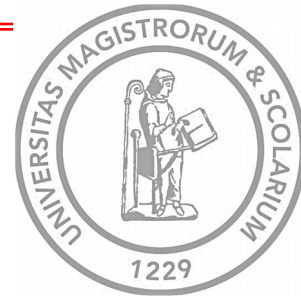


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Thèse dirigée par Monsieur Paul SEABRIGHT et Monsieur Victor GAY

Composition du jury

Rapporteure : Mme Shuang ZHANG

Rapporteure : Mme Jeanet BENTZEN

Examinatrice : Mme Karine VAN DER STRAETEN

Examinatrice : Mme Melanie Meng XUE

Directeur de thèse : M. Paul SEABRIGHT

Co-encadrant de thèse : M. Victor GAY

**UNIVERSITÉ
TOULOUSE
CAPITOLE**



Essays on Economic History and Political Economy

Yifan Zhang¹

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¹Toulouse School of Economics. Email: yifan.zhang@tse-fr.eu.

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Abstract

This thesis consists of three chapters on the Economic History and Political Economy, focusing on the interplay between Mainland China and Taiwan.

In the first chapter, I jointly identify and compare the horizontal and vertical transmission of son preference. I exploit a cultural feature, ancestor worship, which emphasizes the importance of having a son to measure the son preference in China. To isolate the cultural effect of son preference from institutions, a historical experiment, Kuomintang's (KMT) Retreat to Taiwan, is employed to explore the cultural transmission of son preference. Between 1945 and 1954, KMT resettled approximately one million Chinese in Taiwan, without regard for their cultural background, to meet the party's needs. This bold move resulted in local Taiwanese and Chinese migrants being exposed to groups with vastly different son preference beliefs and behaviors. By combining KMT Retreat and the introduction of sex-selective abortion in 1985, I dissect the transmission of son preference in three categories: from migrants to locals, through paternal lines, and within migrant communities. The horizontal transmission from migrants to locals is stronger for locals who are culturally closer to migrants and who have a higher chance of interacting with migrants. I also find migrants' ancestor worship permanently altered locals' beliefs about ancestors, family, and sons. Results in this paper indicate that, even though vertical transmission has the highest marginal effect, the total effect of horizontal transmission is larger than vertical transmission.

The second chapter examines the influence of international counter-propaganda on political attitudes and economic outcomes in authoritarian contexts. Utilizing the de-

criminalization of foreign radio listening in mainland China between 1979 and 1989, I study the impact of exposure to the Voice of Free China (VFC) broadcasts from Taiwan. Combining predicted radio signal strength with individual-level census and survey data, and employing a cohort-based difference-in-differences strategy, I find that greater exposure to VFC broadcasts decreased the likelihood of bureaucratic employment, increased entrepreneurial activity, reduced trust in local officials, and lowered Chinese Communist Party membership. These results contribute to the literature on media effects, political trust formation, and political participation under authoritarian regimes by providing new evidence on the role of external media in shaping individual political and economic outcomes.

The third chapter, coauthored with Nancy Qian and Marco Tabellini, studies the effects of economic growth in mainland China on Taiwanese support for political and economic reunification. It documents that mainland growth is negatively associated with support for reunification and income amongst less educated Taiwanese and positively associated with support for reunification and income amongst more educated Taiwanese. These and other results are consistent with economic prosperity increasing support or tolerance for autocratic political systems.

Chapter 1

The Transmission of Son Preference

1.1 Introduction

The prevalence of cultures that either favor or discriminate against specific groups is a recurring global phenomenon. This can manifest in various forms, including ignorance, expulsion, and even extreme violence. It is important to understand the mechanisms that sustain and transmit these cultural preferences over time. Taking the perspective of cultural transmission, this study examines the complex transmission process of son preference which results in over one million missing women annually. The aim is to shed light on the underlying dynamics that shape social norms and contribute to gender inequality.

Scholars have long argued that cultural barriers in developing countries hinder progress in gender equality [[Jayachandran, 2015](#)]. However, culture is an endogenous variable influenced by institutions and multiple historical shocks. Identifying the cultural persistence of gender inequality requires taking a group of people from the current society, randomly assigning them to a different society, and the behavioral outcomes of them and their descendants; which is impossible to do in both either field or lab experiments. This study aims to dissect son preference culture

by exploring cultural transmission from complex social environments across social groups and across generations [Bisin and Verdier, 2023]. By analyzing a mass migration in human history, I isolate son preference culture from institutions and uncover three simultaneous ways of the son preference transmission: from migrants to locals, through family lineage, and within migrants' communities.

To examine the cultural transmission of son preference, this study leverages the unique historical context of the Kuomintang (KMT) Retreat to Taiwan (hereafter, KMT Retreat). The KMT Retreat is an ideal context for studying cultural transmission because (1) Son preference differs widely among Chinese of different origins. (2) Before KMT Retreat, Taiwan was relatively homogeneous in both culture and institutions. (3) Migrants were forced to migrate to Taiwan for political and military reasons regardless of culture. (4) The first migrant settlements were determined by KMT, leaving little room for the self-selection of mass migrants.

After the Chinese Civil War, the defeated KMT relocated about one million people, including half a million fighters, from mainland China to Taiwan. The proportion of Chinese migrants reached a peak of 15% of the total population in the 1950s but gradually declined to 10% in the 2000s due to the low reproduction of Chinese migrants. While many KMT soldiers lived in military camps and had little interaction with locals, other migrants were able to freely interact with locals on a daily basis.¹

The impact of culture and beliefs on real-world outcomes depends on the available means. During the mid-1980s, increasing demand for safe abortions led Taiwanese lawmakers to legalize abortion for women to induce an abortion up to the

¹Many scholars studied the impacts of KMT Retreat by looking at the oversupply of males of the first generation migrants on female bargaining power [Francis, 2011], entrepreneurship [Chang and Zhang, 2015], and female mortality in old age [Chang, Kan, and Zhang, 2024].

24th week of pregnancy. The Legalization of Abortion in 1985 and ultrasound technology combined to create an efficient, legal, and inexpensive method for parents to choose the sex of their children – prenatal sex selection. Before that, Taiwan had only two least efficient or illegal means of sex selection after birth: neglect of girls and infanticide. It is easy to expect that areas with stronger son preference will have a more male-biased sex ratio after 1985.

To measure migrants' son preference, this study uses a unique cultural feature of son preference in ancient China, ancestor worship.² Only males are allowed to participate in these ritual celebrations designed to commemorate and worship the spirits of one's deceased forebears. However, both males and females with ancestor worship hold the belief that their afterlife is insecure without a male descendant [Das Gupta, Jiang, Li, Xie, Chung, and Bae, 2003]. To construct the measure of ancestor worship, I explore the local festivals from 2,467 county gazetteers and construct the share of local festival days of ancestor worship out of the total days with festival ceremonies. To the best of my knowledge, I am the first one to extract the cultural meanings from festivals to construct cultural variables.

The random assignment of migrants in terms of culture is crucial for identifying the horizontal transmission of son preference. To show that the allocation of migrants across towns is unrelated to their culture or the culture of the locals, I collect several historical data from the 1920-1956 Taiwan Census and other data sources. I find that both fraction of males aged 0-10 in 1920 and local ancestor worship in 1926 are unrelated to the ancestor worship brought by Chinese migrants. I also document the balance across towns with different ancestor worship (migrants) for other histori-

²There are also some pieces of survey evidence that ancestor worship practices strongly and positively correlate with individuals' son preference in mainland China [Li and Lavelly, 2003, Murphy, Tao, and Lu, 2011, Hu and Tian, 2018].

cal variables, such as fraction of males, population density, and fraction of Japanese; and fraction of migrants and fraction of males of migrants.

Next, I show the effect of ancestor worship (migrants) on missing women and test for horizontal transmission from migrants to locals. With and without prenatal sex selection, areas with higher ancestor worship (migrants) have a significantly higher share of boys. After prenatal sex selection is allowed, the effect is concentrated at the third and higher order of birth. With one standard deviation increase in ancestor worship (migrants), local Taiwanese parents are 0.58 p.p. more likely to have a male child at the third and higher order of birth. These results are robust to both different empirical specifications and to controls for a large number of confounders, alternative measures of ancestor worship, and alternative cultures. The effect is stronger for locals who are culturally closer to migrants and who can interact more with migrants. In addition, I also find that the fraction of males positively correlates with ancestor worship (migrants) only for cohorts that were born after 1965, over 10 years after the end of KMT Retreat. It suggests that cultural transmission from migrants to locals is not abrupt, but gradual. The cultural transmission is more likely to occur between second-generation migrants and locals rather than between first-generation migrants and locals.

To identify the vertical transmission through lineage (hereafter family heritage channel), I mirror the epidemiological approach introduced by [Fernández, 2011]. The epidemiological approach compares migrants who or whose parents were born in different places in mainland China and experienced different levels of ancestor worship, but who now live in the same places in Taiwan and therefore face similar social and local institutional constraints when making decisions. I find that among second-generational migrant fathers, one s.d. increase in the fathers' ancestor worship is associated with a 5.55 p.p. increase in the probability of having boys in birth

order 3+ after 1985, which is about eight times larger than the previous horizontal transmission in the margin. In contrast, the effect of mothers' ancestor worship is relatively small and insignificant, suggesting cultural transmission is through the interest group. This family heritage channel is larger than the previous horizontal transmission from migrants to locals.

I also investigate a novel horizontal transmission within migrant communities by testing the average ancestor worship of neighbors from different origins on migrant parents' sex selection. The marginal effect of the horizontal transmission within the migrant group is about 0.8 times of the previous family heritage channel. The effect is stronger when the fraction of migrants from other origins is larger which suggests that the size of groups matters for persisting and transmitting cultures.

These findings are related to three main bodies of literature. First, My study is in line with the sizable literature on missing women. Many studies have shown that with the spread of ultrasound technology, sex selection sharply increases on the higher order of birth in China, India, Korea, and Taiwan [[Arnold, Kishor, and Roy, 2002](#), [Chen, Li, and Meng, 2013](#), [Lin, Liu, and Qian, 2014](#)]. [Almond, Li, and Zhang \[2019\]](#) finds that, once parents earn more income, they are more likely to have a boy if they did not have one. These parents can afford the expensive medical test fees of diagnostic ultrasound. [Qian \[2008\]](#) finds that, when women have comparative advantages in economic production, more girls will be born and the survival girls will have a better education attainment. [Abrevaya \[2009\]](#) shows individual son preference is persistent, where China-born and Indian-born mothers are more likely to have boys at birth even when they live U.S., a country without son preference culture. Except [Xue \[2016\]](#) examines the impacts of cotton-waving culture on gender inequality, most previous literature on missing women mainly focuses on the economic determinants and does not consider the potential roles of cultures [[Alesina and Giuliano, 2015](#)].

Second, by identifying the contemporary effect of ancestor worship, I contribute to a broad literature on how historical legacy shapes the current comparative economic conditions [Acemoglu, Johnson, and Robinson, 2005]. Various studies show that historical shocks alter the economic conditions of women in subsequent generations. Grosjean and Khattar [2019] shows that the male-biased sex ratio in eighteenth-century Australia due to the arrival of a large number of British male convicts had adverse long-run consequences for female labor force participation and gender norms. Michalopoulos, Putterman, and Weil [2019] shows that pre-modern agricultural participation in Africa still influences current individuals' beliefs and economic outcomes. Teso [2019] finds that the lack of male labor force generated by the transatlantic slave trade induced current higher female labor force participation. In Alesina, Giuliano, and Nunn [2013], they find that half of the impact of plough use in agricultural society on contemporaneous attitudes to gender roles is due to the vertical transmission of culture from ancestors to descendants rather than any other institutional changes. Besides, Michalopoulos and Xue [2021] launches a dataset of oral traditions for over 1,000 societies which allows researchers to study the effects of history legacy broadly. By constructing the cultural measure of son preference and adopting a more systematic approach, I show that both socialization and lineage are key for the transmission of son preference. This implies a crucial aspect for analyzing the roles of individuals in generating historical and cultural persistence. My results further suggest that socialization within groups cannot be neglected in understanding how culture persists and transmits.

Third, this study contributes to a series of growing literature that decomposes how cultures emerge and persist over time [Giuliano and Nunn, 2021]. Studies in horizontal cultural transmission usually examine the locals' behaviors and attitudes affected by culture from external or internal migrants [Clingsmith, Khwaja, and

Kremer, 2009, Giuliano and Tabellini, 2020, Miho, Jarotschkin, and Zhuravskaya, 2019]. Many studies in vertical cultural transmission employ the epidemiological approach concluded by Fernández [2011] to identify impacts and transmission of culture. The persistence of fertility culture and female working culture is well documented from vertical cultural transmission Blau et al. [2011], Fernández and Fogli [2006], Gay [2023]. While in many studies, the migration decisions are self-selected and may confound the outcomes of interest; in this study, the allocations of one million Chinese migrants are quasi-random to local cultures and institutions. With the exogenous culture brought by migrants, this study reduces potential biases when migration is endogenous and uncovers both horizontal and vertical channels of cultural transmission in the same context.

The remainder of this paper is organized as follows. Section 2 briefly introduces the historical background of ancestor worship and migration in Taiwan after WWII. Section 3 describes the data for empirical usage. Section 4 shows the random variants of ancestor worship (migrants) and cultural transmission from migrants to locals. Section 5 discusses family heritage channel and cultural transmission within migrant communities. Section 6 presents that ancestor worship (migrants) shapes individuals' beliefs about ancestors, family, and sons. Finally, Section 7 draws a conclusion for this study.

1.2 Historical Background

1.2.1 Ancestor Worship

Ancestor Worship in China

China has a long history of son preference. Son preference can be traced back to the origins of ancestor worship in the third millennium B.C. Ancestor worship emphasizes both the influence of deceased relatives on the living and the influence of the living on the welfare of the deceased soul. The living who do not practice ancestor worship will suffer misfortune and lose family and friends. One's afterlife will be uncertain without male descendants, and s/he will end up as a hungry ghost. Males who share the same patrilineal ancestors and bear their family practice their ancestor worship together in festivals or major days of their family clan to "feed" their ancestors. The communal practices include offering sacrifices to the ancestors, burning joss paper, and sweeping ancestors' graves. When people care more about their ancestors, there is no doubt that they will have more ancestor worship practices.

The practice of ancestor worship is not only about venerating the deceased relatives, but it also requires family bequests, such as bearing sons to carry the family name and taking care of the elderly of the family [Twitchett, Fairbank, and Feuerwerker, 1978]. Males are the majority to carry family names to the next generation and be added to the family genealogy. In ancient China, when women marry, their names are replaced by their husbands' names. Also, men and their wives are mainly responsible for the duty of taking care of elders in the men's families. Women play little role in caring for their own parents when they are married, they care for their husbands' parents and grandparents. Daughters, therefore, were not only considered

culturally inferior, they were also perceived by most families as a net economic and emotional loss.³ Today, even though women can keep their original family names when they marry and have the duty of support to their own parents, that is the long-term care channel of son preference is weakened; their offspring still carry on their husband's family name.⁴ Ancestor worship still influences parents' gender selection mainly through the importance of patrilineal family continuation. Ancestor worship can be seen as an important cultural feature of son preference.

After 1949, the founding of the People's Republic of China, ancestor worship was severely damaged in mainland China. Especially, during the 1966-1976 Cultural Revolution, ancestor worship was regarded as an "Old Custom". The practice of ancestor worship was strictly forbidden and thousands of ancestral halls were destroyed during this period. After the 1966-1976 Cultural Revolution, ancestor worship was gradually revived, ancestor worship. Two of the traditional national festivals related to ancestor worship, Chinese New Year's Eve and Tomb Sweeping Festival, were designated as official festivals by the central government. Nowadays, the practices of ancestor worship still widely exist in mainland China; there are 182 million Chinese adults who embrace ancestor worship practices and beliefs [Yang and Hu, 2012].

Ancestor Worship and Confucianism

Many scholars suggest that ancestor worship in China is related to Confucianism [Baker, 1979, Yang, 1967, Zhuo, 2012]. Therefore, it is not surprising that the many moral requirements in Confucianism are similar to those of ancestor worship. Al-

³The common saying that "œœa married daughter is like water spilled on the ground" — one you cannot retrieve

⁴According to the Chinese Names Report: 2020, only 1 out of 13 newborns in 2020 will carry their mothers' surname, others carry their fathers' surname. http://www.gov.cn/fuwu/2021-02/08/content_5585906.htm, last access: 20/09/2021.

though Confucius himself did not express his views on the subject of the afterlife, he did emphasize the importance of sacrificing ancestors "as if present" and maintaining patrilineal family continuity. [Jia and Kung \[2025\]](#) also discuss the relationship between Confucianism and gender inequality in China.

The Confucian scholars share similar attitudes towards patrilineal family continuity and ancestor worship. Mencius, a well-known Confucian philosopher, emphasized the importance of having sons, stating that "There are three things which are 'unfilial', and to have no posterity is the greatest of them". The term "posterity" is usually interpreted as sons, as they will be the primary labor force for families in the future and they can continue the patrilineal family line. Where "posterity" is interpreted similarly in ancestor worship.⁵ Furthermore, the presence of son preference in Confucianism is evident in the three cardinal guides and the three obediences for women.⁶ It is important to note that these guides and obediences reflect the patriarchal nature of Confucianism. Ancestor worship, which was also influenced by Confucianism, underwent significant evolution as a result. It is clear that Confucianism had a significant impact on these cultural practices.

Ancestor Worship in Taiwan

Due to the fact that most of the local Taiwanese are originally from two provinces of mainland China – Fujian and Guangdong; ancestor worship was widely practiced in Taiwanese society.⁷ Following the First Sino-Japanese War in 1895, Taiwan was

⁵An analysis by [Baker \[1979\]](#) in discussing ancestor worship for the living: "The living individual knew that he had a continued existence after death only if he could ensure his own posterity. Hence, the desire for a 'hundred sons and a thousand grandsons' may be seen to be a very understandable one".

⁶The three cardinal guides are: ruler guides subject, father guides son, and husband guides wife. The three obediences for a woman: she is required to obey her father before marriage, and her husband during married life, and her sons in widowhood.

⁷People who or whose ancestors lived in Taiwan before 1945 are clarified as local Taiwanese.

colonized by Japan until 1945. During this period, the colonial government restricted the practice of ancestor worship in order to promote Shinto, the Japanese national religion. Ancestor worship was considered as a "vulgar culture" and many ancestor tablets were burned in a series of cultural campaigns. [Tsai, 1991]. As a result of forced assimilation, Taiwanese people replaced ancestor tablets with *Jingu Taima* at home and participated in Shinto activities rather than ancestor worship practices.⁸

After World War II, the forced assimilation ended with the departure of the Japanese colonizers. Migrants from mainland China revived the ancestor worship of local Taiwanese and transmitted ancestor worship from all over mainland China, not just from Fujian and Guangdong only. According to Yang and Hu [2012], 87.4% of adults in Taiwan are ancestor worshippers. Cultural transmission by migrants from mainland China after World War II may have played an important role in the emergence of ancestor worship in Taiwan.

1.2.2 Chinese Migrants in Taiwan

Three Major Waves of Migrants in Taiwan

There have been three major waves of migrants to Taiwan since the 17th century. The first wave is Taiwan under Qing rule (1683-1895). Many peasants from Fujian and Guangdong migrated to Taiwan to work in agriculture. Today, over 95% of local Taiwanese are descendants of first-wave migrants.⁹ The second wave is Taiwan under Japanese colonial rule (1895-1945). During this period, migrants from mainland China are strictly restricted and controlled. Most of the migrants are from Japan

⁸There are no precise statistics available regarding the prevalence of ancestor worship or Shinto in history. According to the *Taiwan Governor-General's Archives*, in 1944, 71% of Taiwanese were able to speak Japanese, which suggests that forced assimilation was effective.

⁹The remaining 5% of local Taiwanese are indigenous peoples.

and Korea, making up about 7% of the total population. After World War II, with the surrender of Japan, most of the Japanese and Koreans leave Taiwan. The third wave is due to the 1945-54 KMT Retreat to Taiwan. The KMT brings over one million migrants from mainland China to Taiwan within 10 years. The one million migrants represent about 15% of the total population in Taiwan. They are the focus of this research.

The KMT Retreat

Immediately after the end of World War II, the KMT and the Chinese Communist Party fought a civil war from 1945 to 1949. The former was defeated and retreated to Taiwan. Various studies have suggested that the number of civil war migrants to Taiwan is around one million, while the local population of Taiwan in the 1950s was only 6 million[[Barclay, 1954](#), [Jacoby et al., 1966](#), [Lin, 2002](#)]. After 1954, the last retreat of the KMT army in Thailand and Myanmar, there was virtually no immigration to or emigration from the island.

After the migrants arrived on the island, they were assigned to places based on their occupations or the occupations of their relatives. Many migrants are soldiers, government administrators, or their relatives; their settlements are determined by the KMT. The distribution of migrants may have been guided by KMT's ideas of reforming both economic and political institutions. Military dependents' villages and their neighborhoods are important places for migrants to live. Although many migrants were free to choose their residents after their initial settlement, there was little movement. With the outbreak of the Korean War in 1950, many migrants believed they would soon return back to China with the help of the American army, and paid little attention to their residents in Taiwan [[Lin, 2009](#)].

Cultural Transmission through Migrants

In the 1950s, many local Taiwanese could not speak Mandarin Chinese, but they could speak some dialects of Fujian and Guangdong. Because of the language barriers, first-generation migrants (except those from Fujian and Guangdong migrants) have more social interactions with other migrants than local Taiwanese. The historical documents suggest both the horizontal transmission of ancestor worship within the first-generation migrants and the importance of language in cultural transmission. But for the second-generation migrants, there is no clear separation between them and local Taiwanese, they study and work together which creates the opportunity for the transmission of ancestor worship from migrants to locals. Moreover, due to the huge gender imbalance among migrants, 15% to 20% of local Taiwanese women married a migrant man in the 1950s and 1960s [Wang, 1993a,b]. Intergroup marriage may also contribute to the horizontal transmission of ancestor worship.

