.986) | (2.817) | (3.788) | (4.929) | (13.52) |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 |
| R-squared | 0.918 | 0.872 | 0.910 | 0.757 | 0.913 | 0.481 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Magnitudes of Effects for Provinces Near Dongxing

| | | Three Provinces (Ha Bac, Lang Son, Quang Ninh) | | Two Provinces (Lang Son, Quang Ninh) | |
|---|---|---|---|---|---|
| Dependent Variables | Coefficient | Coefficient*(Average Change in % Chinese (ln)) | Coefficient*(Average Change in % Chinese (ln))/sd | Coefficient*(Average Change in % Chinese (ln)) | Coefficient*(Average Change in % Chinese (ln))/sd |
| Population density 2009 (ln) | 1.00 | -0.40 | -0.41 | -0.57 | -0.59 |
| Share of urban population 2009 (ln) | 1.52 | -0.60 | -1.19 | -0.87 | -1.71 |
| Per capita non-state ind. prod. 2005 (ln) | 2.44 | -0.97 | -1.25 | -1.40 | -1.81 |
| Per capita income 2010 (ln) | 0.46 | -0.18 | -0.61 | -0.26 | -0.86 |
| Per capita cons. exp. 1999 (ln) | 0.49 | -0.19 | -0.65 | -0.28 | -0.94 |
| Share of pop. living in poverty 2010 (ln) | -3.02 | 1.21 | 1.39 | -1.72 | -1.98 |

The quantative effects are calculated based on the estimated coefficients on the share of ethnic Chinese in Tables 3-7 and the average change in the share of ethnic Chinese (ln) in these provinces from 1979-1989

Table 8: Control for Red River and Mekong River

| VARIABLES | Population density 2009 (ln) (1) | Share of urban population 2009 (ln) (2) | Per capita non-state ind. prod. 2005 (ln) (3) | Per capita income 2010 (ln) (4) | Per capita cons. exp. 1999 (ln) (5) | Share of pop. living in poverty 2010 (ln) (6) |
|---|---|---|---|---|---|---|
| Share of Chinese population 1989 (ln) | 0.756*** | 1.411* | 1.077 | 0.212 | 0.116 | -2.172*** |
| | (0.226) | (0.783) | (0.814) | (0.164) | (0.135) | (0.702) |
| Share of Chinese population 1979 (ln) | -0.786*** | -1.318 | -0.973 | -0.187 | -0.130 | 2.175*** |
| | (0.237) | (0.837) | (0.862) | (0.177) | (0.144) | (0.712) |
| Share of pop. in state sector 1989 (ln) | 0.387*** | 0.820*** | 0.149 | 0.317*** | 0.172*** | -0.872*** |
| | (0.0914) | (0.202) | (0.265) | (0.0548) | (0.0433) | (0.211) |
| Population density 1976 (ln) | 0.719*** | 0.0557 | 0.150 | 0.0462* | 0.0660*** | -0.379*** |
| | (0.0381) | (0.0979) | (0.145) | (0.0271) | (0.0204) | (0.114) |
| Distance to Guangxi province, China (ln) | 0.208** | -0.163 | -0.146 | -0.100** | -0.0607 | -0.0927 |
| | (0.102) | (0.237) | (0.230) | (0.0414) | (0.0555) | (0.247) |
| Distance to closest major city | -0.000357 | 0.00140** | -0.000466 | -0.000267* | -0.000456*** | 0.000780 |
| | (0.000246) | (0.000709) | (0.000837) | (0.000153) | (0.000150) | (0.000658) |
| Southern provinces | 4.41e-05 | -0.325 | -0.100 | 0.0655 | 0.200* | 0.644* |
| | (0.108) | (0.520) | (0.291) | (0.0978) | (0.111) | (0.380) |
| Coastal provinces | -0.0424 | -0.0342 | 0.0813 | -0.0450 | 0.00820 | 0.249 |
| | (0.0679) | (0.148) | (0.181) | (0.0313) | (0.0248) | (0.203) |
| Per capita govt's invest. 1976-85 (ln) | 0.0202 | 0.119*** | 0.134*** | 0.0458*** | 0.0564*** | -0.179*** |
| | (0.0134) | (0.0425) | (0.0420) | (0.00939) | (0.00758) | (0.0455) |
| Average precipitation (ln) | 0.0514 | -0.123 | 1.118 | 0.264* | 0.293** | -0.582 |
| | (0.228) | (0.687) | (0.868) | (0.139) | (0.141) | (0.664) |
| Average temperature (ln) | 0.913 | 4.974 | 7.516** | 3.189*** | 2.847*** | -10.05*** |
| | (0.994) | (3.489) | (3.814) | (0.687) | (0.790) | (2.930) |
| Mekong river provinces | -0.0929 | -0.186 | -0.812** | -0.135** | -0.332*** | 1.183*** |
| | (0.123) | (0.287) | (0.366) | (0.0649) | (0.0460) | (0.372) |
| Red river provinces | 0.185 | -0.182 | 0.514 | 0.108 | -0.0580 | 0.903** |
| | (0.148) | (0.398) | (0.428) | (0.0887) | (0.0693) | (0.353) |
| Constant | -2.952 | -12.91 | -23.00** | -4.635** | -3.229* | 40.77*** |
| | (2.662) | (9.706) | (10.64) | (2.155) | (1.962) | (7.846) |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 |
| R-squared | 0.982 | 0.580 | 0.741 | 0.930 | 0.948 | 0.789 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Control for Trade Effects