1.3 Data

1.3.1 Ancestor Worship in China

Ancestor worship practices are common in ancient China. However, there is no measure of ancestor worship to date. To construct a proxy for ancestor worship prevalence, I digitized the local festivals from 2,467 county gazetteers which were published in the 1980s.¹⁰ I treat the festival practices involving the contents of tombs and ancestors as ancestor worship practices. The construction of the ancestor

¹⁰Many local festivals have the same name but the practices associated with them vary widely by region. For example, within Fujian Province, people in Fuqing County sacrifice deceased ancestors on the winter solstice, but people in Wuping County only make rice wine on the same festival.

worship density at the county level is as follows:

$$AW_Density_c = \frac{\# \text{ of days of ancestor worship practices}}{\text{total days of local festivals}}$$

As shown in Figure A.4, there are large regional differences of *AW_Density* within provinces in mainland China. Southeast China has a higher prevalence of ancestor worship. It is hard to say why people in Southeast China practice ancestor worship more often. There may be several reasons, such as natural disasters, aptitude for agriculture, Confucianism, and many others. The process of the evolution of ancestor worship is complex and there is little consensus among historians and sociologists. However, they all agree that ancestor worship is a cultural feature of son preference in ancient China. I use ancestor worship to represent the cultural part of son preference and to study the transmission of son preference. And if we compare Figure A.4 and A.5, it is not hard to see that geographically, *AW_Density* and the fraction of males are positively correlated in mainland China. Appendix A.2 contains more detailed discussions of ancestor worship and son preference in mainland China.

1.3.2 Ancestor Worship in Taiwan

To construct the town-level ancestor worship introduced by Chinese migrants after 1945, I collected the geographic distribution of migrants' origins in each town from the 1956 Taiwan Census. There are 50 provincial-level origins in mainland China and 348 towns in Taiwan. Accordingly, I can construct the ancestor worship

(migrants) as follows:

$$AW_Migrants_a = \frac{\sum_{a,p}(Migrant_{a,p} * AW_Density_p)}{Migrant_{a,p}}$$

where $Migrant_{a,p}$ is the number of migrants from province p in mainland China living in town a in Taiwan, $AW_Density_p$ is the ancestor worship density of the province.¹¹

Figure 1.1 shows the geographic distribution of ancestor worship (migrants). There is no clear geographic pattern to ancestor worship (migrants). It is not concentrated in any region.

Since over 95% of local Taiwanese are originally from mainland China, they also bring their ancestor worship and other pre-1945 cultures to Taiwan. I construct ancestor worship (locals) to represent the local ancestor worship. *Investigation of Han Ancestral Home in Taiwan*, a survey conducted by Ogawa Naoyoshi in 1926, documents the origins of local Taiwanese from 10 prefectures in China and their corresponding residents at the town level of Taiwan.¹² The construction process of ancestor worship (locals) is similar to the previous equation:

$$AW_Locals_a = \frac{\sum_{a,d}(Local_{a,d} * AW_Density_d)}{Local_{a,d}}$$

where $Local_{a,d}$ is the number of locals originally from prefecture d in mainland China and live at town a in 1926 Taiwan. $AW_Density$ is ancestor worship density at the prefecture level.

Figure 1.2 shows the map of ancestor worship (locals). It is clear to see that western areas have higher ancestor worship (locals). The distribution pattern is

¹¹I aggregate the original ancestor worship density from the county level to the province level in mainland China.

¹²The ten prefectures are Quanzhou, Zhangzhou, Tingzhou, Longyan, Fuzhou, Xinghua, and Yongchun in Fujian Province; and Chaozhou, Jiaying, and Huizhou in Guangdong Province.

strongly influenced by geographic characteristics. The western plain areas are close to mainland China and suitable for cultivation, but the central and eastern areas are mountainous and have few Chinese locals. Most of the residents in the central and eastern areas are indigenous Taiwanese who do not have an ancestor worship culture. Accordingly, ancestor worship (locals) is zero in many middle and eastern towns.

1.3.3 Taiwan Population Census

1980 and 1990 Censuses. The universe micro-samples of the 1980 and 1990 censuses naturally avoid measurement bias due to stratification. The two samples include about 18 million and 20 million individuals. Figure 1.3 shows the trend of the fraction of males by birth cohort from the 1980 and 1990 censuses. The fraction of males is higher than the biological normal fraction of males at birth (51 p.p.) in 90% of the birth cohorts except 1957-1960. It shows a persistent but mild male-biased sex ratio pattern in Taiwan.¹³ Figure 1.3 further motivates my focus on the cultural transmission of ancestor worship: since there was no big change in either family planning policies or abortion in 1970-84 Taiwan, the fraction of males gradually increased with birthyear, the trend could be attributed to the gradual cultural transmission of ancestor worship.

In the 1990 census, I match the parents and children based on their family relationships and construct the birth order by the age of their children. I compare the data pattern with Lin et al. [2014] which uses Taiwan's National Birth Registries. Figure 1.4 shows the trend of the fraction of males from the 1990 census. Its

¹³Infanticide of female children was widespread in ancient China including Taiwan [Chen, 1989, Lee, Feng, and Campbell, 1994]. The Taiwanese have apparently not practiced infanticide since the twentieth century [Lee, 1981]. However, parents may neglect their daughters or allocate more resources to sons given the son preference, so that the fraction of males is higher than the biological normal.

trends are consistent with the fraction of males from Lin et al. [2014] using another confidential dataset shown in Figure A.1. Both figures show that sex selection after the Legalization of Abortion is concentrated in the third and higher order of birth.

The 1990 census also provides rich information about individual identities which helps identify different channels of cultural transmission. Based on the Taiwan government, an individual who is regarded as a *migrant* should satisfy two standards: (1) His paternal family is originally from mainland China. (2) He or his paternal ancestor should have arrived in Taiwan after 1945. Otherwise, he is a *local* Taiwanese.¹⁴

1920 - 1956 Censuses. To construct explanatory variables and some historical controls, I digitize the 1920, 1930, 1940, and 1956 Taiwan censuses. From 1920, 1930, and 1940 censuses, I extract information on ethnic distribution, the fraction of males, and population density. The 1956 census records the residence of migrants at the town level with their origin at the province level in mainland China. It also includes other migrant characteristics such as the migrant rate and the fraction of males among migrants.

1.3.4 Other Controls

In this section, I list the data sources for the set of covariates used in the empirical analysis. I control for factors that may be correlated with son preference.

Proxies for Confucianism. I constructed two historical variables, Confucian scholars (*jinsshi*) density and Confucian clan density, to capture the influence of Confucianism.¹⁵ The information on Confucian scholars comes from the China Bio-

¹⁴For example, former President Tsai Ing-wen is a local Taiwanese, even though her paternal ancestor was from Guangdong, China, and arrived in Taiwan before 1945.

¹⁵*Jinsshi* are the people who pass national-level bureaucratic examinations. Most of the political elites in ancient China have the title of *jinsshi*.

graphical Database Project created by Harvard University.¹⁶ Confucian clan data is from Comprehensive Catalogue of Chinese Genealogies created by Yuhua Wang.¹⁷ Historical population data is extracted from Ge [2000]. With the three data from different sources together, I can construct the Confucian scholars density and the Confucian clan density in ancient China.

Geographic Characteristics. I collected a broad set of geographic characteristics. I use these variables to test the exogeneity of ancestor worship (migrants) and as controls in regressions. Data on the soil suitability index of wheat, wet rice, maize, white potato, cotton, and tea are from FAO GAEZ (v4.0).¹⁸ I also constructed the logarithmic distance to Taipei (capital of Taiwan) and the logarithmic distance to the seashore based on the GIS data of the Taiwan administrative map.¹⁹

Family Characteristics. I include a number of family characteristics to control for the family heterogeneity in sex selection. The controls include the years of schooling of the parents, the age of parents at the birth of the child, and the birth order of the child.

I report the summary statistics of town level characteristics in Table A.1 and the individual characteristics from the 1990 census in Table A.2.

1.4 Cultural Transmission from Migrants to Locals

In this section, I first present the main specifications of horizontal cultural transmission, discuss identification assumptions, and present estimation results.

¹⁶link:<https://projects.iq.harvard.edu/cbdb/home>. Last access: 05/08/2022.

¹⁷link:<https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/P00VF6>. Last access: 05/08/2022.

¹⁸link:<https://gaez.fao.org/>. Last access: 23/01/2022.

¹⁹link:<https://data.gov.tw/dataset/7441>. Last access: 23/01/2022.

1.4.1 Empirical Strategies

To examine the impact of ancestor worship (migrants) on the sex ratio, my first approach is to compare the sex of aged 0-4 children across towns in 1980 and 1990 censuses and estimate the following specification:

$$Y_{ia} = \alpha + \beta AW_Migrants_a + \omega \mathbf{X}'_a + \theta_c + \epsilon_{ia} \quad (1.1)$$

where Y_{ia} is the outcome of interest. \mathbf{X}'_a is a set of town-level historical controls and geographic characteristics.²⁰ θ_c is the county fixed effects. I cluster standard errors at the town level.

Differences in having males as children across towns identified through the above strategy could be only achieved by neglecting girls, as infanticide and prenatal sex selection were forbidden in the 1970s. Prenatal sex selection through ultrasound has been the main means of generating missing girls since the 1980s. When parents can easily select the sex of their children, the effect of ancestor worship (migrants) can be fully observed.

To better account for the son preference transmission from migrants to locals, I focus on local parents who were both born after 1954, the end of KMT Retreat, to ensure the locals can communicate and socialize with migrants since their early childhood. I interact ancestor worship (migrants) with a policy shock, the Legalization of Abortion which allowed parents to choose the sex of their children at birth.²¹

²⁰Historical controls are ancestor worship (locals), fraction of males aged 0-10 in 1920, fraction of Japanese in 1940, fraction of males in 1940, population density in 1940, fraction of migrants in 1956, fraction of males of migrants in 1956. Geographic characteristics include the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (ln)distance to seashore, (ln)distance to Taipei.

²¹Before 1985, ultrasound technology is widely available in Taiwan. Parents can observe the sex of fetuses but cannot choose them because abortion is prohibited.

As discussed earlier, the increase in the fraction of males at birth is mainly driven by the sex selection in the third and higher order of birth. I implement a Difference-in-Differences empirical strategy on the sex of children aged 0-9 in the 3+ birth order in the 1990 census:

$$\begin{aligned}
 Male_{ifat} = & \alpha + \beta AW_Migrants_a \times Post_t + \omega \mathbf{X}'_a \times Post_t \\
 & + \phi \mathbf{X}'_f \times Post_t + \lambda_a + \theta_{ct} + \epsilon_{ifat}
 \end{aligned}
 \tag{1.2}$$

where $Male_{ifat}$ is indexed as one if the child i is born at year t in family f of town a is male, otherwise is zero, $Post_t$ equals one if the child is born after 1985 (including 1985). \mathbf{X}'_f is a matrix of family characteristics including years of schooling of parents, the age of parents at childbirth, and the birth order of child. λ_a and θ_{ct} are town fixed effects and county-birthyear fixed effects which capture all of the unobserved town-specific variants and county-year specific shocks. Standard errors are all clustered at the town level.

1.4.2 Identification Assumptions

The main identification assumption to establish the causal effects of ancestor worship (migrants) is that the destination choices of migrants with different cultures are not affected by local ancestor worship culture and gender norms. In other words, ancestor worship (migrants) should be orthogonal to all observed and unobserved determinants of local son preference. This identification assumption is untestable because it concerns unobservables. However, both the historical narrative and the regression analysis presented below provide strong support for this assumption.

I address the identification challenge in four ways: (1) by presenting the trend of

the fraction of males for local Taiwanese in 1920-1956 by the three groups of towns with low, medium, and high levels of ancestor worship (migrants); (2) by presenting a comparative analysis varied by cohorts in 1915-80; (3) by regressing ancestor worship (migrants) on a number of cultural and demographic characteristics before 1945, as well as some migrant characteristics and geographic characteristics; (4) by reporting a balance test of the estimation of historical characteristics with ancestor worship (migrants).

In addition, I show that the size of migrants is strongly related to population and population density, but not related to ancestor worship and other historical controls in Table A.4. It also supports the argument that the decisions of migrants are not driven by ancestor worship because they were sent to Taiwan by military and political orders.

Historical Narratives

The assignment of migrants to their destination was designed by KMT and guided by the idea of total control over Taiwan, e.g. healthy and strong migrant men were assigned to military service or manual force, and educated individuals were sent to teach Mandarin Chinese. Since Taiwan was under martial law from 1949 to 1987, both the occupation and the destination of migrants were determined by KMT authority. Historians also argue that under the propaganda of KMT and the beginning of the Korean War, migrants generally believed that the American army would soon help them retake mainland China; most of them did not care about the residents.

The local population was relatively homogeneous within counties before 1945. In 1940, 5% of the population are Japanese concentrated in the urban or suburban

areas in the western plain of Taiwan.²² 91% of the population are originally from Guangdong and Fujian provinces of mainland China. They also concentrate in the western plain of Taiwan. The rest are indigenous people who live in the eastern mountainous area. This homogeneity makes it implausible that migrants from different origins would have different preferences for different towns within counties. This premise is supported by the following balance tests.

Balance Tests

First, in Figure A.2, I show the relative trends of the fraction of males for local Taiwanese across three groups that experienced high, medium, and low ancestor worship (migrants). Towns with different levels of ancestor worship (migrants) have little different trends in the fraction of males in the pre-KMT Retreat period. This suggests that ancestor worship (migrants) has little correlation with the changes in local gender norms prior to KMT Retreat.

To further test that sex selection before KMT Retreat is not correlated with ancestor worship (migrants), I conduct an analysis that allows the effect of ancestor worship (migrants) to vary by birth cohort. Effects are estimated conditional on town fixed effects, county-birthyear fixed effects, and origin-birthyear fixed effects by comparing with the 1935-44 birth cohort. The estimates in Figure A.3 support ancestor worship (migrants) with both trends and absolute levels of the fraction of males before and during KMT Retreat. Ancestor worship (migrants) has effects after the 1965 cohort. It also suggests that the gradual horizontal transmission of ancestor worship on son preference from migrants to locals.

To see whether the destination choice of migrants from different origins is least

²²However, due to the defeat of World War II, most of the Japanese left Taiwan after 1945.

correlated with local son preference, I regress ancestor worship (migrants) on a set of historical characteristics in culture and demography, as well as geographic characteristics; and report the estimates in Table 1.1. In the first two columns, I find no predictive power of the pre-period son preference behavior, the fraction of males aged 0-10 in 1920. By adding a set of observable historical and geographic characteristics in columns 3 and 4, it is hard to see any observables with strong predictive power on ancestor worship (migrants). Moreover, all controls can only explain 6.6% of the variance in ancestor worship (migrants). The analysis supports the assumption that most of the variance in ancestor worship (migrants) is orthogonal to many gender-related local characteristics.

Conversely, I conduct a balance test by estimating a town-level analog of Specification 1.1 and let the outcomes be historical characteristics that might affect son preference. Figure 1.5 shows the estimates for this exercise. The estimates suggest that, conditional on the county fixed effects and geographic characteristics, towns that happen to have higher ancestor worship (migrants) are generally not significantly different from counties that have lower ancestor worship (migrants). These results provide additional support for treating ancestor worship (migrants) as exogenous to local son preference.

1.4.3 Results

Baseline estimates. Table 1.2 shows the simple cross-sectional analysis following Specification 1 on the sample of children aged 0-4 from the 1980 and 1990 census. The estimate in column 1 implies that towns with one s.d. (0.022) increase in ancestor worship (migrants) will lead to 0.09 p.p. increase in the fraction of males from the 1980 census. I repeat the analysis with the 1990 census and with the subsample

by birth order. The estimate in column 2 shows that when prenatal sex selection is available, towns with one s.d. (0.018) increase in ancestor worship (migrants) will lead to 0.11 p.p increase in the fraction of males. The estimates in columns 3 and 4 show that the sex selection driven by ancestor worship is concentrated in children of 3+ birth order. This finding is consistent with a series of empirical evidence that sex selection is concentrated at the 3+ birth order in the countries without fertility control.²³

Main result. From now on, let us focus on children with 3+ birth order and examine the possible channels of cultural transmission of son preference. I first check the horizontal transmission from migrants to locals by looking at the sex selection of local parents who were both born after 1954, the end of KMT Retreat. Table 1.3 presents the results from estimating Specification 1.2 . The difference-in-differences specification allows the probability of having a son at each birth to follow different trends over time in each town following their historical and geographic characteristics. In column 1, I include town fixed effects and county-birthyear fixed effects to account for the sex selection effect of town-specific trends and time-varying shocks across counties. In column 2, I control for the historical legacies that may affect both ancestor worship (migrants) and sex selection. For example, I use two proxies for the local gender norm: fraction of males aged 0-10 in 1920 and fraction of males in 1940. The interaction of these variables with the Legalization of Abortion captures the possibility that parents in more historically conservative towns may have been on a different trajectory with respect to sex selection. Similarly, in column 3, I include geographic characteristics interacting with the Legalization of Abortion. Despite the

²³Chinese migrants select children's sex mainly at the 3+ birth order in Canada [Almond, Edlund, and Milligan, 2013], United States [Abrevaya, 2009], and Spain [Castelló, Urquía, Rodríguez-Arenas, and Bolívar, 2019].

limited self-selection of migrants, the distribution of migrants is determined by KMT to meet the needs of land reform in the 1950s. Thus, this specification accounts for the possibility that sex selection followed different trends in different towns with different needs of local society and land reform for migrants. Finally, in column 4, I add the child's birth order, ages of parents at child's birth, and years of schooling of parents; which interacts with the Legalization of Abortion. This flexibly accounts for the heterogeneity of family backgrounds and women's biological capacities that could affect parents' sex selection behavior before and after the Legalization of Abortion.

The estimates of interest are stable across different specifications. The estimates in columns 1-4 show that one s.d. (0.018) increase in ancestor worship (migrants) leads to 0.58 p.p. increase in the probability of having a male, or approximately 300 excess males every year. This accounts for about 6% of the excess males after 1985. Both estimates in Specifications 1.1 and 1.2 together suggest that the effect of ancestor worship (migrants) is stable and consistent under different policy environments.

A reasonable hypothesis is that the magnitude of the effects depends on the sex composition of the previous births. As ancestor worship emphasizes the importance of having at least one son, parents without a son in the first two births are incentivized to have a son in the following birth. Indeed, I find a larger and highly significant effect among 3+ births whose parents do not have a son in the first two births in column 5. Among parents who already have son(s), the estimated effect is smaller but statistically significant in column 6. The heterogeneous response by the sex composition of the first two births suggests that the incentive of parents is a plausible channel through which ancestor worship (migrants) increases the probability of having a son.

1.4.4 Robustness Check

In this section, I report estimates from a series of exercises that I perform to assess the robustness of the estimated results. For the sake of exposition, from now on I focus on children aged 0-9 with 3+ birth order in the 1990 census.

Parallel Trend Assumption. As discussed above, ancestor worship (migrants) correlates little with the trend of sex selection before 1945. However, sex selection could be salient due to a series of family planning policies that were introduced in Taiwan in the 1950s. The parallel trend assumption could be violated if the family planning policies changed both the sex selection trend and the son preference. To test this assumption, I reproduce the estimate in column 4 of Table 1.3 by allowing the effects of ancestor worship (migrants) and all controls to vary by children's birthyear. Figure 1.6 shows the event study that there is little pre-trend difference before the Legalization of Abortion. The dynamic effects of ancestor worship (migrants) are positive and persistent by birthyear after 1984.

Alternative Specifications. I run Specification 2 with several variants and report them in Table A.5. In column 1, I cluster the standard errors at the county level with 21 clusters. The standard errors change little and the coefficient of interest remains statistically significant at the 1 percent level. In column 2, I cluster standard errors over two dimensions, as suggested in [Cameron, Gelbach, and Miller \[2011\]](#): at town and county-birthyear level. Similar to column 1, the coefficient of interest remains statistically significant at the 1 percent level.

In column 3, I eliminate the heterogeneity in family culture by adding the parents' origin-birthyear fixed effects. The estimated coefficient of interest remains quantitatively unchanged and statistically significant at the 1 percent level. To validate that the interpretations of the empirical results are not sensitive to the choice of pol-

icy time, I change *Post* to 0 for the 1985 cohort and report the estimate in column 4. The estimate decreases by 0.06 units and the standard error increases somewhat, but the coefficient of interest remains statistically significant at the 1 percent level. In columns 5 and 6, estimates are robust to the choice of regression models. The estimates from Logit model and Probit model are both statistically significant at the 1 percent level. Besides, the marginal coefficients of Logit and Probit model evaluated at the mean of the covariates are similar to OLS coefficients in Table 1.3.

Alternative Measures. The choice of aggregation methods of ancestor worship density from county level to province level in mainland China may damage the estimates of interest. In the main analysis, I use ancestor worship density at the province level which is the average of the county level data to construct ancestor worship (migrants). Ancestor worship density in mainland China will be mismeasured if the number of Chinese migrants differs across counties within a province. Then, ancestor worship (migrants) in Taiwan would also be mismeasured. Alternatively, I use the county population from the 1953 China Population Census and the county area to proxy the number of Chinese migrants from each town within each province. I then construct the province level ancestor worship density with county level population and area weights and construct two alternative ancestor worship (migrants). Another concern might be the representative of ancestor worship density. The effects of ancestor worship could be biased if the number of local festivals (other than ancestor worship) is correlated with the local son preference. Therefore, I use the number of ancestor worship festivals with and without weights as alternative measures of ancestor worship in mainland China.

Table A.6 shows the correlation of original ancestor worship (migrants) with alternative measures of migrants' ancestor worship. It is easy to see that the original ancestor worship (migrants) is positively and significantly correlated with the al-

ternative measures. Moreover, the measure of ancestor worship (migrants) is highly consistent through weights. The adjusted R-squared in columns 1 and 2 suggests that over 90% of the variance of ancestor worship is unchangeable by weighted methods. Although adjusted R-squared drops in columns 3-5, the lowest adjusted R-squared is 0.235 in column 5. Overall, the estimates in the table collectively support that original ancestor worship (migrants) is an appropriate measure of ancestor worship.

In Table [A.7](#), I replace the original ancestor worship (migrants) with the above alternative measures in Specification 2. For comparability across variables, we report the standardized coefficients in square brackets. The estimates are consistent in columns 1-3 and columns 4-6. Compared to columns 4-6, the lower standardized coefficients in columns 1-3 suggest that the estimated effect of ancestor worship (migrants) is a lower bound of the ancestor worship culture in the analysis.

Alternative Cultures. In addition to ancestor worship, other types of culture may also be transmitted and affect son preference. If these cultures are correlated with ancestor worship, previous estimates will be biased. To validate the cultural transmission of ancestor worship, I consider three types of alternative cultures: Confucian culture, tea culture, and rice culture. Table [A.8](#) shows that the alternative cultures may have effects on sex selection in some specifications, but do not damage the effect of ancestor worship (migrants).

1.4.5 Parents' Fertility Decisions

This section examines the relationship between the sex composition of the first two births and the fertility choice for the third birth. The sample is comprised of parents who have at least two births. Overall, I find parents who have fewer sons in the first two births are more likely to continue fertility, while ancestor worship

(migrants) amplifies this effect. In columns 1 and 2 of Table 1.4, I estimate the effect of having no son in the first two births on having a third birth with and without town fixed effects and parents' birth fixed effects. The results indicate that without any son in the first two births, parents are 20 p.p. more likely to have the third birth. The effect persists in column 3 with adding parents' years of schooling. In columns 1-3, it is easy to see that parents who have only one son in the first two births are 5-6 p.p. likely to continue fertility than parents who have two sons. The two estimates jointly rule out the possible explanation of parents' mixed sibling-sex composition preference in fertility and suggest the fertility decision is driven by son preference.

To empirically test the roles of son preference in fertility, in column 4, I interact having no son in the first two births with ancestor worship (migrants). The estimate of having no son in the first two births drops from 0.20 to 0.07, yet remains statistically significant. The estimate of the interaction term is positive and significant, suggesting that over a 60 percent increase in giving a third birth is through the mechanism of ancestor worship (migrants). Therefore, to some extent, son preference amplifies the extensive margin of fertility.

1.4.6 Mechanisms: Migrant Share and Cultural Distance

The behavior of the locals can be affected by the culture of migrants for several reasons. [Bisin and Verdier \[2011\]](#) emphasizes cultural transmission is expected to be higher when the benefits of adopting the culture are high or the costs of adoption are low. The costs of adopting another culture are lower when there are more individuals with another culture around or when groups are culturally closer, both of which increase the possibility of contact and communication across groups. It is reasonable

to hypothesize that the share of migrants and cultural distance can affect the cultural transmission.²⁴

To assess the cultural distance of the local society to Chinese migrants before the KMT Retreat, I employ two distinct cultural variables: the distance to Confucian schools and the foot-binding rate in 1920. The use of these two variables offers two primary advantages. First, the recognition and similarity. Many Confucian scholars espouse ancestor worship. Similarly, the practice of ancestor worship has been shown to have a detrimental impact on daughters, as it emphasizes the importance of sons. Foot binding, on the other hand, has been identified as a practice that harms women, particularly in terms of its role in fostering a culture of female beauty competitiveness and marital prosperity [Fan and Wu, 2023]. Second, Confucian schools and foot-binding were prohibited throughout much of the period before 1945. Most Confucian schools were banned and replaced by Japanese schools after 1895. Since 1915, women have been prohibited from binding their feet except for elders.

I estimate the heterogeneous effects of ancestor worship (migrants) by applying Specification 1.2 to different subsamples separated by town level of migrant share in 1956, the distance to Confucian schools in 1895, and foot-binding rate in 1920. The results are shown in Table A.9. Every subsample contains 174 towns which are separated by the median fraction of migrants, median distance to Confucian schools, or the median foot-binding rate. The difference between estimates in columns 1 and 2 is clear, where horizontal cultural transmission is stronger in towns with a higher fraction of migrants. It is easy to see that the estimates are significant at the 1% level and larger in towns that are closer to Confucian schools or with higher foot-binding

²⁴Miho et al. [2019] highlights the size of migrants relative to locals promotes horizontal cultural transmission. Spolaore and Wacziarg [2022] and Beach and Hanlon [2023] together show that cultural transmission is more effective in groups who have a closer cultural distance.

rates in columns 3 and 6. Conversely, the effects of ancestor worship (migrants) are smaller and insignificant at the 10% level in columns 4 and 5. The differences in the estimates between columns 3 and 4, and between columns 5 and 6 jointly suggest the effect of horizontal cultural transmission depends on the cultural distance in local society.

1.5 Cultural Transmissions within Migrants

In this section, I identify the cultural transmission within migrant groups, I focus on the second-generation migrants and consider both vertical transmission within migrant families (family heritage channel) and horizontal transmission within migrant communities (community channel).

1.5.1 Epidemiological Approach

I use empirical strategies that mirror the epidemiological approach to cultural transmission proposed by [Fernández \[2011\]](#). Given that the relationship between inherited beliefs and behaviors may be co-determined by institutional factors and the socioeconomic environment, this approach identifies cultural transmission through the behaviors of individuals with different places of origin but who grow up and live in the same environment and thus face similar constraints in their decision-making.

Ancestor worship is a cultural feature of son preference, which has a dispreference for girls in Chinese history. The dispreference for girls may materialize girls and treat girls as a kind of "collateral" such as bride price. If the collateral effect persists, the incentive structure faced by parents would be systematically different in places with different son preferences. That ancestor worship culture is mixed with the local marriage market. To identify the portable component of son preference and

disentangle cultural transmission from confounding institutional factors, I exploit variations in the sex selection among migrant parents who make decisions under similar local conditions but whose places of origin differ and whose migrant neighbors differ in their exposure to ancestor worship.

1.5.2 Family Heritage Channel

In the 1990 census, the origin of an individual’s patrilineal origin. Thus, the family heritage of ancestor worship identified by the epidemiological approach originates from the paternal line. I first explore the role of fathers’ origins by looking at the second-generation migrant fathers. The empirical specification is as follows:

$$\begin{aligned} Male_{i,j,a,t} = & \beta AW_Density_j \times Post_t + \omega_1 \mathbf{X}'_j \times Post_t \\ & + \omega_2 \mathbf{X}'_f \times Post_t + \sigma_j + \lambda_{k,t} + \delta_{a,t} + \epsilon_{i,j,a,t} \end{aligned} \quad (1.3)$$

Where $AW_Density$ is the ancestor worship culture of father j from his Chinese origin. \mathbf{X}'_j contains historical controls from the father’s origins: Confucian scholar density, Confucian clan density, and suitability index of tea, wet rice, and wheat. \mathbf{X}'_f is a matrix of family controls containing the parents’ years of schooling, age at birth of the child, birth order, and whether parents are from the same origin. σ_j and $\lambda_{k,t}$ are fathers’ origin fixed effects and mothers’ origin-birthyear fixed effects which can absorb unobserved effects from the fathers’ origin and control for the potential channel of mothers’ original culture. $\delta_{a,t}$ is town-birthyear fixed effects to absorb time-variant shock at the town level including the impact of horizontal cultural transmission estimated in Section 4. Standard errors are all two-way clustered at the fathers’ origin level and resident town level.

In Table 1.5, I report the results for the family heritage channel of fathers. In

columns 1-3, the sample is the children of second-generation fathers. The coefficient of interest in column 3 is 1.79 and is statistically significant at the 5 percent level. It implies that migrant fathers with one s.d. (0.031) higher ancestor worship will be 5.55 p.p. more likely to have a boy when prenatal sex selection is available. The migrant fathers' family heritage channel is about eight times larger than the horizontal cultural transmission from migrants to locals in Section 4.

In column 5, I replicate column 4 estimation by restricting the sample to both parents who are migrants. The resulting estimate is larger and statistically significant at the 5 percent level. The assortative marriage in culture seems to have some impacts on the family heritage channel. Given that about 40 percent of intermarriage in this sample and fertility is jointly determined by parents, the local mothers probably deny the need for a son from the migrant fathers, making the impact of fathers' origins less influential.

Next, I reproduce the above analysis with the mother's ancestor worship from her origin. The estimates in Table A.10 are all negative, but on small scales and not significant at the 10 percent level. The family heritage channel has no clear effect on second-generation migrant mothers. This suggests that only the group of people, who benefit from the unequal culture, men, have incentives to adopt and transmit the ancestor worship.

1.5.3 Community Channel

When the first-generation migrants moved to Taiwan, most of them settled down in the military dependents' villages which were composed of migrants from different places. Living in military dependents' villages creates opportunities for migrants to socialize and transmit cultures. Combining the feature of migrant communities with

the theory raised by [Panebianco and Verdier \[2017\]](#), which emphasizes the importance of social networks in cultural transmission. I examine the horizontal transmission within migrant networks (community channel).

I construct a variable indicating that migrants are influenced by their migrant neighbors from other origins within the migrant community. The variable is similar to the previous ancestor worship (migrants) but captures the variation at the individuals' origin-residential town level. The variable is constructed:

$$AW_Neighbors_{pi,a} = \frac{\sum_{a,p \neq pi} (Migrant_{a,p \neq pi} * AW_Density_{p \neq pi})}{Migrant_{a,p \neq pi}}$$

where the migrant from origin pi is influenced by the culture of other migrants from other origins $p \neq pi$ within the migrant community of town a in Taiwan.

The estimation function is similar to [Specification 1.3](#) and to estimate the horizontal cultural transmission within the migrant community, where I pool the migrant fathers of different origins in the same town:

$$Male_{i,j,a,t} = \alpha + \beta AW_Neighbors_{j,pi,a} \times Post_t + \omega_2 \mathbf{X}'_f \times Post_y + \phi_{f,t} + \delta_{a,t} + \epsilon_{i,j,a,t} \quad (1.4)$$

Where $\phi_{f,t}$ absorbs parents' origin-birthyear fixed effects, in which the family heritage channel of ancestor worship is absorbed. Standard errors are all three-way clustered in the fathers' origin, mothers' origin, and resident town. β is identified from variations in the sex selection of migrant fathers from the same origin, but surrounded by migrant neighbors from different origins. I also show that the effect of β is mainly driven by the relative size of the migrant community, proxied by the fraction of migrants from other origins.

I identify the community channel with the sample that parents are both migrants

and fathers are second-generation migrants. The estimates in columns 1 and 2 of Table 1.6 imply that migrant fathers living in the migrant community surrounded by neighbors with one s.d. (0.006) higher ancestor worship will be 4.57 p.p. more likely to have a boy when prenatal sex selection is available. This is about 0.8 times the family heritage channel. After rescaling the coefficient to account for the group size of migrants with different origins, the magnitude is about 8.8 percent of the coefficient of column 4 in Table 1.5.²⁵ The estimate in column 3 suggests that the effect of the community channel is driven by the possibility of interacting with migrants from other origins. In other words, one p.p. increase in the fraction of migrants from other origins will generate about a 4.1 percent increase in the effect of the community channel.

I reproduce the above analysis for mothers. The estimates in Table A.11 are all on a smaller scale and not significant at the 10 percent level. The community channel of mothers is imprecise. Similar to the family heritage channel above, the horizontal transmission within the community is insignificant for mothers. The reasons could be either the nature of ancestor worship, which requires the son to worship the paternal-line ancestors so that the mother would be excluded from worshipping after one generation; or the patrilineal culture is not welcomed and disliked by women, so that they have no incentive to accept and transmit the ancestor worship.

²⁵On average, the group size of migrants with different origins in a town is 36 times the group size of migrants with the same origin. Accordingly, when rescaling the community diffusion channel by the relatively average size of migrants with different origins, the marginal effect of an increase in the population to higher ancestor worship to migrants with different origins is $7.61/36 = 0.21$, which is about 8.8 percent of the increase in the same level of ancestor worship in the family heritage channel.

1.5.4 Comparisons across transmission channels

In order to evaluate the findings of this study on male-biased sex selection and contextualize their magnitudes and impacts, I present the estimates from three distinct cultural transmission channels in Table 1.7. It is challenging to establish a common framework for comparing the estimated effects across cultural transmission channels, as the samples and sources of variants vary considerably. One potential approach is to compare the estimated effects with a change in one residual standard deviation to compute residual magnitudes. In other words, one should rely on the effective variation in the treatment variable used for identification once fixed effects are taken into account. Then, multiply the raw estimates with these residual standard deviations and potential confounders [Mummolo and Peterson, 2018].²⁶ To facilitate a more comprehensive comparison of the effects of horizontal and vertical transmission, I compare both estimated coefficients and estimated missing girls, while taking into account the varying group sizes across samples.

The initial focus is on the estimated result, which is based on local parents born after 1954. In comparison to the estimates identified by migrant fathers' origin and migrant fathers' origin-residential town, the magnitude of the estimate identified on local parents is found to be lower. It appears that the transmission of ancestor worship brought by migrants is more likely to occur horizontally and vertically among migrants than from migrants to locals in the margin. When interpreting estimates with residual standard deviation, the estimate identified by the migrant father's origin has the highest margin; which is consistent with findings in numerous studies indicating that vertical transmission is the most important channel in persisting culture. However, horizontal transmission from migrants to locals has the highest

²⁶Gay [2023] applies a similar method with computing standardized estimates to compare different channels of vertical transmission of female working culture.

estimated impact on missing girls. One residualized standard deviation increase in ancestor worship (migrants) will lead to 1,251 missing girls or 4.2 percent of the total missing girls in 1985-90 Taiwan. The comparison between horizontal and vertical transmission indicates that cultural transmission within lineage contributes is the most significant channel in persistence, whereas horizontal transmission is the most significant channel in diffusion. In total, one s.d. increase in the three cultural transmission channels will result in a joint increase of 1,532 missing girls or 5.1 percent of the total missing girls in 1985-90 Taiwan.

1.6 Changes in Preferences toward Son and Ancestor

To account for the above results on sex selections, I argue that Chinese migrants altered preferences toward son and ancestor of their children and social relationships. These changes translated into sex selections in subsequent generations. Since individuals form preferences early in life from learning and socializing with their parents, peers, and neighbors [Bisin and Verdier, 2023], people who grew up with gender-biased parents or in an environment with higher son preference, should form conservative attitudes to son and ancestor. To explore the validity of this argument, I analyze the long-run implications of ancestor worship brought by Chinese migrants for attitudes toward son and ancestor.

1.6.1 Data and Empirical Strategy

Taiwan Social Change Survey 1994 and 1999 proposed three statements related to attitudes toward son and ancestor to respondents, whether they think is "not important at all", "not important", "neutral", "important", or "really important". The statements are (1) "To carry on the ancestral line,

you should have at least one sonTM, (2) 'You should bring honors to your family clan', (3) 'After death, people should be memorized and worshiped by their descendants'. I assign 0 to $\hat{\text{disagree}}^{\text{TM}}$ and 1 to $\hat{\text{agree}}^{\text{TM}}$, and use 0.25-point increments for responses in between, so that higher values indicate more conservative attitudes toward son and ancestor. To ensure respondents have interaction with migrants in their early life, I restrict the sample to people who were born after 1954. The summary statistics of preference on son and ancestor is shown in Table A.3. The subsample of males has higher valuations for son and ancestor than the whole sample.

Applying a similar approach as Specification 1.1, I test the horizontal transmission by comparing respondents who live in the town with different ancestor worship (migrants) :

$$Y_{ia} = \alpha + \beta AW_Migrants_a + \omega \mathbf{X}'_a + \delta \mathbf{X}'_i + \theta_c + \sigma_t + \phi_s + \epsilon_{ia} \quad (1.5)$$

where Y_{ia} denotes the one-point scale values of interest for respondent i who lives in town a . \mathbf{X}'_a is a set of historical controls and geographic characteristics assigned at the town level. I also include a set of individual controls \mathbf{X}'_i , gender, number of children, marriage, and years of schooling. Besides, three types of fixed effects are included, county fixed effects θ_c , birthyear fixed effects σ_t , and survey fixed effects ϕ_s . I cluster standard errors at the town level. β is identified from variations in attitudes held by respondents of the same cohort but live in towns that experienced different ancestor worship (migrants).

1.6.2 Results

I report results in Table 1.8. The corresponding coefficients toward son preference, ancestor worship, and family honor are separately presented in Panel A, B, and C. With and without controls, the coefficients of interest are all significant at the 1% level or 5% level. Column 1 implies that respondents who live in the towns that experienced one s.d. higher ancestor worship (migrants), hold more conservative attitudes to son preference, ancestor worship, and family honor: the value of interest will be 2.2 pp, 1.3 pp, and 0.8 pp higher; which correspond to 5.2%, 1.8%, and 1.3% of the mean. Adding controls only slightly changes the estimates in Panel A and B from column 1 to 4, except for estimates in Panel C, which increase about 150% from column 1 to 4.

1.7 Conclusion

Due to the specificity of Taiwan, this paper is the first to empirically investigate both horizontal and vertical cultural transmission in the same context. Taking advantage of the random assignment of migrants during KMT Retreat and a policy shock, Legalization of Abortion, I identify the causal effect of ancestor worship on sex selection and son preference through three different cultural transmissions: horizontal transmission between groups, vertical transmission through (paternal) family, and horizontal transmission with migrant communities.

I find that one s.d. increase in ancestor worship (migrants) can account for about 20% of excess males through horizontal transmission from migrants to locals alone, suggesting that the effect of culture is unignorable in both son preference and gender inequality. Consistent with Spolaore and Wacziarg [2022], Beach and Hanlon [2023], I explicitly show that cultural similarity matters for horizontal cultural

transmission. The effect of vertical transmission is stronger. It is consistent with models of vertical transmission that cultural transmission through the family has the strongest effect. I show a novel way of cultural transmission, transmission within migrant communities. The marginal effect of transmission within migrant communities is only 10% of vertical transmission through family. However, when we consider the relative population of migrants with different backgrounds, the total effects of transmission within migrant communities are substantial and even larger than those of vertical transmission.

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Figures and Tables

Figure 1.1: The Map of Standardized Ancestor Worship (Migrants)



Figure 1.2: The Map of Standardized Ancestor Worship (Locals)

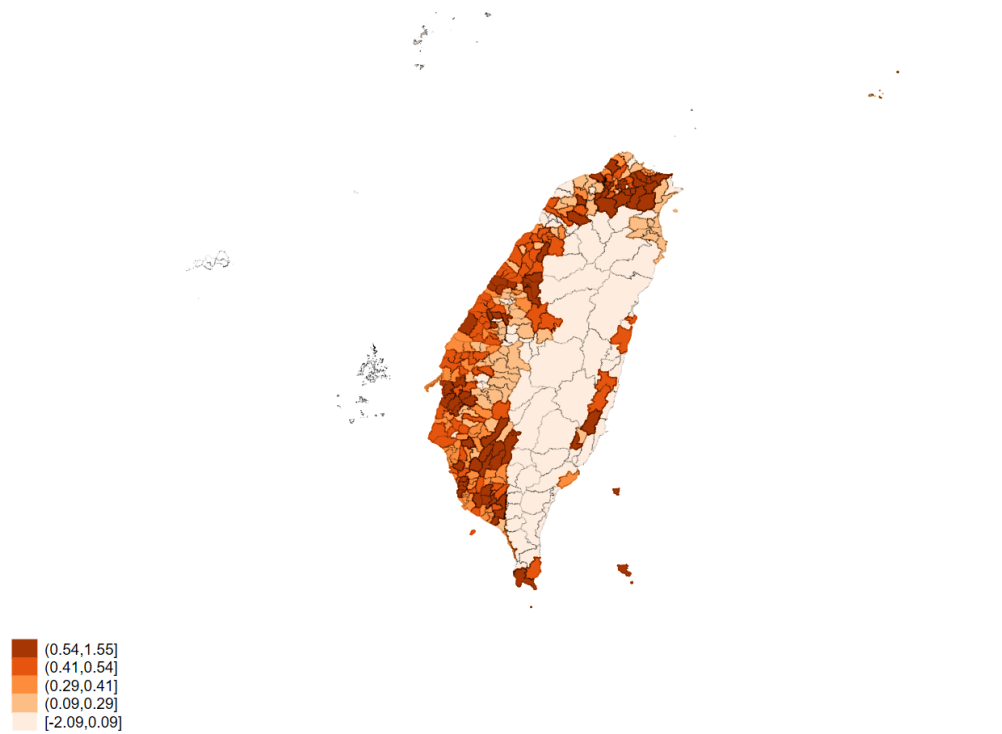


Figure 1.3: Fraction of Male over Time (1940-1990)

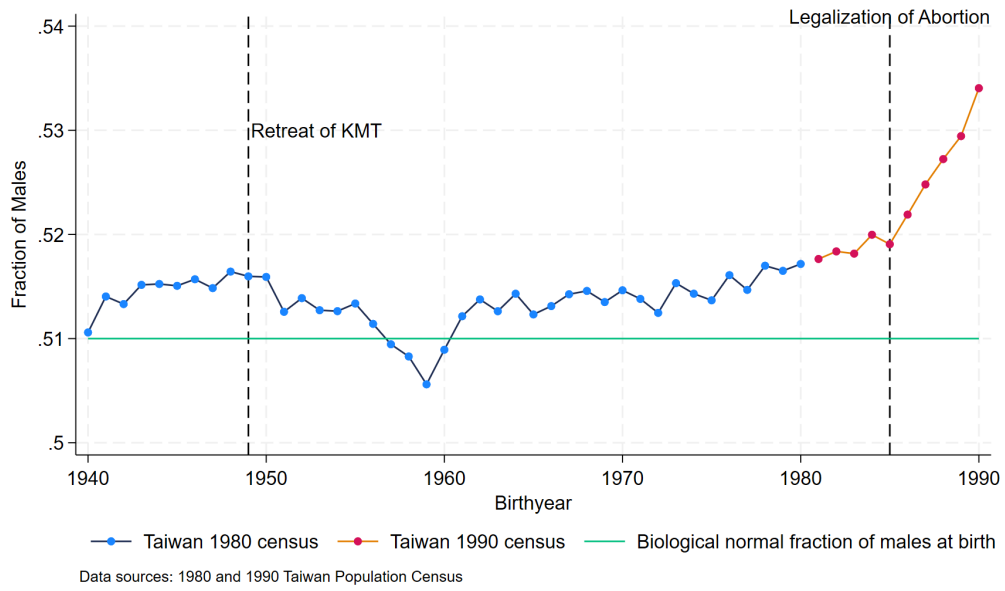


Figure 1.4: Fraction of Male by Birth Order (1981-1990)