| VARIABLES | Population density 2009 (ln) (1) | Share of urban population 2009 (ln) (2) | Per capita non-state ind. prod. 2005 (ln) (3) | Per capita income 2010 (ln) (4) | Per capita cons. exp. 1999 (ln) (5) | Share of pop. living in poverty 2010 (ln) (6) |
|---|---|---|---|---|---|---|
| Share of Chinese population 1989 (ln) | 0.704*** | 1.310* | 2.328** | 0.330* | 0.274 | -2.649** |
| | (0.213) | (0.739) | (1.166) | (0.180) | (0.187) | (1.105) |
| Share of Chinese population 1979 (ln) | -0.702*** | -1.192 | -2.293* | -0.283 | -0.283 | 2.662** |
| | (0.222) | (0.802) | (1.210) | (0.187) | (0.195) | (1.126) |
| Share of pop. in state sector 1989 (ln) | 0.366*** | 0.742*** | 0.447 | 0.400*** | 0.267*** | -1.385*** |
| | (0.0572) | (0.205) | (0.327) | (0.0568) | (0.0478) | (0.344) |
| Population density 1976 (ln) | 0.769*** | 0.00580 | 0.00205 | 0.0287 | 0.0415 | -0.199 |
| | (0.0451) | (0.148) | (0.275) | (0.0424) | (0.0364) | (0.215) |
| Distance to Guangxi province, China (ln) | 0.145** | -0.165 | -0.493 | -0.195*** | -0.0884 | -0.207 |
| | (0.0684) | (0.271) | (0.373) | (0.0517) | (0.0723) | (0.372) |
| Distance to closest major city | -0.000411** | 0.00113 | -0.000977 | -0.000121 | -0.000490** | 0.000329 |
| | (0.000203) | (0.000696) | (0.00108) | (0.000172) | (0.000192) | (0.00114) |
| Southern provinces | -0.0907 | -0.321 | 0.270 | 0.0274 | 0.146 | 0.933 |
| | (0.117) | (0.471) | (0.627) | (0.105) | (0.129) | (0.662) |
| Coastal provinces | -0.107* | -0.148 | -0.161 | -0.0432 | -0.0559 | 0.260 |
| | (0.0639) | (0.184) | (0.334) | (0.0357) | (0.0471) | (0.315) |
| Per capita govt's invest. 1976-85 (ln) | 0.00253 | 0.0939** | 0.140*** | 0.0401*** | 0.0360*** | -0.115** |
| | (0.01000) | (0.0373) | (0.0494) | (0.00944) | (0.0110) | (0.0556) |
| Average precipitation (ln) | 0.220 | -0.0459 | 1.429 | 0.211 | 0.351** | -0.223 |
| | (0.208) | (0.715) | (1.289) | (0.159) | (0.158) | (0.899) |
| Average temperature (ln) | -1.223 | 2.963 | 7.117 | 3.249*** | 0.967 | -6.368 |
| | (1.150) | (4.685) | (6.038) | (1.146) | (0.931) | (5.419) |
| Provinces with class-I seaports | 0.00640 | 0.280 | 0.553 | -0.0317 | 0.140* | -0.318 |
| | (0.0671) | (0.194) | (0.348) | (0.0555) | (0.0794) | (0.493) |
| Distance to Yunnan province, China (ln) | 0.119 | 0.0968 | -0.217 | -0.0373 | 0.113 | -0.353 |
| | (0.0779) | (0.335) | (0.433) | (0.0611) | (0.0758) | (0.420) |
| Share border with China | -0.303*** | -0.207 | -0.610 | -0.278*** | -0.182** | 0.0446 |
| | (0.0878) | (0.385) | (0.554) | (0.0589) | (0.0743) | (0.386) |
| Constant | 2.701 | -6.999 | -18.96 | -3.603 | 2.035 | 30.21** |
| | (2.695) | (10.70) | (13.63) | (2.740) | (2.199) | (12.51) |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 |
| R-squared | 0.988 | 0.642 | 0.447 | 0.930 | 0.903 | 0.594 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: The Impacts of Ethnic Chinese Minority on Change in Population Density, Urbanization, Per Capita Non-state Industrial Production, and Per Capita Income