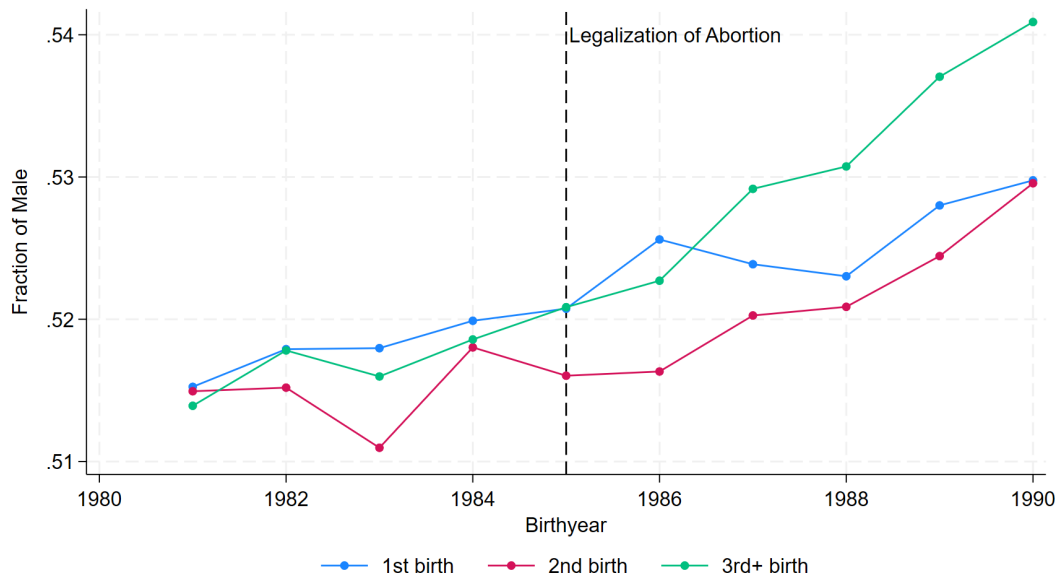
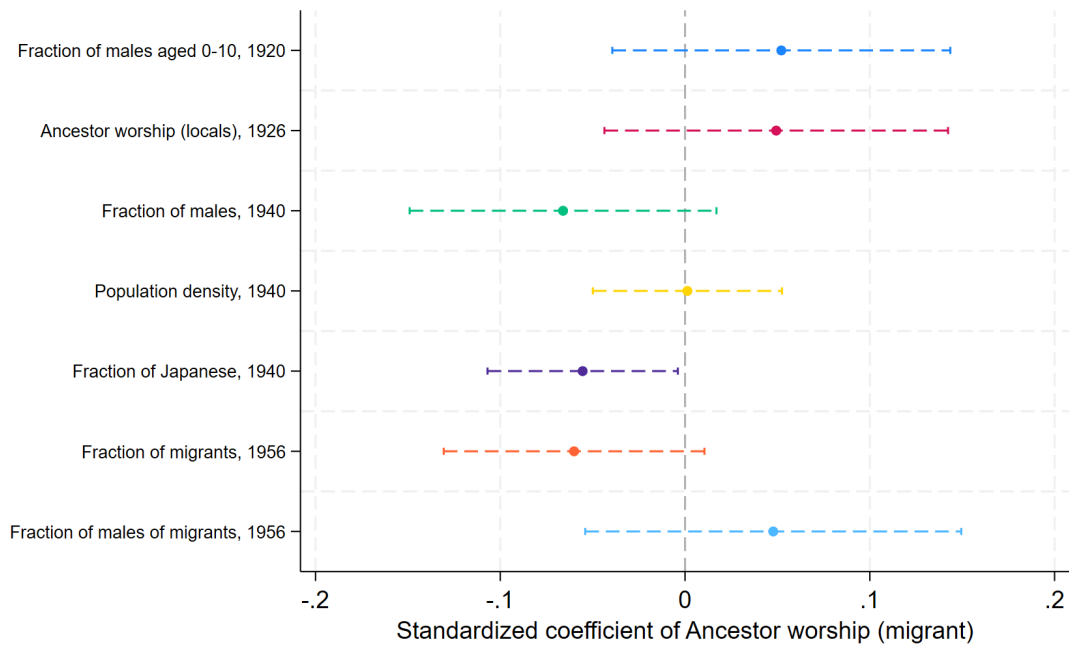
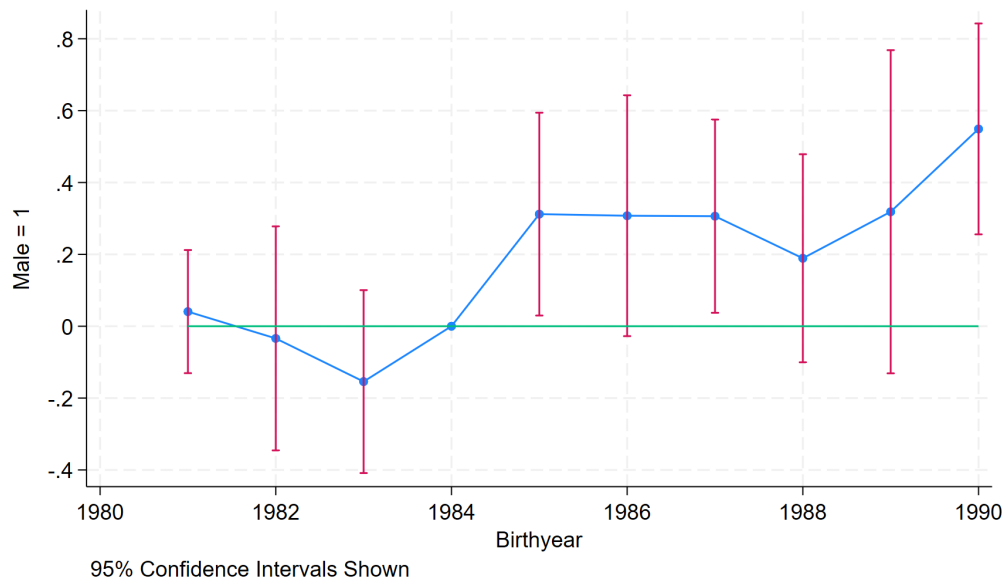


Figure 1.5: Historical Characteristics and Ancestor Worship (Migrant)



Note: The figure presents the estimated standardized coefficients and respective 95 percent confidence interval from estimating Specification (1) on various historical characteristics at town level (denoted on the y-axis), conditional on county fixed effects and geographic characteristics.

Figure 1.6: Event Study of the Ancestor Worship (Migrants) on Male (1981-1990)



Note: The figure presents the event study by estimating an alternative version of Specification (2), which allows the estimators of ancestor worship (migrants) to vary by birthyear and uses the birthyear=1984 cohort as the baseline comparison group. With this, I can examine the trend of estimators before the Legalization of Abortion and the dynamic effects of ancestor worship (migrants) after the Legalization of Abortion.

Table 1.1: Ancestor Worship (Migrants) and Historical Characteristics

Dependent variable	Ancestor worship (migrants)			
	(1)	(2)	(3)	(4)
Fraction of males aged 0-10 in 1920	0.00 (0.05)	0.04 (0.05)	0.02 (0.05)	0.05 (0.05)
Ancestor worship (locals) in 1926			0.09 (0.07)	0.08 (0.08)
Fraction of males in 1940			-0.06 (0.06)	-0.08 (0.07)
Population density in 1940			-0.02 (0.03)	0.04 (0.04)
Fraction of Japanese in 1940			-0.03 (0.06)	-0.06 (0.06)
Fraction of migrants in 1956			-0.08 (0.06)	-0.08 (0.06)
Fraction of males of migrants in 1956			0.09* (0.06)	0.05 (0.05)
County FEs	No	Yes	No	Yes
Geographic characteristics	No	No	Yes	Yes
# of Towns	354	354	354	354
Adj. R^2	-0.003	0.043	0.029	0.069

Notes: This table reports standardized coefficients from regressing ancestor worship (migrants) on various demographic characteristics before 1945, migrant characteristics measured in 1956, and geographic characteristics. *Geographic characteristics*: the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (ln)distance to seashore, (ln)distance to Taipei. Robust standard errors are in parentheses.

*** Significant at the 1 percent level. ** 5 percent level. * 10 percent level.

Table 1.2: The Effect of Ancestor Worship (Migrants) on Male Birth

Dependent variable	Male = 1			
	1980 census		1990 census	
Sample	All		1 st &2 nd birth	3 rd + birth
Birth order	(1)	(2)	(3)	(4)
Ancestor worship (migrants)	0.04** (0.02)	0.06** (0.02)	0.02 (0.03)	0.10** (0.04)
County-birthyear FEs	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes
Geographic characteristics	Yes	Yes	Yes	Yes
# of Towns	354	354	354	354
# of Observations	1,887,290	1,123,546	791,017	332,529
Outcome mean	0.516	0.528	0.525	0.534
Ancestor worship (migrants) s.d.	0.022	0.018	0.018	0.018

Notes: This table reports OLS coefficients from estimating Specification (1) on the sample of aged 0-4 children from 1980 census in column 1 and from 1990 census in column 2-4. The estimated results in column 3 and 4 only consider the first two birth order children and the third and higher order birth children. They jointly suggest that the sex selection driven by ancestor worship concentrates on the third and higher birth order children. The results from regressing male indicator county fixed effects, and a set of historical controls, as well as a series of geographic characteristics. *Geographic characteristics*: the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (ln)distance to seashore, (ln)distance to Taipei. Standard errors are all clustered at the town level.

*** Significant at the 1 percent level. ** 5 percent level. * 10 percent level.

Table 1.3: The Effect of Ancestor Worship (Migrants) on 3+ Birth Order Children's Sex

Dependent Variable	Male = 1					
	All				No	Yes
Have boy(s) in 1 st &2 nd birth	(1)	(2)	(3)	(4)	(5)	(6)
Ancestor worship (migrants) X Post	0.33*** (0.09)	0.34*** (0.08)	0.32*** (0.08)	0.32*** (0.08)	0.39** (0.18)	0.29** (0.12)
County-birthyear FEs	Yes	Yes	Yes	Yes	Yes	Yes
Town FEs	Yes	Yes	Yes	Yes	Yes	Yes
Historical controls X Post	No	Yes	Yes	Yes	Yes	Yes
Geographic characteristics X Post	No	No	Yes	Yes	Yes	Yes
Family controls X Post	No	No	No	Yes	Yes	Yes
# of Towns	354	354	354	354	354	354
# of Observations	358,287	358,287	358,287	358,287	117,230	241,057
Outcome mean	0.527	0.527	0.527	0.527	0.537	0.523
Ancestor worship (migrants) s.d.	0.018	0.018	0.018	0.018	0.018	0.018

Notes: This table reports OLS coefficients from estimating Specification (2) on the sample of 3rd+ birth order aged 0-9 children whose parents are both locals and born after 1954. The results from regressing male indicator on county-birthyear fixed effects, town fixed effects, and a set of historical controls, as well as a series of geographic characteristics and family controls. *Geographic characteristics*: the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (ln)distance to seashore, (ln)distance to Taipei. *Family controls*: birth order of the child, age of parents at child's birth, and years of schooling of parents. Standard errors are all clustered at the town level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 1.4: Children's Sex Composition and Fertility Decisions for Two-child Parents

Dependent variable	Third child = 1			
	(1)	(2)	(3)	(4)
No son in 1 st &2 nd birth	0.21*** (0.00)	0.20*** (0.00)	0.20*** (0.00)	0.07* (0.04)
One son in 1 st &2 nd birth	0.06*** (0.00)	0.06*** (0.00)	0.05*** (0.00)	-0.03 (0.03)
No son in 1 st &2 nd birth				0.43***
X Ancestor worship (migrants)				(0.14)
One son in 1 st &2 nd birth				0.29***
X Ancestor worship (migrants)				(0.10)
Town FEs	No	Yes	Yes	Yes
Parents' birthyear FEs	No	Yes	Yes	Yes
Parents' education	No	No	Yes	Yes
# of Towns	354	354	354	354
# of Observations	565,324	565,324	565,324	565,324
Outcome mean	0.383	0.383	0.383	0.383

Notes: This table reports OLS coefficients from regressing the discrete choice of having a third child on the indicators of having no son and one son in the 1st&2nd birth and years of schooling of parents with the town and parents' birthyear fixed effects. The sample is the local parents who had at least two children and were both born after 1954. Standard are all clustered at the town level.

*** Significant at the 1 percent level. ** 5 percent level. * 10 percent level.

Table 1.5: The Effect of Migrant Father’s Ancestor Worship on the Sex of 3+ Birth Order Children

Dependent variable	Male = 1			
	(1)	(2)	(3)	(4)
Ancestor worship (father) X Post	1.22* (0.69)	1.71** (0.79)	1.79** (0.79)	2.40** (1.07)
Town-birtheyear FEs	Yes	Yes	Yes	Yes
Father’s origin FEs	Yes	Yes	Yes	Yes
Mother’s origin-birtheyear FEs	Yes	Yes	Yes	Yes
Origin controls (father) X Post	No	Yes	Yes	Yes
Family controls X Post	No	No	Yes	Yes
# of Father’s origin	39	39	39	34
# of Towns	231	231	231	194
# of Observations	10,380	10,380	10,380	6,025
Outcome mean	0.532	0.532	0.532	0.530
Ancestor worship (father) s.d.	0.031	0.031	0.031	0.032

Notes: This table reports coefficients from estimating Specification (3) on the sample of 3rd+ birth order aged 0-9 children whose father is a second-generation migrant in column 1-3. The sample is restricted to parents who are both migrants in column 4. The results from regressing male indicator on town-birtheyear fixed effects, father’s origin fixed effects, mother’s origin-birtheyear fixed effects, and origin controls (father) as well as a series of family controls. *Origin controls (father)*: Imperial scholars density, Confucian clan density, and suitability index of wheat, wet rice, and tea of father’s origin. *Family controls*: birth order of the child, age of parents at child’s birth, and years of schooling of parents, as well as whether parents are from the same origin. Standard errors are all clustered at the town level and migrant father’s origin level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level.

* Significant at the 1 percent level.

Table 1.6: The Effect of Ancestor Worship of Migrant Neighbors from Other Origins than Father on the Sex of 3+ Birth Order Children

Dependent variable	Male = 1		
	(1)	(2)	(3)
Ancestor worship (neighbors, father) X Post	7.63** (3.63)	7.61** (3.69)	8.62** (3.57)
Ancestor worship (neighbors, father) X Post X Fraction of migrants from other origins			35.41* (18.96)
Town-birthyear FEs	Yes	Yes	Yes
Parents' origins-birthyear FEs	Yes	Yes	Yes
Family controls X Post	No	Yes	Yes
# of Father's origin	33	33	33
# of Towns	193	193	193
# of Observations	5,976	5,976	5,976
Outcome mean	0.529	0.529	0.529
Ancestor worship (neighbors, father) s.d.	0.006	0.006	0.006

Notes: This table reports coefficients from estimating Specification (4) on the sample of 3rd+ birth order aged 0-9 children whose parents are both migrants and father is a second-generation migrant. The results from regressing male indicator on town-birthyear fixed effects, parents' origins-birthyear fixed effects, and a series of family controls. *Family controls*: birth order of the child, age of parents at child's birth, and years of schooling of parents, as well as whether parents are from the same origin. Standard errors are three-way clustered at the town level, migrant father's origin level, and migrant mother's origin level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level.

* Significant at the 1 percent level.

Table 1.7: Estimates' Magnitudes and Estimated Impacts

Analysis	Source of variation	Ancestor worship ↑ one s.d.			Reference
		Raw s.d.	Residual s.d.	Missing girls	
Local parents	town-cohort	0.58 p.p.	0.48 p.p.	1251	Column 4, Table 3
Migrant fathers	father's origin-cohort	5.55 p.p.	2.60 p.p.	217	Column 3, Table 5
Migrant communities	father's origin-town-cohort	4.57 p.p.	1.37 p.p.	64	Column 2, Table 6

Notes: This table reports the main estimates in this research. *Raw s.d.* is the sample standard deviation of the independent variable. *Residual s.d.* is the residualised standard deviation of the independent variable with respect to specification-specific fixed effects and control variables. *Missing girls* is the estimated missing girls by one residual s.d. of the independent variables * size of birth in 1985-1990 of the corresponding sample.

Table 1.8: The Effect of Ancestor Worship (Migrants) on Preferences on Son and Ancestor

	(1)	(2)	(3)	(4)
Panel A: <i>Son Preference</i>				
Dependent variable	The importance of having at least one son			
Ancestor worship (migrants)	1.51*** (0.55)	1.19*** (0.36)	1.17*** (0.34)	1.54** (0.59)
# of Towns	73	73	73	73
# of Observations	2,263	2,263	2,263	2,263
Panel B: <i>Ancestor Worship</i>				
Dependent variable	The importance of being memorized and worshipping after death			
Ancestor worship (migrants)	0.84*** (0.29)	1.13*** (0.35)	1.13*** (0.34)	1.01** (0.43)
# of Towns	78	78	78	78
# of Observations	2,315	2,315	2,315	2,315
Panel C: <i>Family Honor</i>				
Dependent variable	The importance of bringing honor to your family clan			
Ancestor worship (migrants)	0.51** (0.19)	0.59** (0.29)	0.65** (0.28)	1.33** (0.64)
# of Towns	73	73	73	73
# of Observations	2,263	2,263	2,263	2,263
County FEs	No	Yes	Yes	Yes
Birthyear FEs	No	Yes	Yes	Yes
Survey FEs	No	Yes	Yes	Yes
Individual controls	No	No	Yes	Yes
Historical controls	No	No	No	Yes
Geographic characteristics	No	No	No	Yes
Ancestor worship (migrants) s.d.	0.015	0.015	0.015	0.015

Notes: This table reports OLS coefficients from estimating Specification (5) on the sample of respondents born after 1954 in the Taiwan Social Change Survey (1994&1999). The results from regressing attitudes of interest on county fixed effects, birthyear fixed effects, survey fixed effects, and a set of historical controls, as well as a series of geographic characteristics and individual controls. *Geographic characteristics*: the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (ln)distance to seashore, (ln)distance to Taipei. *Individual controls*: gender, marriage, number of children, years of schooling. Due to the missing information of survey sample, the number of children and years of schooling are neither controlled in Panel B.

*** Significant at the 1 percent level. ** Significant at the 5 percent level.

Chapter 2

Radio (Counter-)propaganda and Job Choices

2.1 Introduction

The economic and political impacts of media have been discussed a lot by scholars. However, most of the studies examine the effects of a specific media within the regime. It is hard to decompose the effect of media which can be explained by social movement, publicity, and many other socioeconomic changes within the regime. Out of these possible mechanisms, the competition between international media and local media is an unignorable one. From World War I to the Israel-Palestine conflict, every political group tries to influence an audience to further an agenda. Can international media effectively correct or even counter the effects of domestic propaganda? If so, how large will be the international media effect?

The conflicts between mainland China and Taiwan is the continuation of the Chinese Civil War. In 1949, the Chinese Communist Party (CCP) defeated the Kuomintang (KMT) and won control of mainland China. KMT retreated to Taiwan. The two political parties have never signed any form of ceasefire and have competed in multiple areas, from diplomatic relationships to scientific cooperation, till now. Out of them, the competition in political propaganda is an unignorable one and has huge implications

for people in either mainland China or Taiwan.

This paper studies the effects of Voice of Free China (VFC) broadcasts from Taiwan on individuals' job choices, political trust, political membership, and protests in mainland China. After 1949, the Chinese civil, VFC in Taiwan embraced radio broadcasting to mobilize anti-Chinese Communist Party (CCP) campaigns. VFC initially broadcasted daily news but switched to broadcasting almost exclusively its opposite opinions to CCP following the start of "psychological warfare". To prevent the impacts of VFC and enhance domestic propaganda, CCP banned the radios from VFC and any other Western countries through radio jamming and criminalization in 1949-78. Besides, the limited amount of radio receivers prevented the mass population from listening to VFC.

In 1979-89, VFC was allowed to compete with other domestic radios in mainland China. Since 1979, with the end of the Cultural Revolution and corporations with Western countries, listening to VFC was allowed, and radio jamming was stopped. At the same time, the fast-growing radio production ensured almost every family has a radio receiver in the 1980s. After the Tiananmen Square Protest in 1989, radio jamming were initiated again, but there was no criminal punishment for listening to VFC anymore. Even though the amount of VFC listenership is unknown, VFC was really popular in mainland China there was a folk saying in the 1980s, "*Listen to the 'old Deng' by day and listen to 'little Teng' by night*", whereas the 'old Deng' represents CCP propaganda and the 'little Teng' represents VFC.¹

The decriminalization of listening to VFC provides a unique opportunity to study the impact of international propaganda by political rivals. However, as mainland China is an autocratic regime, it is hard to observe people's political behaviors (e.g. vote

¹The "old Deng": Deng Xiaoping, who was Chinese Communist Party leader in the 1980s. The "little Teng": Teresa Teng, a well-known Taiwanese singer whose songs were firstly and frequently broadcasted by VFC.

and protest) or uncensored political preferences [[DellaVigna and Gentzkow, 2010](#)]. My baseline analysis examines the impact of exposure to VFC on job choice, bureaucrat versus entrepreneur. To examine this impact empirically, I combine the predicted radio strength of VFC and four waves of population census in 2000-15. Then, I study the impacts of VFC on political trust and party membership by utilizing the 2010 and 2012 China Family Survey Survey (CFPS).

To simulate the radio strength of VFC, I collect data on the location and technical details of VFC's transmitters and import these data into the Voice of America Coverage Analysis Program (VOACAP) to attain the predicted radio strength of VFC. The VFC broadcasts short-wave and medium-wave radio from Taiwan island and relies on ionospheric propagation. Ionospheric propagation relies on the distance and ionospheric characteristics between receiving locations and VFC transmitters and the latitude and longitude of receiving locations.

The main challenge in estimating the causal impact of VFC radio strength is the presence of unobserved heterogeneity since the location of Taiwan island is not random, and the decriminalization of listening to VFC is accompanied by a series of political reforms in 1980s China. To make progress, I use a cohort difference-in-differences strategy advanced by [Duflo \[2001\]](#) that takes advantage of both regional variations in radio strength and cohort variations in ideology formation. The variation in VFC radio strength is caused by ionospheric factors, such as controlling for the distance between receiving locations and VFC transmitters and the latitude and longitude of receiving locations. The cohort variation is inspired by behavioral and psychology literature [[Sut-ter and Kocher, 2007](#), [Flanagan and Stout, 2010](#)], which suggests that adolescence is the critically malleable period of ideology formation. The individuals' lifetime decisions are affected a lot by their experiences in the adolescent hood. Given this, I treat the individuals who were aged 10-20 in the freely listening to VFC period (1979-1989) as

affected cohorts. The older individuals whose ideologies were already shaped. This strategy is able to account for all cohort-invariant county factors that affect both VFC radio strength and corresponding outcomes. It relies on a parallel cohort trend assumption across counties affected by different VFC radio strength.

After controlling for county and prefecture-birthyear fixed effects, to account for any direct economic-, political-, and geographical-cohort specific effect on job choice; I found one s.d. increase in the VFC radio strength will influence affected cohort 0.08 percentage points (p.p.) less likely to be a bureaucrat, relative to 4% of the mean of bureaucrats. Reversely, one s.d. increase in the VFC radio strength will influence the affected cohort 0.09 p.p. more likely to declare as an entrepreneur, relative to 0.8% of the mean of entrepreneurs.

To show that the results did not reflect the effect of exposure to domestic radio programs in general. First, I compare the effects of VFC with China National Radio (CNR) which is ran by CCP. I find that VFC perfectly counters the effects of CNR on individuals' job choices. The result is consistent with the fact that VFC and CNR are rivals in ideology. Second, I ran a falsification test using exposure to local radios, which has existed since the 1950s, and we should not expect any effects in the cohort DiD setting. The estimates of local radios are small and insignificant.

Despite job choice, I find VFC has strong effects on individuals' ideology. Specifically, for individuals who were exposed to VFC during adolescence, one s.d. increase in VFC radio strength reduces trust towards local officials (resp. CCP membership) by 3.4 p.p. (resp. 0.2 p.p.). It accounts for 7% (resp. 3%) of the mean of trust towards local officials (resp. CCP membership).

These findings can contribute to three main bodies of literature. First, my study is in line with a sizeable literature on the political effects of media. For instance, [DellaVigna and Kaplan \[2007\]](#) finds that the entry of Fox News increased Republican

vote shares in both US presidential and senatorial elections. [Enikolopov, Petrova, and Zhuravskaya \[2011\]](#) finds that the only independent national TV channel in Russia increased votes for opposition parties and reduced support for the government party in the 1999 parliamentary election. [Adena, Enikolopov, Petrova, Santarosa, and Zhuravskaya \[2015\]](#) finds that radio controlled by Nazi Germany contributed to the domestic support for the Nazi Party and anti-Semitism. Besides, [Gagliarducci, Onorato, Sobbrío, and Tabellini \[2020\]](#) shows BBC radio affected the insurgencies against the Nazi-fascist occupation in 1943–1945 Italy by conveying coded messages to the partisan brigades.

Second, by identifying the effect of VFC on political trust, my research adds to the literature on trust formation. A growing body of work investigates the determinants of trust, including individual characteristics and experiences [[Alesina and La Ferrara, 2002](#)], curriculum [[Cantoni, Chen, Yang, Yuchtman, and Zhang, 2017](#)], cultural beliefs [[Gershman, 2016](#)], conflicts [[Rohner, Thoenig, and Zilibotti, 2013](#)], and historical legacies [[Nunn and Wantchekon, 2011](#)], with both within and cross-country evidence. This paper shows that exposure to international propaganda during the critical period of trust formation alters the level of political trust in later adulthood. This is in line with existing findings, showing that historical traumas can result in a long-lasting deterioration in trust [[Bugle, 2016, Lichter, Löffler, and Siegloch, 2021](#)].

Third, by studying the VFC's impact on party membership, this paper also contributes to the literature on political participation in authoritarian regimes [[Cantoni et al., 2023](#)]. [Lorentzen \[2013\]](#) argues that informal toleration of small-scale economic protests can be an effective information gathering tool for authoritarian regimes. [Qin, Strömberg, and Wu \[2021\]](#) examines mass communication through social media affects protest dynamics in China. [Yanagizawa-Drott \[2014\]](#) shows at least 10 percent of victims Rwandan Genocide can be attributed to the effects of the radio. [Ou and Xiong \[2021\]](#) also shows propaganda through radio caused higher campaigns and deaths dur-

ing the Cultural Revolution. While in many studies, due to the media are all domestic, the information generation and transmission process of media may be biased by social movements or unobserved historical legacies within the regime. It is also hard to decompose the estimated effects of media into publicity, propaganda, or counter-propaganda. In this study, VFC is not controlled by CCP or located in mainland China, which can be used to accurately identify the propaganda effect of media and avoid possible bias due to unobserved shocks within the research regime.

2.2 Historical Background

Like many Western countries, radio entered China in the early 1920s. However, due to limited manufacturing productivity, less than 1% of the Chinese population owned radio receivers in 1949. To accelerate information dissemination, the Chinese government chose to promote loudspeakers as it is much cheaper than radio receivers. With loudspeakers only, everyone in the same region listens to the same local radio and receives the same information. Figure 2.1 shows that there are over 100 million loudspeakers, but radio receivers' ownership was lower than 20 million in the early 1970s. In 1972, the low-cost "Red Light" brand radio receiver was innovated in Shanghai. The "Red Light" radio receiver was soon popular and helped radio receiver ownership increase over 10 times within 15 years. In the late 1980s, almost every household has a radio receiver that they could freely choose both domestic and foreign radios.

2.2.1 The Broadcast of VFC

Since KMT lost the Chinese Civil War and retreated to Taiwan, VFC started in the summer of 1949 with a 4-hour daily broadcast to mainland China from 7 p.m. to 11 p.m. The original purpose of VFC is to broadcast as many channels as possible

to counter the radio propaganda from CCP. The primary broadcast utilized a 100 kW medium wave transmitter that could only cover Eastern China. Due to the outbreak of the Korean War, U.S. government provided technical support to help VFC expand its length, scope, and contents. In 1952, it reached an 11-hour daily broadcast and broadcasted in multiple languages.² After 1954, VFC could broadcast the whole of mainland China with short-wave transmitters.

The VFC was structured in four main sessions: (1) News bulletins broadcast eight times in Mandarin and seven times in other languages daily, from 10 minutes to 60 minutes. The 10-minute bulletins comprise 60% Taiwan news and 40% international news. The 30-minute and 60-minute bulletin reports news about mainland China; (2) Publicity programs, which were 5 to 15 minutes long and broadcast at night. They not only discuss and criticize the drawbacks of communism but also show the life of Taiwanese and abroad Chinese; (3) The music programs, are 15 minutes long and broadcast between news bulletins and publicity programs. Teresa Teng's songs were broadcast in the 1970s and 1980s which attained high listenership in mainland China.³ (4) Coded messages, to communicate with intelligence personnel and seduce CCP soldiers to defect.

While it is difficult to have a precise estimate of the audiences of VFC, several articles and reports are suggesting that it had a relatively high credibility and a large audience among the Chinese population in the 1970s and 1980s. Many writers documented that listening to VFC was common among youths and juveniles [Zhong, 2008]. In the times people has little contact with the outside world, VFC provides them with entertainment [Wang, 2005] and uncensored news [Zhong, 2008]. The uncensored news

²Except Mandarin Chinese, VFC also broadcasts in other Chinese dialects such as Cantonese, Hakka, and Hokkien, and other languages such as English, Japanese, and Korean.

³Without accounting for numerous pirated records in mainland China, the sales of records of Teresa Teng are over 48 million.

not only publicizes information to help people have a better sense of the things going on in China and the rest of the world, but it also engages in counter-propaganda and lowers people's trust in the government.

2.2.2 The Ban and Lift in China

Since the CCP won the Chinese Civil War in 1949, it banned all "radios from enemies" including VFC in mainland China. To counter the radio broadcasts from enemies, the CCP broadcasted as many radios with the same frequency as possible. Hence, when the CCP radio was at work, people who wanted to listen to the enemies' radios could only listen to the CCP programs or noise. Besides, listening to enemies' radio is related to the crimes of counter-revolution. Once individuals are found listening to enemies' radios or discussing the contents related to enemies' radios, they would be put on trial. The severe punishment is the death penalty.

In 1978, the new leader of the CCP, Deng Xiaoping, came into power. He started a series of economic and political reforms. One of them is lifting the ban on all "radios from enemies". After 1978, the CCP stopped radio jamming and decriminalized listening to enemies' radio.⁴ Given that television was expensive and many local radio repeatedly broadcast information from People' Daily, listening to songs of Teresa Teng broadcasted by VFC soon became a popular form of individual entertainment. Even though many of her songs were criticized as "spreading capitalism lifestyle" and "decadent music" by CCP leaders, she was super popular and got invited many times by China Central Television.

People can freely listen to VFC until 1989. After the Tiananmen Square Protest in 1989, the radio jamming re-operated again. Besides, the television market expanded

⁴Communicating with and writing letters to enemies' radio are still crimes of counter-revolution.

a lot and replaced radio as the individuals' main entertainment in the 1990s.

2.2.3 The Broadcast of Domestic Radios

Since CCP rising power, it has attached great importance to propaganda and indoctrination. It considered radio as a powerful weapon for spreading information and doctrine. Hu Qiaomu, Mao Zedong's senior secretary, emphasized radio broadcasts as an important propaganda tool and called for the establishment of a nationwide radio network in 1950. Given China's vast territory and underdeveloped transportation systems, the speed and massive reach of radio made it uniquely suited to disseminating propaganda at this time [Jan, 1967]. After realizing the huge potential of radio, the CCP made a calculated effort to expand its listening public. From the mid-1950s, wired loudspeakers were installed in every village throughout the country. The network allowed the CCP to extend its reach further into the vast countryside.

Unlike in Western countries where people listened to the radio through private radio receivers, collective listening was the general practice and was sometimes even a forced political activity [Houn, 1957]. County radio stations controlled the local broadcast. They relayed programs from prefectural or provincial stations and could only add local news or local entertainment.

Figure 2.1 shows the trends of radio receivers and local loudspeakers. It is easy to see the numbers of local loudspeakers are stable since mid-1970s. In contrast, radio receivers ownership increased from about 20 million in 1970 to over 250 million in the late-1980s.

2.3 Data Sources

This analysis makes use of four main datasets at the individual level or county level. First, the radio strength of different radios is calculated by the Voice of America Coverage Analysis Program (VOACAP) or Irregular Terrain Model (ITM). Second, working sectors (Bureaucrats versus entrepreneurs) at the individual level are measured in the micro samples of 2000-15 censuses. Third, trust to local officials and CCP membership, as measured in the 2010 and 2012 CFPS. Fourth, the county characteristics in the 1960s and 1970s were collected by [Walder \[2014\]](#). The rest of this section describes each of them in more detail.

2.3.1 Radio Strength

Radio Strength Prediction: Local Radios I calculate the radio strength of the local radios in each county by using information on the transmitters' location and power from [Liu \[1964\]](#) and provincial radio broadcast gazetteers. Based on these data, I apply ITM [[Hufford, 1999](#)] with a high-resolution geo-topographical map of China to calculate the predicted local radio strength in 1979-89. For each county, I predict the radio signal strength at the county seat. This method is to compute the signal loss caused by physical distance and topography between the transmitters and radio receivers. To account for potential endogeneity in the location of radio stations, I follow [Olken \[2009\]](#) and simulate and control for the hypothetical signal quality in the absence of any geographic obstacle.

Radio Strength Prediction: VFC and CNR The broadcasts of VFC and CNR in China use the same technology, medium wave and short wave radio transmission, but through different transmitters and with different frequencies. I hand collected data on the location, frequency, and power of VFC transmitters from [He et al. \[2018\]](#) and of

CNR transmitters from provincial radio broadcast gazetteers and historical newspapers.

The medium and short wave broadcasting by the VFC and CNR made it possible to reach thousands of kilometers away locations by exploiting the (over 50 kilometers high) ionospheric radio propagation, which is shown in Figure 2.2. To calculate the VFC signal strength in each mainland Chinese, I make use of the VOACAP [Lane, 2001]. Similarly to ITM, VOACAP exploits information on transmitter locations, frequency, and power and on the latitude and longitude of the receivers. Yet, different from local radio broadcasting, ionospheric radio propagation is not influenced by orographic characteristics. The regional variance is heavily affected by the intersection of the latitudes of the transmitter and receiver and the distance between the transmitter and receiver. The latitude and distance have nonlinear relationships with radio strength.⁵

Affected by the ionosphere anomaly, the radio signal is poor and unstable if it is close to the Equator or Arctic Circle. The receiving location would receive a low signal if it is close to the transmitter, as many radio waves would be reflected back to the ground after hundreds of kilometers. With a fixed working frequency, large changes in ionospheric conditions may create skip zones where reception fails. On the other hand, if the receiving location is too far away from the transmitter, the reflection of radio waves also lowers radio strength. Moreover, the interaction between latitude and distance induces additional heterogeneity in the reflection, and consequently in the reception of signals across counties.

After inputting the information on VFC and CNR transmitters and other technical settings showed in Figure 2.3, VOACAP provides a prediction of the radio strength in terms of Signal-to-Noise Ratio (SNR), expressed in decibels. Specifically, it provides a

⁵Gagliarducci et al. [2020] discussed the monthly variation of ionospheric radio propagation affected by solar activity. The variation of radio strength across cohorts is too little across calendar year, so I focus on the regional variations of short and medium wave radio broadcasting.

predicted SNR for each BBC transmitter-frequency-power combination in each county and month at every half hour. As the entertainment activities are usually after work and the broadcasts of VFC and CNR are mainly at night, I use the average SNR from 17h to 24h in each county as the radio strength in analysis.

2.3.2 Outcome Variables

In this study, I focus on individuals born between 1938-1979 and aged 21-62. This ensures that individuals in the sample completed their education and are in the labor market.

Bureaucrats I focus on whether the individual is a bureaucrat from 0.1% random sample of 2000 and 2010 China Censuses, and 10% random sample of 2015 1% Population Survey (hereafter "Mini-Census"). Both Censuses and Mini-Censuses contain information on demographics, residency, housing registration (*hukou*), working industry, and occupation. All the samples are representative and were collected by the National Bureau of Statistics of China.

As the Censuses do not contain information about residency in the adolescent hoop, I focus on individuals who have lived in the current county since birth. There are about 1.5 million individuals in the sample, with 600,879 individuals in the 2000 Census, 480,045 individuals in the 2010 Census, and 441,902 individuals in the 2015 Mini-Census. The working industry provides information on different public sectors. In the data, I define an individual as a bureaucrat if she works in a government agency, public institution, or political party agency.⁶The mean of bureaucrat in the sample is 1.86 p.p. which is between the share in France and in Spain.

Entrepreneurs The outcome of entrepreneurs is from the 20% random sample of

⁶The political party agency is funded by the government budget in China.

the 2005 1% Population Survey, the only census contains information on entrepreneurs. Consistently, I focus on individuals who have lived in the current county since birth. There are 1,127,705 individuals in the sample, with 10.06 p.p. of them being entrepreneurs. The entrepreneurs include employers, self-employed workers, and individuals who work in their family company.

Political Trust and Party Membership Individual outcomes in the trust towards local public officials, CCP membership, and age of joining CCP come from the 2010 and 2012 CFPS a nationally representative dataset covering 25 provinces in China. It is conducted by Peking University and is considered one of the most comprehensive surveys in China. It is designed to examine social and economic changes at the individual, family, and community levels. CFPS yields a representative sample of 95% of China's population. One useful feature is the detailed information regarding the family members of respondents (e.g. gender, education, occupation, birthplace, and birthyear, etc.). It is a powerful dataset for studying how individual early life experiences can affect their economic and political preferences and related behaviors.

The first nationwide baseline took place in 2010, with repeated surveys every two years. Since the information on CCP membership was only included in the 2010 survey, but questions on trust were only available from 2012, I merged the 2010 and 2012 waves for the sample of 23,617 individuals. The mean of CCP membership is 6.6 p.p., consistent with the national share of CCP members, 6 p.p., in 2010 [Ma, 2011]. Specifically, the question of trust towards local government officials is as follows:

Question: In general, what's your trust level towards local government officials?

Answers: from very untrustful in 0, 1, 2, ..., to very trustful in 10.

For better interpretation, I rescale the trust to 0-100 p.p. level. The mean of trust towards local officials is 49.3 p.p. As shown in the Table ??, the younger cohorts have lower party membership and lower trust towards local officials on average.

2.4 Empirical Strategies

I begin the analysis by estimating the effects of exposure to VFC on individuals political attitudes and job choices. I build on a large body of literature in psychology [Krosnick and Alwin, 1989, Flanagan and Stout, 2010] and economics [Sutter and Kocher, 2007, Bai and Wu, 2020] that documents that individuals' political preferences are formed during adolescence. That is, individuals aged 10-20 during 1979-89, are expected to be influenced a lot by VFC.

I apply a cohort Difference-in-Differences strategy to estimate the effects of VFC and CNR:

$$\begin{aligned}
 Y_{icht} = & \alpha + \beta_1 VFC_c * Post_{ih} + \beta_2 CNR_c * Post_{ih} + \omega X_c * Post_{ih} \\
 & + \delta W_i * Post_{ih} + \phi_c + \eta_{ph} + \lambda_t + \epsilon_{icht}
 \end{aligned}
 \tag{2.1}$$

where Y_{icht} is the outcome of interest of individual i from county c born in year h and interviewed in survey-year t ; $Post_{ih}$ is a binary variable, which equals one if the individual i was born between 1959 and 1979; X_c is a vector of historical and geographic controls in county level; W_i is a vector of individual controls; and VFC_c and CNR_c are the corresponding radio strength of the two competing radios broadcasted from Taiwan and from mainland China.

To account for the possibility that exposure to VFC coincided with regional economic and political trends, which may influence individuals attitudes and job choices, I include the prefecture-birthyear and survey-year fixed effects (η_{ph} and λ_t). Finally, I include county fixed effects (ϕ_c). Standard errors are clustered at the county level.

The inclusion of prefecture-birthyear fixed effects implies that β_1 and β_2 are estimated from changes across birth cohorts within a prefecture, as compared to changes across the same age groups in other counties. County fixed effects absorb any county

specific endowments, like human capital accumulation, cultures, and institutions; that may affect individuals' attitudes and job choices.

2.5 Results

This section presents the main findings on how exposure to VFC broadcasts affected individuals' job choices, political trust, and CCP membership in mainland China. The evidence shows that access to international counter-propaganda during adolescence produced lasting changes in both economic behaviors and political attitudes.

2.5.1 Effects on Bureaucratic Employment

I begin by examining whether exposure to VFC influenced individuals' likelihood of becoming bureaucrats. Figures 2.4 and 2.5 illustrate clear cohort differences. For older cohorts born between 1938 and 1958, there is no relationship between VFC signal strength and bureaucratic employment in Figure 2.4. In contrast, for cohorts born between 1959 and 1979, who were adolescents during the period of open access to VFC, stronger VFC exposure is associated with a lower likelihood of working as a bureaucrat in Figure 2.5.

Table 2.1 quantifies the above pattern with cohort difference-in-differences estimations. In Column 6, one standard deviation increase in VFC signal strength during adolescence reduces the probability of becoming a bureaucrat by 0.283 p.p., relative to a baseline mean of 2.31 p.p. This effect corresponds to a substantial 12% decline relative to the mean. Meanwhile, exposure to CNR, the domestic propaganda outlet, increases the probability of bureaucratic employment, reinforcing the ideological competition between the two broadcasters.

I further show that the negative impact of VFC exposure is robust across different

census waves (2000, 2010, and 2015). Although point estimates vary slightly in Table 2.2, the pattern remains consistent across time, suggesting long-term effects on occupational choices. Figure 2.6 plots cohort-by-cohort estimates of VFC and CNR effects. Consistent with the identification strategy, the effects only emerge for cohorts reaching adolescence after the decriminalization of foreign radio listening in 1979-89, and there are no significant differences across older cohorts.

2.5.2 Effects on Entrepreneurship

Next, I study whether reduced bureaucratic employment was accompanied by greater entrepreneurial activity. Table 2.3 shows that stronger VFC exposure significantly increases the probability of becoming an entrepreneur. One standard deviation increase in VFC signal strength raises entrepreneurship rates by approximately 0.284 p.p. In contrast, exposure to CNR has negative but insignificant effect on entrepreneurship. This asymmetry suggests that VFC not only discouraged public-sector careers but also encouraged individuals to pursue private economic ventures and self-employment, fostering a more independent and market-oriented mindset.

Similarly, I show that these effects are concentrated among cohorts exposed to VFC during adolescence in Figure 2.7, while no comparable trends are observed among older cohorts.

2.5.3 Mechanisms

The empirical findings show that VFC propaganda push many individuals away from bureaucracy and start their own business. These are consistent with the goals and context of VFC — anti-communism through advocating the goodness of free market. To investigate the mechanism behind these findings, I focus on the political channel by

looking at individual political trust and CCP membership.

Political Trust

As most of Chinese government officials are CCP members and the anti-communism context in VFC, it is natural to expect that individuals with better VFC exposure have lower trust to local government. Table 2.4 shows that individuals exposed to stronger VFC signals during adolescence report significantly lower trust in local government officials. A one standard deviation increase in VFC strength reduces trust scores by approximately 1.10 percentage points. Exposure to domestic CNR broadcasts, by contrast, does not have a statistically significant effect on political trust. These results are consistent with the objectives of VFC programming, which sought to undermine confidence in CCP governance by presenting alternative information and critical perspectives.