| VARIABLES | Change in population density 1989-2009 (Δln) (1) | Change in share of urban population 1989-2009 (Δln) (2) | Change in per capita non-state ind. prod. 1990-2005 (Δln) (3) | Change in per capita income 1996-2010 (Δln) (4) |
|---|---|---|---|---|
| Share of Chinese population 1989 (ln) | 0.684*** | 1.145** | 1.780 | 0.332* |
| | (0.200) | (0.492) | (1.083) | (0.197) |
| Share of Chinese population 1979 (ln) | -0.685*** | -1.089** | -1.736 | -0.285 |
| | (0.207) | (0.517) | (1.122) | (0.198) |
| Share of pop. in state sector 1989 (ln) | 0.381*** | 0.407*** | 0.335 | 0.406*** |
| | (0.0565) | (0.157) | (0.297) | (0.0869) |
| Population density 1976 (ln) | -0.123*** | -0.0983 | -0.0729 | 0.0300 |
| | (0.0404) | (0.104) | (0.264) | (0.0366) |
| Distance to Guangxi province, China (ln) | 0.107** | -0.296 | -0.496 | -0.193*** |
| | (0.0531) | (0.186) | (0.322) | (0.0509) |
| Distance to closest major city | 2.60e-05 | 0.000395 | -0.00100 | -0.000125 |
| | (0.000204) | (0.000516) | (0.000867) | (0.000180) |
| Southern provinces | -0.271*** | -0.196 | 0.326 | 0.0237 |
| | (0.0915) | (0.361) | (0.537) | (0.124) |
| Coastal provinces | -0.0915 | -0.225 | -0.243 | -0.0438 |
| | (0.0568) | (0.149) | (0.292) | (0.0360) |
| Per capita govt's invest. 1976-85 (ln) | 0.0107 | 0.0610** | 0.116** | 0.0407*** |
| | (0.00773) | (0.0300) | (0.0468) | (0.0137) |
| Average precipitation (ln) | 0.0655 | 0.223 | 1.166 | 0.215 |
| | (0.161) | (0.512) | (1.011) | (0.168) |
| Average temperature (ln) | 0.416 | 3.645 | 5.390 | 3.259*** |
| | (0.786) | (2.444) | (4.912) | (1.198) |
| Provinces with type-1 ports | 0.0109 | 0.259* | 0.488* | -0.0330 |
| | (0.0784) | (0.147) | (0.284) | (0.0539) |
| Distance to Yunnan province, China (ln) | 0.0990* | 0.0308 | -0.348 | -0.0354 |
| | (0.0599) | (0.230) | (0.364) | (0.0609) |
| Share border with China | -0.161** | -0.352 | -0.590 | -0.280*** |
| | (0.0750) | (0.261) | (0.479) | (0.0659) |
| Share of urban population 1989 (ln) | | -0.555*** | | |
| | | (0.111) | | |
| Per capita non-state ind. prod. 1990 (ln) | | | -0.634** | |
| | | | (0.268) | |
| Per capita income 1996 (ln) | | | | -1.015*** |
| | | | | (0.126) |
| Constant | -2.336 | -9.011 | -12.06 | -3.609 |
| | (2.002) | (5.723) | (12.14) | (2.770) |
| Observations | 37 | 37 | 37 | 37 |
| R-squared | 0.786 | 0.511 | 0.435 | 0.819 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1