CCP Membership

In the end, I examine how VFC exposure influenced formal political participation. Table 2.5 reports that a one standard deviation increase in VFC signal strength during adolescence reduces the probability of Chinese Communist Party (CCP) membership by about 0.77 p.p., representing a sizable 11% decline. Once again, CNR exposure has no significant counteracting effect on CCP membership.

Taken together, these results suggest that adolescent exposure to international counter-propaganda had persistent effects on political trust, party alignment, and economic life choices well into adulthood.

2.6 Conclusion

This paper investigates the impact of international counter-propaganda on political attitudes and economic behaviors in an authoritarian context. Leveraging the decriminalization of foreign radio listening in mainland China between 1979 and 1989, and exploiting geographic variation in the strength of VFC broadcasts, I provide evidence that exposure to external media during adolescence had persistent effects on individuals' job choices, political trust, and party membership.

The findings reveal that greater exposure to VFC broadcasts significantly reduced the likelihood of becoming a bureaucrat and increased entrepreneurial activity. VFC exposure also led to lower levels of trust in local government officials and a lower probability of CCP membership in adulthood. In contrast, domestic propaganda from CNR did not produce significant countervailing effects on political trust or party membership, underscoring the distinct influence of external media narratives.

This study contributes to several strands of literature. First, it adds to the growing body of work on the political effects of media by showing that international broadcasting can successfully counteract domestic propaganda, even under strict authoritarian control. Second, it complements research on trust formation, demonstrating that adolescent exposure to alternative information sources can have long-lasting consequences for political beliefs. Third, it offers new insights into political participation under autocratic regimes, highlighting how external ideological competition can shape individual political behavior independently of internal regime dynamics.

More broadly, the results underscore the critical role of media competition in shaping political and economic outcomes. In environments where access to information is restricted, even a small opening for alternative narratives can have enduring and transformative effects.

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Figures and Tables

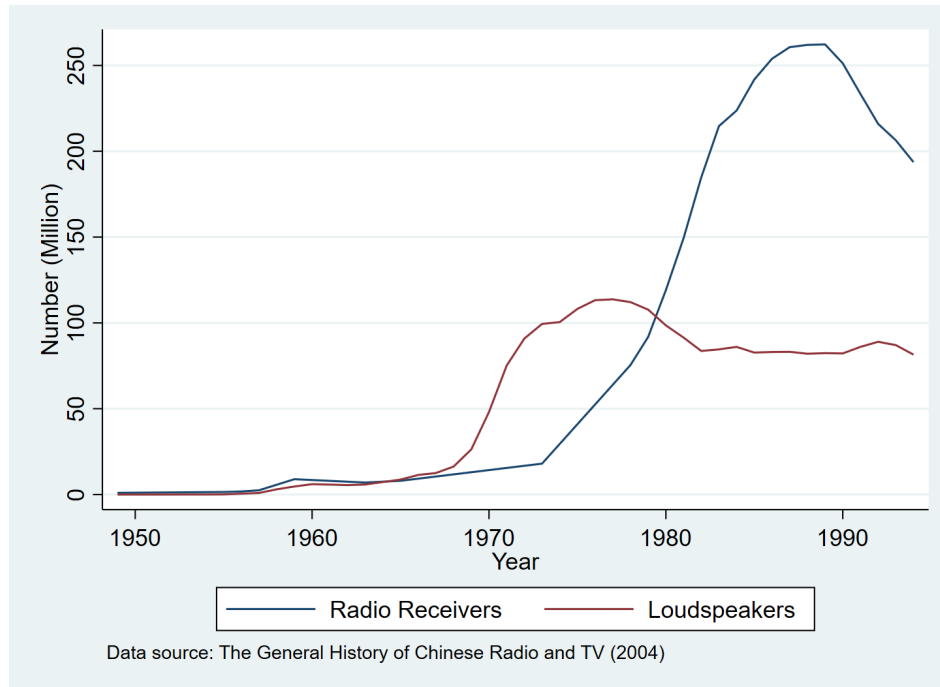


Figure 2.1: Trends of Radio Receivers and Loudspeakers

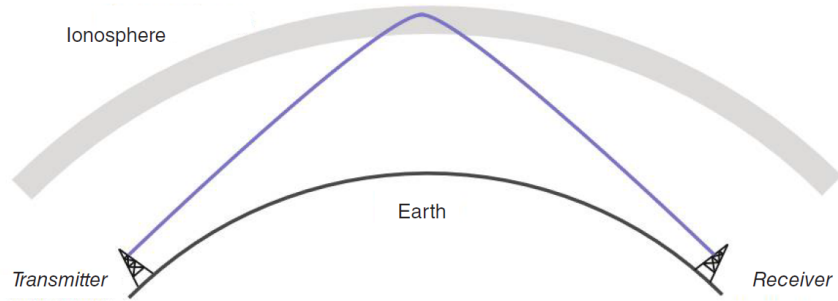


Figure 2.2: Ionospheric Propagation

Method	30 = Short/Long smoothing (7-10000 km) - Recommended							
Year	1994	Coefficients		CCIR (Os1o)				
Time	01 to 24 by 1 hours			UT				
Groups	Month.Day= 6.00							
	SSN = 100							
Transmitter	35.80N	5.90W	TANGIER, Morocco			Swap Tx-Rx		
Receiver	44.90N	20.50E	BELGRADE					
Path	Short Distances: 2441km 1318nmi 1517mi Azimuth: 57.4deg							
Freq(MHz)	6.075 7.200 9.700 11.850 13.700 15.350 17.725 21.650 25.885							
System	Noise	Min Angle	Req.Rel.	Req SNR	Multi Tol	Multi Del	Absorp	
	145 (-dBw)	0.10deg	90%	73dB	3.00dB	0.10msec	Normal	
Eprob	1.00*foE		1.00*foF1	1.00*foF2	0.00*foEs			
Tx Antenna	#	Min	Max	Design	Directory\Filename.sfx	Model	MainBeam	Power kW
	1	2	30	0.000	DEFAULT \CONST17.VOA	2-D Table	0.0	500.0000
Rx Antenna	DEFAULT \SWWHIP.VOA		0.0deg	0.00dB				

Figure 2.3: Operation Interface of VOACAP

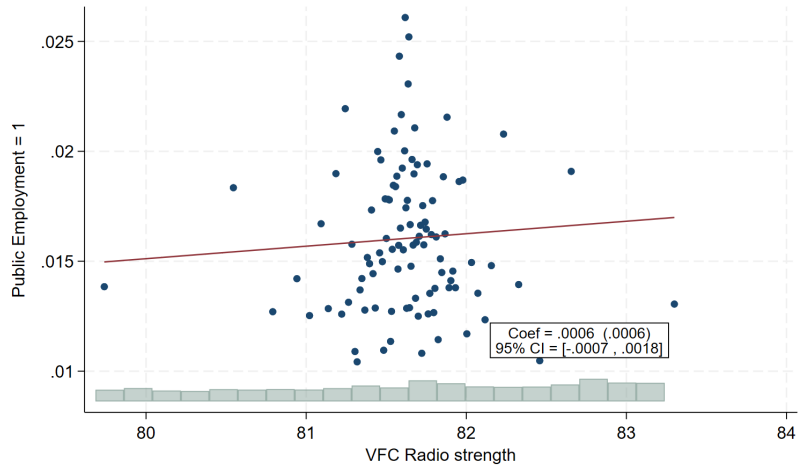


Figure 2.4: VFC and Bureaucrats in 1938-58 Cohorts

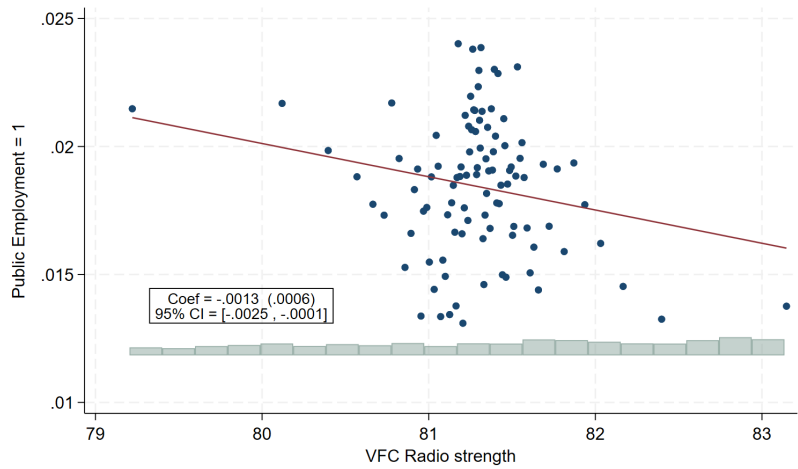


Figure 2.5: VFC and Bureaucrats in 1959-79 Cohorts

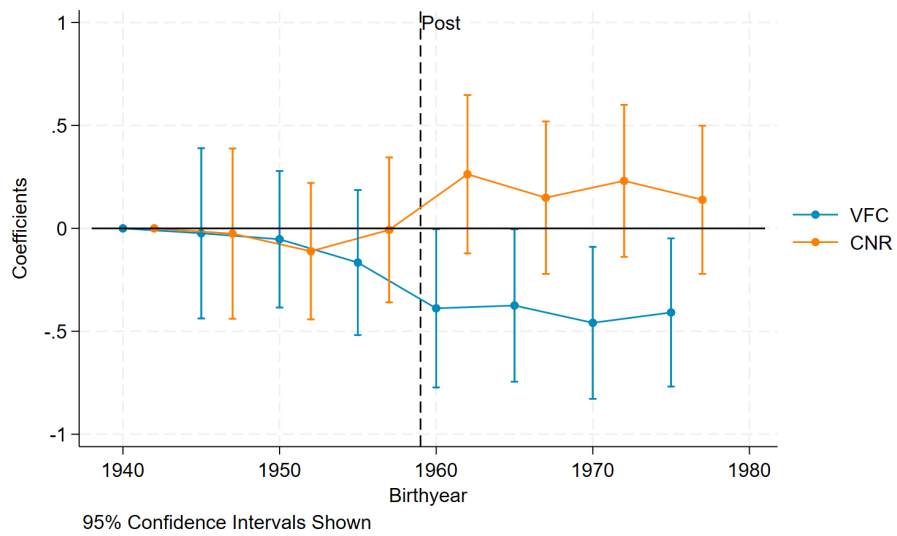


Figure 2.6: The Dynamic Effects of VFC and CNR on Bureaucrats

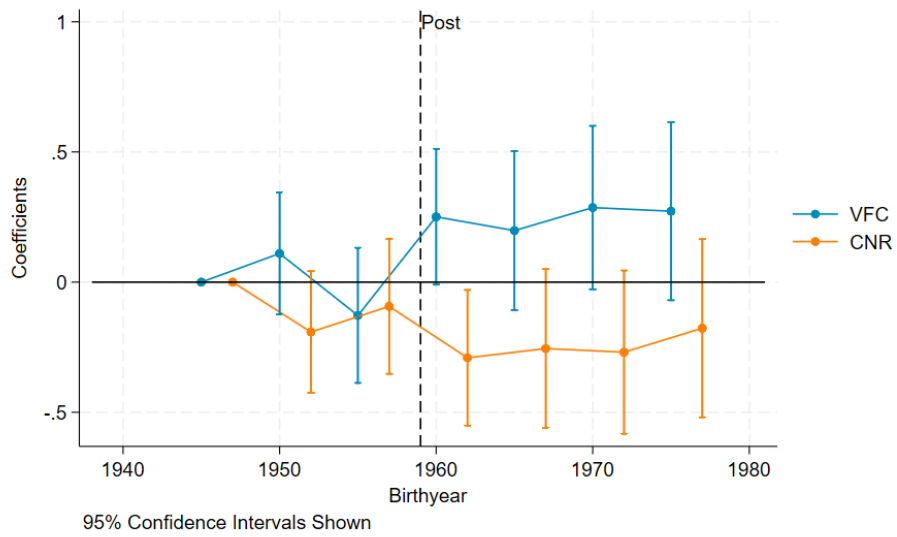


Figure 2.7: The Dynamic Effects of VFC and CNR on Entrepreneurship

Table 2.1: The Effects of VFC and CNR on Bureaucratic Employment

Dependent Variable	Bureaucratic Employment = 100					
	(1)	(2)	(3)	(4)	(5)	(6)
VFC X Post	-0.132** (0.062)	-0.149** (0.068)	-0.164** (0.067)	-0.309*** (0.089)	-0.246*** (0.084)	-0.283*** (0.105)
CNR X Post				0.234*** (0.087)	0.203** (0.083)	0.178* (0.105)
County FEs	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture-birthyear FEs	Yes	Yes	Yes	Yes	Yes	Yes
Geographic controls x Post	No	Yes	Yes	Yes	Yes	Yes
Historical controls x Post	No	No	Yes	Yes	Yes	Yes
Individual controls	No	No	No	No	Yes	Yes
Conditional on employment	No	No	No	No	No	Yes
# of Counties	2,867	2,867	2,867	2,867	2,867	2,867
# of Birthyear	42	42	42	42	42	42
# of Observations	1523123	1523123	1523123	1523123	1523123	1228083
Outcome mean (p.p.)	1.863	1.863	1.863	1.863	1.863	2.310
VFC s.d.	5.12	5.12	5.12	5.12	5.12	5.12

Notes: This table reports OLS coefficients from regressing Bureaucrat indicator on the VFC X Post and CNR X Post. The specification includes county fixed effects, prefecture-birthyear fixed effects, and a set of historical controls, as well as a series of geographic characteristics and individual controls. *Geographic characteristics*: logged distance to Taipei, latitude, and longitude. *Historical controls*: population density in 1964, share of cadres in 1965, share of non-agricultural employment in 1965, share of victims in the Cultural Revolution, and Hakka area. *Individual controls*: sex, Han ethnic, and years of schooling. Standard errors are all clustered at the county level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 2.2: The Effects of VFC and CNR on Bureaucratic Employment in Different Censuses

Dependent Variable	Bureaucratic Employment = 100			
	All (1)	2000 (2)	2010 (3)	2015 (4)
Census Sample				
VFC X Post	-0.309*** (0.089)	-0.279** (0.123)	-0.250* (0.138)	-0.320** (0.138)
CNR X Post	0.234*** (0.087)	0.130 (0.110)	0.160 (0.146)	0.242** (0.121)
# of Counties	2,867	2,867	2,769	2,790
# of Birthyear	42	42	32	27
# of Observations	1523123	600879	480045	441902
Outcome mean (p.p.)	1.863	1.745	1.982	1.893
VFC s.d.	5.12	5.12	5.15	5.13

Notes: This table reports OLS coefficients from regressing Bureaucrat indicator on the VFC X Post and CNR X Post in different census samples. The baseline controls are all included in every column. Standard errors are all clustered at the county level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 1 percent level.

Table 2.3: The Effects of VFC and CNR on Entrepreneur

Dependent Variable	Entrepreneur = 100			
	(1)	(2)	(3)	(4)
VFC X Post	0.151** (0.072)	0.153* (0.092)	0.166** (0.087)	0.284** (0.116)
CNR X Post				-0.155 (0.124)
Prefecture FEs	Yes	Yes	Yes	Yes
Province-birthyear FEs	Yes	Yes	Yes	Yes
Geographic controls x Post	No	Yes	Yes	Yes
Historical controls x Post	No	No	Yes	Yes
# of Prefectures	315	315	315	315
# of Birthyear	37	37	37	37
# of Observations	906122	906122	906122	906122
Outcome mean (p.p.)	12.521	12.521	12.521	12.521
VFC s.d.	5.58	5.58	5.58	5.58

Notes: This table reports OLS coefficients from regressing Entrepreneur indicator on the VFC X Post and CNR X Post in 2005 census. The specification includes prefecture fixed effects, province-birthyear fixed effects, and a set of historical controls, as well as a series of geographic characteristics and individual controls. *Geographic characteristics*: logged distance to Taipei, latitude, and longitude. *Historical controls*: population density in 1964, share of cadres in 1965, share of non-agricultural employment in 1965, share of victims in the Cultural Revolution, and Hakka area. Standard errors are all clustered at the prefecture level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 1 percent level.

Table 2.4: The Effects of VFC and CNR on Political Trust

Dependent Variable	Trust to Cadres == 100			
	(1)	(2)	(3)	(4)
VFC X Post	-0.42** (0.21)	-0.96*** (0.30)	-1.03*** (0.31)	-1.10*** (0.41)
CNR X Post				0.18 (0.48)
County FEs	Yes	Yes	Yes	Yes
Province-birthyear FEs	Yes	Yes	Yes	Yes
Geographic controls x Post	No	Yes	Yes	Yes
Historical controls x Post	No	No	Yes	Yes
# of Counties	159	159	159	159
# of Birthyear	42	42	42	42
# of Observations	22159	22159	22159	22159
Outcome mean (p.p.)	49.293	49.293	49.293	49.293
VFC s.d.	3.38	3.38	3.38	3.38

Notes: This table reports OLS coefficients from regressing Trust to Cadres on the VFC X Post and CNR X Post in the 2012 China Family Panel Survey. The specification includes county fixed effects, province-birthyear fixed effects, and a set of historical controls, as well as a series of geographic characteristics and individual controls. *Geographic characteristics*: logged distance to Taipei, latitude, and longitude. *Historical controls*: population density in 1964, share of cadres in 1965, share of non-agricultural employment in 1965, share of victims in the Cultural Revolution, and Hakka area. Standard errors are all clustered at the county level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level.

* Significant at the 1 percent level.

Table 2.5: The Effects of VFC and CNR on Party Membership

Dependent Variable	CCP Member = 100			
	(1)	(2)	(3)	(4)
VFC X Post	-0.23 (0.22)	-0.60** (0.29)	-0.58** (0.29)	-0.77** (0.32)
CNR X Post				0.43 (0.40)
County FEs	Yes	Yes	Yes	Yes
Province-birthyear FEs	Yes	Yes	Yes	Yes
Geographic controls x Post	No	Yes	Yes	Yes
Historical controls x Post	No	No	Yes	Yes
# of Counties	159	159	159	159
# of Birthyear	42	42	42	42
# of Observations	23617	23617	23617	23617
Outcome mean (p.p.)	6.652	6.652	6.652	6.652
VFC s.d.	3.36	3.36	3.36	3.36

Notes: This table reports OLS coefficients from regressing Party Member indicator on the VFC X Post and CNR X Post in the 2012 China Family Panel Survey. The specification includes county fixed effects, province-birthyear fixed effects, and a set of historical controls, as well as a series of geographic characteristics and individual controls. *Geographic characteristics*: logged distance to Taipei, latitude, and longitude. *Historical controls*: population density in 1964, share of cadres in 1965, share of non-agricultural employment in 1965, share of victims in the Cultural Revolution, and Hakka area. Standard errors are all clustered at the county level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Chapter 3

The Economic Determinants of Taiwanese Support for Reunification with Mainland China (With Nancy Qian and Marco Tabellini)

3.1 Introduction

The relationship between economic growth and democratization is a central question in political economy. *Modernization theory* famously argues that economic development promotes the development of democratic institutions and demand for civil liberties (e.g., [Lipset, 1959]).¹ This is particularly true if economic growth encourages the growth of an educated middle class because schools instill civil values and teach skills like reading and writing and critical thinking that facilitate democracies by increasing political participation and social capital [Glaeser et al., 2007, Larreguy and Liu, 2024]. Thus, educated individuals may value democracy more and be less willing to forgo elections or civil liberties in exchange for economic growth. This theory is motivated by the historical experiences of Western democracies. However, it does not explain the recent experiences of countries such as China, Singapore and Saudi Ara-

¹Barro [1999] finds a positive cross-country relationships between income and democracy.

bia that experienced economic growth with little movement towards democratizing; or, the recent cross-country panel data, in which there is no relationship between income growth and democracy [[Acemoglu et al., 2008](#)].

In an attempt to explain the latter phenomenon, this paper hypothesizes that economic growth in autocratic regimes might increase support or tolerance for the regime, and whether the educated population tolerate more or less autocracy will depend not just on civic education, but also on whether economic growth benefits the educated more or less. To the best of our knowledge, we are the first to provide evidence on this point with systematic empirical evidence.

The main empirical challenge for our study is the difficulty of measuring citizens' preferences in non-democracies. The usual ways of measuring support for the regime by observing voting behavior or soliciting preferences in surveys are unavailable in autocracies, where there are no free elections and survey respondents may be reluctant to provide sincere responses. We address this difficulty by taking advantage of the unique institutional arrangement of mainland China and Taiwan. Taiwan is a democracy that is *de facto* politically and economically autonomous from mainland China, which is openly autocratic and rejects Western-style democracy. Whether Taiwan should reunify with the mainland, maintain status quo, or become officially independent has always been a key issue for its electorate. Reunification means full political and economic integration under the Beijing-run system. Thus, we can assume that support for reunification implies that an individual is willing to accept Beijing's autocratic system in place of Taipei's democratic system. It follows that we can test our hypothesis by studying the relationship between mainland Chinese economic growth and Taiwanese support for reunification.

This study uses detailed individual-level data from the *Taiwanese Social Change Survey* (TSCS), which is a nationally representative repeated cross section from 1995

to 2022. It includes information about political preferences (e.g., support for reunification), educational attainment, income, and many other variables. We estimate a heterogeneous treatment effects model by examining the interaction effect of mainland growth and individual education on an individual’s political preferences. The baseline specification controls for the uninteracted education term and other individual characteristics, town fixed effects, and linear and quadratic time trends. The town fixed effects control for time invariant differences across locations such as geography, and time trends control for secular changes over time such as the steady and gradual democratization and liberalization of Taiwan. The identification assumption is that there are no unobserved variables that can affect political preferences and are correlated with mainland growth and education of the Taiwanese citizen. In the paper, we will present many robustness checks after the main result.

The first outcome we examine is support for reunification. 12.2% of survey respondents support reunification, while 54% support the status quo of “One China with respective interpretations” and 23.5% support official independence.² We find that relatively uneducated individuals (with educational attainment of less than high school) become less supportive of reunification when mainland China grows faster. But for educated individuals (with educational attainment of high school or higher), mainland growth increases support for reunification. The results are statistically similar between “local” Taiwanese (*benshengren*), who have no ancestry to the Kuomintang (KMT) diaspora from the mainland in the 1940s and 50s, and the “migrants” (*waishengren*), who are descended from the KMT diaspora.³ The change in support for reunification is mainly driven by a change in support for the status quo for migrants and by a change

²10.3% support an unspecified residual category “other”.

³Over one million individuals moved from mainland China to Taiwan during and immediately after the Chinese Civil War (1945-1949). We discuss this in the Background Section.

in support for independence for locals. These results are consistent with the fact that on average, only 10.5% of migrants support independence while 25.3% of locals support independence.

Next, we explore the mechanisms. There are two complementary mechanisms for our findings. The first is economic: mainland growth can have heterogeneous economic effects on Taiwanese according to their level of education. Taiwan (2024 per capita GDP \$34,059) is on average much more economically developed than mainland China (2024 per capita GDP \$13,306). Cross-strait economic engagement has been known to benefit educated and skilled Taiwanese workers, who are in high demand on the mainland, while uneducated and low-skilled Taiwanese workers have been concerned about competition with the large low skilled mainland labor force.⁴ We investigate the role of the economic channel by examining individual income and the probability of having lived or worked on the mainland as dependent variables. The estimates are similar to those for reunification in both cases. Mainland growth is negatively associated with income and the probability of having lived or worked in the mainland in the past three years for uneducated Taiwanese workers and positively associated for educated workers. The estimate for having visited or lived on the mainland for uneducated Taiwanese is statistically insignificant. Nevertheless, these results are consistent with the hypothesis that the economic opportunities that mainland economic growth creates increases support for reunification.

Consistent with the role that economics play in driving the main results, we also find that when the mainland economy growth rate is higher, educated Taiwanese are more likely to state that economics is the primary issue for Taiwan, while uneducated Taiwanese are more likely to state that geopolitics is the primary issue for Taiwan.

⁴To protect the benefits of framers, Taiwan ban lots of agricultural imports from mainland China. See [report from Ministry of Agriculture, Taiwan](#).

Second, mainland growth can increase support for reunification even if it has no implication for Taiwanese income. Historians such as [Hobsbawn \[1990\]](#) have long pointed out that schools encourage nationalism by teaching common histories and languages, and emphasizing cultural similarities and (real and imagined) shared ancestries [[Bandiera et al., 2019](#), [Bazzi et al., 2020](#)]. If educated Taiwanese hold a higher value for being part of a wealthier and more powerful unified China, then they may be more persuadable of the advantages of an autocracy. We investigate this “indoctrination” channel in two ways. One way is to exploit the changes in ideology due to liberalization of education in Taiwan. Prior to the late 1980s, school curricula emphasized mainland Chinese culture and history at the exclusion of local history. Starting in the late 1980s, the curricula broadened to include discussion of both mainland and local Taiwanese history and culture. If pro-One China indoctrination drives the results, we should see stronger effects for older cohorts who were educated in the first system. Instead, we find that the estimates are similar across cohorts. Another way to investigate the indoctrination channel is to examine identity – whether an individual self-identifies as “Chinese” – as the outcome variable. We find that mainland growth increases the probability that Taiwanese of all education levels identify as Chinese, but the increase is more pronounced for the educated. While these patterns may explain why mainland growth increases support for reunification amongst the more educated Taiwanese, they cannot explain why mainland growth reduces support for reunification amongst uneducated Taiwanese. Thus, we conclude that the indoctrination mechanism plays a limited role in explaining the main results.

The main concern for the causal interpretation of our estimates is omitted variables. For example, mainland economic growth can be correlated with growth in Taiwan or its other large trading partners – the U.S. and Japan. In this case, our estimates would be spurious. To address this potential issue, we additionally control for the economic

growth of Taiwan, the U.S. and Japan, each interacted with education. The estimates for mainland growth and its interaction with education are robust to the additional controls. Moreover, the growth of Taiwan and its other large tradition partners do not have the same effect on reunification. In the paper, we also demonstrate that results are robust to many additional concerns, and different standard error estimations.

Finally, we ask whether survey responses translate to real-world political behavior. For this, we examine voting data. The cross-strait relationship is *the* divisive issue for the two main political parties of Taiwan. The Kuomintang (KMT) has always advocated for the “One China” policy. Until recently, this meant reunification with the KMT at the head of China. As this possibility has diminished, it came to mean maintaining the status quo. The Democratic Progressive Party (DPP), a Taiwanese nationalist party, advocates for official independence. Voting data for all presidential and legislative elections between 1995 and 2024 are available at the township and election year level (there are 346 townships). We construct a township-level panel and examine vote shares for KMT and DPP as a function of mainland economic growth and the average education of each township in 1990. The estimates are consistent with the estimates of survey responses regarding reunification. They suggest that survey responses are consistent with political behavior with the caveat that voting for KMT includes both support for reunification from support for the status quo.

The results of this paper provide novel and rigorous evidence that individuals who have grown up in a high-income stable and functional liberal democracy are willing to tolerate an autocratic government in exchange for economic growth. They imply that people will support the regime that provides more economic opportunities, even at the cost of the rights that one has in a democracy. Our results do not imply that economic growth increases support for autocracies more than for democracies.

The findings contribute to our understanding of the relationship between economic

growth and democracy, which has been a core question in political economy. Existing studies find that economic crises drive democratization because the state is forced to extend the franchise to obtain the support of the population [e.g., [Acemoglu and Robinson, 2000](#)], and growth is on average higher in democracies [[Acemoglu et al., 2019](#), [Papaioannou and Siourounis, 2008](#), e.g.,]. In contrast, [Alsan et al. \[2023\]](#) shows disadvantaged citizens are less willing to sacrifice their civil liberties for health security during the COVID-19 pandemic. Recent studies such as [Besley and Persson \[2019\]](#) and [Persson and Tabellini \[2009\]](#) have also provided theoretical treatments of the long-run dynamic relationship between democracy and growth.

This study is organized as follows. Section [3.2](#) discusses the background. Section [3.4](#) describes the data. Section [3.5](#) presents the empirical results. Section [3.6](#) offers concluding remarks.

3.2 Background

3.2.1 Taiwanese Politics and Economics

After the KMT lost a bitterly fought Civil War against the Chinese Communist Party (CCP), 1945-1949, it was exiled to Taiwan. From there, the Republic of China (ROC), was internationally recognized as the legitimate Chinese government for most of the Cold War. The KMT imposed martial law and repressed all political opposition until 1987.

Both international and domestic politics began to change in the 1970s. On the international front, the United Nations recognized mainland China, the People's Republic of China (PRC), as the legitimate China starting in 1971. Today, there is officially "One China" with two autonomous political and economic entities on the two sides of the

strait. On both sides of the strait, the KMT and the CCP advocate for “One China” with their own party in charge. Other countries support this nuanced arrangement with a policy of “strategic ambiguity”.

Domestically, Taiwan underwent a major political change after the death of its founding dictator, the Generalissimo Chang Kai Chek. His son and political successor, Chiang Ching-kuo, allowed Taiwan to gradually liberalize. And, his appointed successor, Lee Teng-hui, held Taiwan’s first democratic and direct election for the unicameral legislature, the Legislative Yuan, in 1992. In 1996, Taiwan held its first democratic presidential election and Lee Teng-hui was re-elected to office. Taiwan elected its first (non-KMT) DPP president, Chen Shui-bian, to office in 2000.

The main political issue for Taiwan is the cross-strait relationship. Part of the concern is political. Mainland China is an autocracy while Taiwan is a liberal democracy. Part of it is economic. Mainland China is the largest trade partner of Taiwan for decades. Reunification implies both political and economic integration.

Taiwan is much richer than mainland China. Average 2024 income in Taiwan was around \$34,059 as opposed to \$13,306 in mainland China. During the years of mainland China’s rapid economic growth, Taiwan became a source of high-skilled talent and worked in or with the mainland in manufacturing, services (e.g., restaurants, hotels) and more recently, high-tech. China became an important market for Taiwanese products and services and a source of raw materials for Taiwan. Today, the mainland (including Hong Kong after 1997) is Taiwan’s largest trading partner for imports and exports.

Under the current status quo, Taiwan and the mainland engage in economic and cultural exchange. But there are important restrictions. For example, migration from the mainland to Taiwan is limited. This is partly motivated by the concern that a large influx of unskilled workers from the mainland would reduce wages for unskilled Taiwanese. Similarly, Taiwan restricts the import of agricultural products from the

mainland to Taiwan. To protect technology advantages and local labor markets, Taiwan also scans and limits the bilateral investments.

3.2.2 Salience of Mainland Economic Growth in Taiwan

The geographic, cultural and linguistic proximity between Taiwan and the mainland means that there are few barriers to information in our study period. Taiwan has 23.4 million residents. As shown in Figure 3.1, the island is only 126 km away from the mainland and the shores are often visible across the strait. All those living in Taiwan and the mainland today are native speakers of Mandarin Chinese (the official dialect), which has been the only language taught in schools since 1945 on both sides of the strait.⁵

Mainland economic growth is a popular topic in Taiwanese media outlets. Major outlets usually report Chinese quarterly growth rates the same day or one day after they are released in Beijing, which is usually followed by extensive discussions and analyses by pundits and economists. Taiwanese can also access some radio broadcasts, and in more recent years, internet and social media, directly from the mainland.

The school curricula of Taiwan liberalized in the late 1980s. In 1949, the KMT banned local dialects and the teaching of local histories at school and forced all children to learn Mandarin and study a common Chinese history focused on the mainland. Starting in the late 1980s, the curricula was liberalized to allow more prominence to Taiwanese local culture and history, though Mandarin is still the national language for education and official business. Starting in the 1990s, the curricula was intentionally adapted to emphasize democracy and civil values. However, the effects of curriculum

⁵The writing system differs slightly. Taiwan (and Hong Kong) uses traditional characters and teaches phonetics with the Wage-Giles system. Mainland China uses simplified characters and teaches phones with the pinyin system. Traditional and simplified characters are mostly mutually understandable.

reforms are mixed: [Chen et al. \[2023\]](#) shows the 1997 reform enhanced the individuals' national identity as exclusively Taiwanese but [Hong and Lyu \[2025\]](#) documents the 2006 reform increase the likelihood of holding dual national identity – both Chinese and Taiwanese.

Note that the Taiwanese electorate is not directly influenced by the mainland because it is very difficult to become a citizen of the ROC. Usually, the only pathway is via marriages with a Taiwanese citizen and waiting for six years or more, and there are very few political asylum cases.⁶

Mainland China is controlled by the CCP, which is openly autocratic and has repeatedly openly rejected the notion of democratization. Our study assume that Taiwanese are aware of this fact and that when they support reunification, they understand that it means transitioning from a democratic to an autocratic regime.

⁶According to National Immigration Agency in Taiwan, 252,235 mainland Chinese immigrated to Taiwan through marriage during 1987-2023. Less than half of them attain citizenship in Taiwan.

Figure 3.1: The Location of Taiwan



Note: The map shows the location of Taiwan. Taiwan is in the east of Mainland China, the southwest of Japan, and the north of Philippine. The closest distance between Taiwan island and Mainland China is 126 km. The map is generated by Sora powered by OpenAI.

3.3 Conceptual Framework

3.3.1 Mainland Growth and Reunification

Taiwanese support for reunification with the mainland is increasing in the benefits and decreasing in the costs of reunification, which can be economic and non-economic. Full economic integration with the mainland will create economic costs and benefits that will differ across people. Reunification is expected to increase cross-strait economic integration and expand access to the Chinese market, particularly in high value-added sectors such as advanced manufacturing, finance, and technology.

Theoretical and empirical work on trade liberalization suggests that integration with a large, lower-wage economy like China increases relative demand for high-skilled labor in the more developed economy, as comparative advantage shifts toward skill-intensive exports [Burstein and Vogel, 2017, Autor et al., 2013]. This channel is particularly relevant for Taiwan, where educated workers are concentrated in export-oriented sectors that already rely heavily on cross-strait supply chains. Reunification could also lower institutional and regulatory barriers to migration, allowing Taiwanese professionals to access high-paying labor markets in the mainland's largest cities. Together, these factors imply that the economic gains from reunification would disproportionately benefit the educated, who are better positioned to respond to increased labor demand and mobility opportunities.

Reunification with the mainland would reduce the barriers currently limiting these channels. It would eliminate restrictions on the migration of labor and capital, expand access to Chinese consumer and input markets, and likely harmonize regulations that currently constrain firm-level cross-strait operations. These changes would increase the salience of economic considerations in shaping Taiwanese attitudes toward reunification,

particularly among those with higher levels of education.

In principle, economic integration can hurt businesses and workers in sectors that are relatively less productive than their mainland counterparts (e.g., low skilled labor and labor-intensive sectors). In practice, this is unlikely to be quantitatively important for Taiwanese voters because Taiwan suffers from a labor shortage and relies on short-term migrant workers for most labor-intensive work [[National Development Council, 2019](#)].

Beyond economics, being part of a larger economy may also come with more economic and geopolitical prestige, which can be valuable to some. The main political cost of reunification is the loss of having a say in policies. Part of the loss would have occurred even if the mainland is a democracy simply because the Taiwanese would become a small part of a much larger country. But the fact that the mainland is not a democracy makes the loss complete. In addition to losing elections, the Taiwanese will have to accept many mainland laws such as state control of the media, limited freedoms of religion and other civil liberties that were introduced in Taiwan in the 1980s and 90s.

Mainland economic growth is likely to increase the economic benefits as well as the perceived prestige from reunification. It can also increase the political costs of reunification if Taiwanese perceive a richer mainland government to be more autocratic.⁷ Given the advantages of Taiwan in high-value added industries which benefits a lot from the trade with mainland China, we expect the individuals who have better education should support reunification more when they can enjoy more benefits from the mainland China.

⁷Economic growth can increase government revenues and allow the state to centralize and invest in more direct control [[Martinez-Bravo et al., 2022](#)] or state surveillance [[Beraja et al., 2023](#)].

3.3.2 Heterogeneous Treatment Effects

The empirical analysis asks how mainland economic growth affects Taiwanese support for reunification with the mainland, and whether this differs for individuals with various education attainment that have different economic benefits from the mainland. The parsimonious baseline equation can be written as the following.

$$y_{ijt} = \alpha + \beta growth_t \times edu_i + \gamma growth_t + \phi edu_i + X_i + \delta_j + \theta_t + \varepsilon_{ijt} \quad (3.1)$$

Outcome y of individual i lives township j in year t is a function of: the interaction of mainland GDP growth rate per capita, $growth_t$, and the years of education attainment of i , edu_i ; the uninteracted mainland growth rate per capita, individual controls, X_i , township fixed effects, δ_j and linear and quadratic time trends, θ_t . The individual controls X_i includes age, age squared, sex, and marriage. The township is the smallest administrative unit in Taiwan and the level for which we have voting data. Figure 3.2 presents the administrative divisions of Taiwan, the grey lines show the township boundaries and the black lines show the county boundaries. All standard errors are clustered at the township level. We will later show that the results are robust to alternative methods of estimating the errors.

We are interested in β and γ . β is literally the relationship between mainland growth and support for reunification or other outcomes for an uneducated individual. Since the average and γ is the differential effect of education attainment, then we can explore the trade off between democracy and economic benefits, and attain a break-even point of education attainment with β and γ .

Figure 3.2: The Administrative Division in Taiwan

Taiwan Map



The boundaries of counties and towns are shown

Note: The map shows the administrative division of Taiwan. The area with black boundary is a county. The area with grey boundary is a town. Towns are within county. The capital of Taiwan, Taipei, is in the north part of Taiwan island.

3.4 Data

3.4.1 Support for Reunification and Voting

The outcome variables in our analyses come from three sources, TSCS, Taiwan’s Election and Democratization Study (TEDS), and voting data provided by the Central Election Commission.

TSCS

The first data source is the TSCS for the years 1995 to 2022. The surveys are jointly collected by Academia Sinica and the Institute of Sociology and the Center for Survey Research in Taiwan. They are nationally representative in-person interviews conducted every year on a repeated cross-section of individuals.⁸ Each wave samples around 0.1% of the population. The baseline sample includes 22,107 individuals surveyed in year 1995, 1998, 2000, 2003-5, 2010, 2012-14, 2016, 2020; in the 220 towns. The individuals who were not surveyed questions about reunification are excluded from the sample.

The main outcomes of interest in our analysis are individuals’ attitudes on support reunification with the mainland, status quo, independence or “others”; and individuals’ national identity: Chinese, Taiwanese or “others”. Both attitudes and national identities are all dummy variables. We also look at the individual income. Individual income is reported in the intervals in TSCS. To make the income is comparable across years, we use the mean of intervals and inflation rate in the survey year to construct the “real individual income”.

Besides, The data includes information on ancestry – whether he or she has a

⁸The questions surveyed differ every year. Many of the surveys are not included for the lack of outcome of interest.

parent with ancestry from the KMT diaspora (*waishengren*). We will code anyone who has one or more parent who is a “migrant”, and all others as “locals”. For young respondents, this means that migrants include those with at least one grandparent from the mainland. For middle age respondents, this includes those with at least one parent from the mainland. There are a few older respondents who came from the mainland as children. For younger respondents, it is possible to measure ancestry with error if their parents have mixed ancestry.

TEDS

The second data source is the TEDS from 2001 to 2020. TEDS was initiated by National Chengchi University and supported by National Science and Technology Council, Taiwan. Similar to TSCS, TEDS is a nationally representative survey repeated every year. Each wave samples 0.05-0.1% of the population. Unlike TSCS conducts fully on-site interviews, around half of the interviews in TEDS are conducted through phone or internet. To avoid survey bias, we only use limited outcome variables from TEDS which in lack in TSCS to complement the analysis.

We focus on the individuals’ visits and stays in mainland China and their primary issue facing Taiwan. The individuals’ visits and stays in mainland China is a dummy variable, which equals to one if 1) whether visited mainland China in the last three years, or 2) have stayed or have family stay in mainland China for months now. The primary issue is an open question, individuals can write down anything they concern. We look at the key words and abstract the issues of “Economy” and “Geopolitics” out of the primary issue. The primary issue is “Economy” if it is related to economic development and “Geopolitics” if it is about the political issues related to Taiwan and other regimes.⁹

⁹The "Primary Issue: Economy" are the issues with words: "Economy", "Finance", "Investment",

Figure 3.3: The Average Years of Schooling in 1990

Note: The map shows the town-level average years of schooling in 1990. The data is generated by the full sample of 1990 Census. The black line is county boundary.

Voting Data

The third is the voting data from all presidential and legislative elections provided by the Central Election Commission. We will refer to this as the *election* data in the paper. It includes voting and turnout at the township level for all eight direct democratic presidential elections (every four years from 1996 until 2024), and the nine direct Legislative Yuan (the unicameral legislature) elections (1995-2024). There are 346 townships, which are administrative subdivisions of 21 “counties” in our sample.¹⁰ Even though individuals can only vote in person on the election day in Taiwan, the average turnout rate is over 70%, higher than the turnout rate of presidential elections in the U.S. Hence, we believe the election data from Taiwan represent the political preference of the mass population.

In empirical analysis, as the voting data is in the town-year level, we use the average years of education attainment in 1990 instead. Figure 3.4 shows the town level years of education attainment in 1990.

"Industry", and "Entrepreneur". The "Secondary Issue: Geopolitics" are the issues with words: "Chinese Communist Party", "Mainland", "Cross-Strait", "Reunification", "Independence", "Military Defense", "Sovereignty", and "United Nation".

¹⁰Taiwan comprises 23 first-level administrative divisions in 1990. We exclude two counties, Kinmen and Lienchiang for 1) they are super close to mainland China (the closest distance is 2 km), 2) unlike other counties, they were not colonized by Japanese before, 3) The TSCS and TEDS did not cover the two counties. The rest include two special municipalities (Taipei, and Kaohsiung), fourteen counties (Taipei, Taoyuan, Kaohsiung, Hsinchu, Miaoli, Changhua, Nantou, Yunlin, Chiayi, Pingtung, Yilan, Hualien, Taitung, Penghu,) and five cities (Taichung, Tainan, Keelung, Hsinchu, and Chiayi) in 1990.

3.4.2 Correlations and Descriptive Statistics

We examine the relationship between years of educational attainment and a range of demographic characteristics and political outcomes. Table 3.1 reports the results from a series of regressions. In rows (1)–(15), we regress years of education on individual-level covariates using the survey data, controlling for town fixed effects and weighting each observation by the corresponding survey weight. In rows (16)–(18), we regress average years of education in 1990 on voting outcomes at the town-year level, weighting by the number of eligible voters in each town-year cell. Each row corresponds to a separate regression. Column (1) reports the sample mean of the independent variable, column (2) the standard deviation, and column (3) the estimated coefficient.

Columns (1)–(5) document that men, younger cohorts, higher-income individuals, and those with migrant ancestry tend to have higher levels of education. In contrast, individuals who are or have been married have lower educational attainment, consistent with the fact that older cohorts—who are more likely to be married—received less schooling on average. Taiwan implemented compulsory education in 1968, which increased schooling levels for younger generations. Migrants have higher educational attainment for historical reasons: many arrived with elite status during the KMT retreat from the mainland and benefited from privileged access to educational and financial resources during the Martial Law period (1949–1987).

Columns (6)–(18) explore the association between education and political attitudes. A consistent pattern emerges: individuals with higher education tend to be more favorable toward the mainland. For instance, years of education are positively associated with identifying as “Chinese” (column 10) and negatively associated with identifying as “Exclusively Taiwanese” (column 11). Education is also positively correlated with support for reunification and with visits or stays in the mainland

(columns 6 and 15).

These correlations suggest that educational attainment is systematically associated with individual characteristics and political preferences that may influence attitudes toward China. Education is not randomly assigned, and is shaped by historical and policy-driven variation. To account for this, our baseline specification controls for demographic covariates, town fixed effects, and time trends. In addition, we address remaining concerns about selection by presenting sub-sample estimates by migrant status and birth cohort.

3.4.3 Mainland Growth

Our study takes place during a period of sustained high economic growth in mainland China. Figure 3.4 shows that annual per capita GDP growth in the mainland averaged approximately 9%, with substantial year-to-year variation ranging from 5% to 18% prior to the COVID-19 pandemic. Importantly, the figure also demonstrates that growth in mainland China is not perfectly correlated with growth in Taiwan. This mitigates concerns that our results are confounded by concurrent economic performance in Taiwan. Over the thirty-year period of rapid growth, mainland GDP per capita increased from roughly 5% of Taiwan's level in 1995 to approximately 40% by 2023.

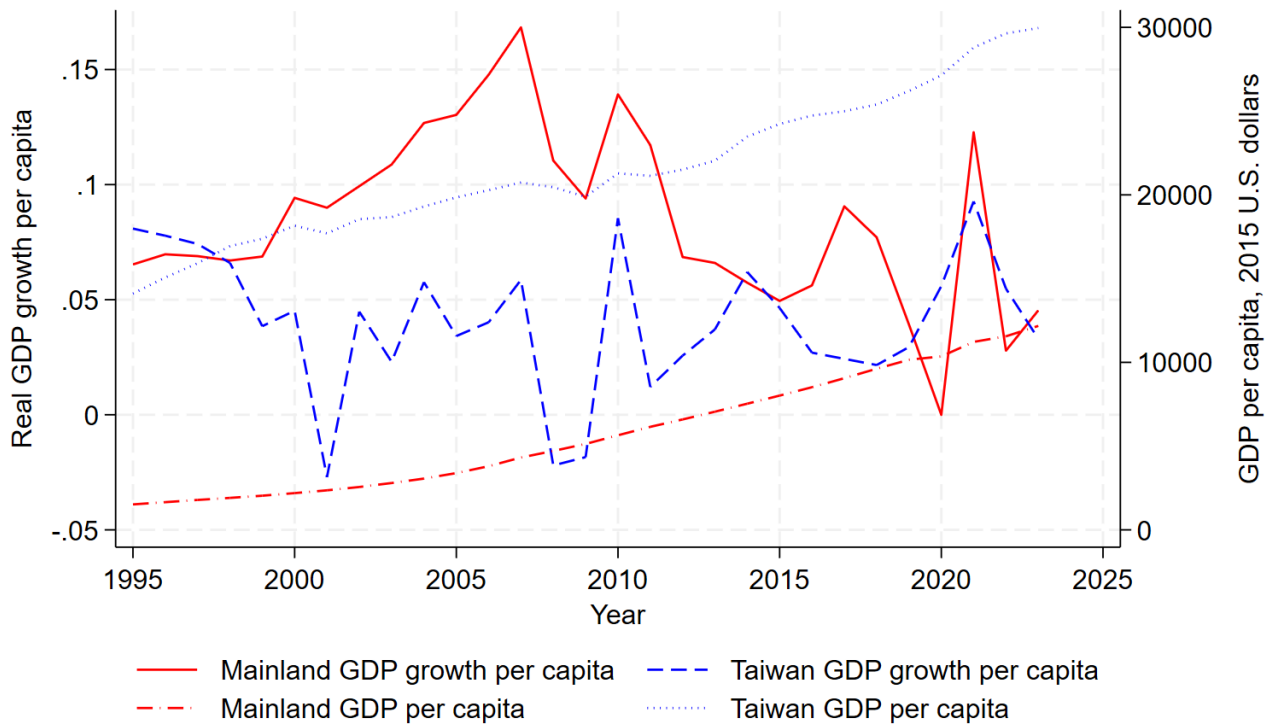
Our empirical strategy exploits individual-level variation in educational attainment and annual variation in mainland China's per capita GDP growth. Recall that individuals with higher levels of education are more likely to benefit from economic engagement with the mainland. To support this premise, we examine a survey question that asks whether the respondent has visited mainland China in the past three years or has a family member who has stayed there. As reported in row (15) of Table 3.1, 26% of respondents report such personal or familial exposure. Consistent with conventional

Table 3.1: Correlations and Descriptive Statistics

		Dependent Variable: Years of Education				
		(1)	(2)	(3)	(4)	(5)
		Mean	Std. Dev.	Coef.	Std. Err.	Obs
(1)	Male	0.51	0.50	1.376	(0.068)	22107
(2)	Birthyear	1962.13	17.36	0.174	(0.003)	22094
(3)	Married	0.74	0.44	-3.933	(0.104)	22107
(4)	log (1 + Real Individual Income)	9.87	5.68	0.963	(0.026)	20406
(5)	Migrant	0.11	0.32	1.119	(0.117)	22107
(6)	Support Reunification	0.12	0.33	0.996	(0.104)	22107
(7)	Support Status Quo	0.54	0.50	0.114	(0.094)	22107
(8)	Support Independence	0.24	0.42	0.673	(0.107)	22107
(9)	Support Others (include missing values)	0.11	0.31	-2.779	(0.179)	22107
(10)	Identify as Chinese	0.39	0.49	1.136	(0.088)	20244
(11)	Identify as Exclusively Taiwanese	0.58	0.49	-0.979	(0.087)	20244
(12)	Identify as Others (include missing values)	0.03	0.17	-1.053	(0.246)	20244
(13)	Primary Issue: Economy	0.34	0.48	0.541	(0.058)	39693
(14)	Primary Issue: Geopolitics	0.12	0.33	0.946	(0.069)	39693
(15)	Visited or Stayed in China	0.26	0.44	0.750	(0.076)	18394
(16)	KMT Vote Share	0.42	0.13	0.388	(0.183)	5980
(17)	DPP Vote Share	0.43	0.13	-1.246	(0.331)	6014
(18)	Others Vote Share	0.19	0.16	0.642	(0.173)	5147

Notes: Each row is one regression. The statistics in rows (1)-(12) is from TSCS, in rows (13)-(15) is from TEDS, in rows (16)-(18) is from the Central Election Commission. In rows (1)-(15), observations are on the individual and year level, each regression controls for township fixed effects. In rows (16)-(18), observations are on the town and year level, the dependent variable is the average years of education in 1990. Standard errors are all clustered in the town level.

Figure 3.4: The GDP per capita and Growth of Mainland China and Taiwan



Note: The figure shows the GDP per capita (constant price) and the real GDP growth per capita of Mainland China and Taiwan, from 1995 to 2023. The real GDP growth per capita is in the left y-axis and the GDP per capita is in the right y-axis.

wisdom, the probability of having visited or lived in the mainland is significantly higher among more educated individuals.

We also consider the possibility that Chinese economic growth is not exogenous, and may be correlated with growth in other large economies. To address this concern, we include annual GDP growth rates for the United States and Japan and interact them with educational attainment. The results are robust: the effects of U.S. and Japanese growth differ markedly from those of mainland China, and do not drive our main findings. In subsequent sections, we further demonstrate that our results are stable when controlling for the interaction of mainland growth with these alternative growth measures.

3.5 Empirical Results

3.5.1 Baseline Estimates

We begin by estimating how mainland Chinese economic growth affects Taiwanese attitudes toward reunification, the status quo, and independence. Table 3.2 reports results from individual-level regressions using the TSCS. Panel A presents estimates of the interaction between mainland GDP growth and individual education, as well as the uninteracted effect of growth.

Column (1) shows that among individuals with lower educational attainment, faster growth in mainland China is associated with a decline in support for reunification. The negative effect is attenuated—and ultimately reversed—for more educated individuals, who become more supportive of reunification when the mainland grows faster. Columns (2) and (3) indicate that this pattern is largely driven by "local" Taiwanese respondents, with weaker and more imprecise effects among migrants.

Columns (4)–(6) use support for maintaining the status quo as the dependent variable. The coefficients on the interaction term are again positive, and those on the uninteracted growth term are negative, mirroring the pattern observed for reunification. However, most estimates are statistically insignificant, with the exception of column (6), where the interaction term is positive and significant for migrants.

Columns (7)–(9) turn to support for (formal) independence. Here, the coefficients reveal that increases in support for reunification come largely at the expense of support for independence. This trade-off holds for both locals and migrants. The result is consistent with group-level ideological baselines: locals are more likely to favor independence, while migrants are more inclined toward reunification. The estimates suggest that individuals with higher education in both groups can be persuaded toward reunification, albeit from different starting points.

Columns (10)–(12) examine non-responses (i.e., those selecting “other” or providing no answer). The results indicate that less educated individuals are more likely to abstain from expressing a position when mainland growth is high, while more educated individuals are more likely to provide a definitive response.

To assess magnitudes, note that the mean probability of supporting reunification is 12.2%, and the mean for independence is 23.5%. The coefficient estimates imply that an increase in the mainland growth rate from 5% to 10% is associated with a 4.24 percentage point (p.p.) decrease in support for reunification among uneducated respondents (a 34.75% decline relative to the mean), and a 2.21 p.p. increase in support for independence (a 9.40% increase). In contrast, among individuals with a master’s degree (18 years of education), the same increase in growth is associated with a 1.79 p.p. increase in support for reunification (14.67% of the mean) and a 4.10 p.p. decrease in support for independence (17.45% of the mean). Given that the interquartile range of education in our sample is 7 years, and assuming a current growth rate of 5%, our

estimates imply that individuals at the 75th percentile of education are 19% more likely to support reunification and 10% less likely to support independence than those at the 25th percentile.

A potential concern is that these patterns are driven non-linearly by the effects of higher education alone. Panel B addresses this by replacing years of schooling with a binary indicator for high school completion. The results remain robust: economic growth increases support for reunification among the educated and reduces it among the uneducated. Notably, the magnitude of the uninteracted growth term is smaller in Panel B, suggesting that variation below the high school threshold—i.e., between primary and secondary schooling—also plays a meaningful role.

Another concern is that the results reflect differential exposure to pro-One China ideological education during the Martial Law period. To investigate this, Panel C estimates heterogeneous effects by birth cohort, separating respondents born before and after 1980. Since ideological curricula were removed from schools beginning in 1987, individuals born after 1980 would not have been exposed to the same political messaging during their education. The estimates show no significant differences across cohorts, suggesting that responsiveness to mainland growth is not driven by exposure to indoctrination and is not limited to older generations.

3.5.2 Mechanisms

The empirical findings show that the education reshape the individual support to reunification under fast mainland growth. This is consistent with hypothesis that economic growth in autocratic regimes might increase support or tolerance for the regime. To investigate the mechanisms behind these findings, we focus on the economic channel by looking at individual incomes, visit or stay in mainland, issues salience; and

Table 3.2: The Effects of China Growth on Support Reunification

Dep. Variable Mean	Dependent Variables											
	Support Reunification			Support Status Quo			Support Independence			Others (Undecided or Missing)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	0.122	0.109	0.260	0.541	0.529	0.555	0.235	0.253	0.105	0.103	0.109	0.080
A. Years of Educational Attainment												
	All	Locals	Migrants	All	Locals	Migrants	All	Locals	Migrants	All	Locals	Migrants
Growth X Edu	0.067 (0.018)	0.064 (0.017)	0.011 (0.088)	0.044 (0.037)	0.033 (0.038)	0.236 (0.118)	-0.070 (0.032)	-0.067 (0.033)	-0.066 (0.070)	-0.040 (0.026)	-0.031 (0.028)	-0.181 (0.085)
Growth	-0.848 (0.291)	-0.816 (0.274)	-0.593 (1.207)	-0.818 (0.587)	-0.705 (0.617)	-2.806 (1.656)	0.441 (0.440)	0.412 (0.473)	0.356 (0.819)	1.225 (0.462)	1.109 (0.482)	3.043 (1.278)
Edu	0.002 (0.002)	0.000 (0.002)	0.000 (0.007)	-0.002 (0.003)	-0.002 (0.003)	-0.015 (0.010)	0.006 (0.003)	0.008 (0.003)	0.004 (0.006)	-0.006 (0.002)	-0.007 (0.002)	0.011 (0.007)
Obs.	22095	19617	2438	22095	19617	2438	22095	19617	2438	22095	19617	2438
Adj. R-sq.	0.031	0.027	0.060	0.025	0.026	0.015	0.034	0.036	0.048	0.080	0.084	0.056
B. High School Education												
	All	Locals	Migrants	All	Locals	Migrants	All	Locals	Migrants	All	Locals	Migrants
Growth X High School	0.478 (0.186)	0.535 (0.181)	-0.768 (0.907)	0.282 (0.347)	0.170 (0.353)	2.338 (1.091)	-0.641 (0.274)	-0.681 (0.291)	-0.214 (0.629)	-0.119 (0.220)	-0.024 (0.234)	-1.356 (0.745)
Growth	-0.400 (0.246)	-0.441 (0.237)	0.178 (0.850)	-0.480 (0.444)	-0.419 (0.467)	-1.538 (1.107)	0.070 (0.314)	0.115 (0.344)	-0.363 (0.616)	0.810 (0.334)	0.746 (0.350)	1.723 (0.792)
High School	0.025 (0.017)	0.005 (0.016)	0.098 (0.076)	-0.030 (0.031)	-0.030 (0.032)	-0.149 (0.090)	0.037 (0.023)	0.061 (0.025)	-0.025 (0.057)	-0.032 (0.020)	-0.035 (0.021)	0.077 (0.063)
Obs.	22096	19618	2438	22096	19618	2438	22096	19618	2438	22096	19618	2438
Adj. R-sq.	0.032	0.027	0.061	0.025	0.026	0.015	0.035	0.035	0.050	0.073	0.076	0.053
C. All (Locals and Migrants) by Birth Cohort												
	All	<1980	>=1980	All	<1980	>=1980	All	<1980	>=1980	All	<1980	>=1980
Growth X Edu	0.067 (0.018)	0.055 (0.023)	0.085 (0.066)	0.044 (0.037)	0.023 (0.040)	0.053 (0.140)	-0.070 (0.032)	-0.027 (0.032)	-0.147 (0.125)	-0.040 (0.026)	-0.052 (0.029)	0.009 (0.056)
Growth	-0.848 (0.291)	-0.721 (0.318)	-1.708 (1.108)	-0.818 (0.587)	-0.525 (0.628)	-1.428 (2.143)	0.441 (0.440)	0.032 (0.466)	1.400 (2.003)	1.225 (0.462)	1.214 (0.486)	1.736 (0.929)
Edu	0.002 (0.002)	0.003 (0.002)	-0.009 (0.006)	-0.002 (0.003)	-0.002 (0.003)	-0.001 (0.011)	0.006 (0.003)	0.003 (0.003)	0.011 (0.010)	-0.006 (0.002)	-0.004 (0.003)	-0.001 (0.005)
Obs.	22095	18136	3954	22095	18136	3954	22095	18136	3954	22095	18136	3954
Adj. R-sq.	0.031	0.035	0.018	0.025	0.031	0.041	0.034	0.032	0.049	0.080	0.087	0.050

Notes: We use Taiwan Social Change Survey (1995-2022) in the analysis. Observations are on the individual and year level. High school education refers to individuals who have at least high school education attainment. All regressions include town fixed effects, linear and quadratic year trends, and individual controls (age, age squared, sex, marriage). Standard errors are clustered at the town level.

the “indoctrination” channel by focusing on national identity.

Individual Income

The most direct way to evaluate the economic channel is to examine how mainland Chinese growth affects Taiwanese income. Table 3.3 replicates the baseline specification using $\log(1 + \text{real individual income})$ as the dependent variable. Columns (1)–(3) report results separately for the full sample, locals, and migrants. The estimates are consistent with those in Panel A of Table 3.2: the interaction between mainland growth and education is positive, while the uninteracted effect of mainland growth is negative across all subsamples. This pattern implies that economic growth in the mainland increases income for more educated individuals, but reduces income for the less educated—likely reflecting increased competition from low-skilled mainland labor.

Columns (4)–(6) include interactions between educational attainment and Taiwan’s own growth rate, along with the uninteracted Taiwan growth term. In contrast to the effects of mainland growth, we find that income rises for both educated and uneducated individuals when Taiwan grows faster, although the gains are larger for the educated. These results are consistent with the view that domestic growth raises income broadly, while growth in the mainland produces more unequal effects that disproportionately benefit higher-skilled individuals.

Visit or Stay in Mainland

Except individual income, individuals visit and stay in mainland can reflect the economic integration between the mainland and Taiwan. Based on 2020 China Population Census, there are 157,886 (0.67% of Taiwan population) Taiwanese stay in mainland. According to Ministry of the Interior, Taiwan, over 2.5 million (10.6% of Taiwan pop-

Table 3.3: The Effect of China Growth on Income

	log (1 + Real Individual Income)					
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Locals	Migrants	All	Locals	Migrants
Dep. Variable Mean	9.87	9.82	10.32	9.87	9.82	10.32
Growth X Edu	3.007 (0.350)	2.910 (0.366)	4.287 (1.023)	3.189 (0.350)	3.072 (0.365)	4.866 (1.081)
Growth	-53.118 (5.945)	-51.395 (6.149)	-73.058 (17.360)	-54.221 (6.020)	-52.223 (6.208)	-80.873 (18.131)
Taiwan Growth X Edu				1.080 (0.438)	0.928 (0.467)	3.165 (1.098)
Taiwan Growth				0.397 (6.701)	0.707 (6.845)	-17.772 (17.774)
Edu	-0.087 (0.030)	-0.083 (0.031)	-0.229 (0.093)	-0.133 (0.037)	-0.123 (0.038)	-0.387 (0.120)
Obs.	20406	18163	2199	20406	18163	2199
Adj. R-sq.	0.127	0.132	0.091	0.129	0.134	0.102

Notes: We use Taiwan Social Change Survey (1995-2022) in the analysis. Observations are on the individual and year level. There are fewer observations as the 1998 survey did not ask questions about income. All regressions include town fixed effects, linear and quadratic year trends, and individual controls (age, age squared, sex, marriage). Standard errors are clustered at the town level.

ulation) Taiwanese visited the mainland in 2024. We present results in the Panel A of Table ??, the mean of outcome is consistent with official statistics. It shows that educated individuals are more likely to have visited or lived in the mainland when mainland growth faster, suggesting selective migration and first-hand exposure to mainland economic opportunities. Though the estimate of uninteracted growth is statistically insignificant, the negative sign is consistent with estimates in support reunification and individual income.

Primary Issues

Consistent with economic benefits drive the main results, the Panel B of Table ?? presents that educated individuals are more likely to cite the economy as Taiwan's primary issue, while the uneducated are more focused on geopolitical concerns such as sovereignty or cross-strait conflict. This suggests that the economic framing of reunification is more salient among the educated, consistent with a utility-based re-evaluation of regime preferences.

National Identities

One may wonder the indoctrination channel plays a key role in driving the main results, as mainland gets stronger and have more resources in propaganda. We examine the indoctrination effect by focusing on the national identity, whether individuals self-identify themselves as "Chinese". Table 3.5 examines changes in national identity. Mainland growth increases identification as Chinese and reduces identification as exclusively Taiwanese, for individuals from all education levels. Even though the educated are more responsive to the mainland growth, these identity shifts do not account for the negative responses to growth among the uneducated. Given cohort analysis in Panel

C of Table 3.2 also reveals no discontinuity around Taiwan's educational liberalization in 1987, suggesting that ideological indoctrination has limited effects on the shift of support reunification.

Overall, these patterns suggest that the main channel is economic benefits: educated Taiwanese perceive higher economic returns from integration and update their political preferences accordingly. Less-educated Taiwanese, by contrast, associate growth with economic threat and respond by strengthening preferences for independence.

3.5.3 Robustness

Growth Rates of Other Countries

Another alternative interpretation is that the economic growth of any large economic partner makes Taiwanese believe that they need to change the regime and integrate into a larger economy. Since Taiwan is closed to the mainland China which is also the biggest trading partner of Taiwan (30% of Taiwan's international trade), this means shifting towards reunification. We consider the growth effects from other top trading partners of Taiwan, the U.S. (13%) and Japan (10%) in the analysis.

Table 3.6 further supports our interpretation by adding growth of Taiwan, U.S., and Japan. The effects of mainland growth are robust and consistent. Moreover, these alternative growth measures yield coefficients that are different from mainland growth and the interaction term with education attainment. This reinforces that the observed effects are specific to economic growth in mainland China and are driven by the perceived economic gains of reunification.

Alternative Specifications

We conduct a wide range of sensitivity checks to address alternative explanations and potential biases. Table 3.7 reports results for support for reunification, status quo, independence, and individual income. First, we account for geographic heterogeneity by controlling for the interaction of mainland growth with township distance to the mainland in column (2). The distance to the mainland addresses the concern that military threat from mainland China correlates with education as more educated people live in the west of Taiwan, which is closer to the mainland. Next, we control for growth interacts with urban area dummy variable in column (3). This address the concern that the heterogeneous development across township is correlated with support reunification and education attainment.

In the columns (4)-(6), we include some “bad controls” that may influence the mainland growth and individuals attitudes towards reunification. DPP has a pro-Independence and anti-One China agenda. During its incumbency, DPP not only promotes curriculum reforms in removing context about China, but it also compete or go against the mainland in policies and diplomacy. We control for DPP incumbency interacts with education attainment in column (4). As the mainland becomes wealthier, it becomes more challenging for the mainland to maintain a high growth rate, due to the diminution of the catch-up effect. In columns (5) and (6) we control for log mainland GDP and log mainland GDP per capita interact with education attainment. The magnitudes of estimates in support independence and individual income decrease a lot, but the signs are still consistent with baseline estimates.

Columns (7) and (8) use alternative inference strategies. The results so far present standard errors that are clustered at the township level. We can alternative standard errors at the county level using wild bootstraps [Cameron et al., 2008] and estimate

Conley [1999] spatial standard errors with a 25 km cutoff. The results remain robust, suggesting that spatial correlation or clustering choice does not drive our findings.

3.5.4 Voting outcomes

If mainland growth shapes political preferences, it is reasonable to think it also influence real-world political behaviors. To test this, we examine the voting outcomes in the town-year-election level for all presidential and legislative elections from 1995 to 2024. Since 1995, there have been nine legislative (1995, 1998, 2001, 2004, 2008, 2012, 2016, 2020, and 2024) and eight presidential elections (1996, 2000, 2004, 2008, 2012, 2016, 2020, and 2024). Starting in 2004, the two types of elections are held in the same years. Until that time, they were staggered. Taiwan has high voter participation. Approximately 75% turnout for presidential elections and 68% turnout for legislative elections. To be eligible to vote, a person must be a citizen of the ROC, be twenty years or more of age, and have lived in Taiwan for no less than six consecutive months for presidential elections and for no less than four consecutive months for legislative elections.

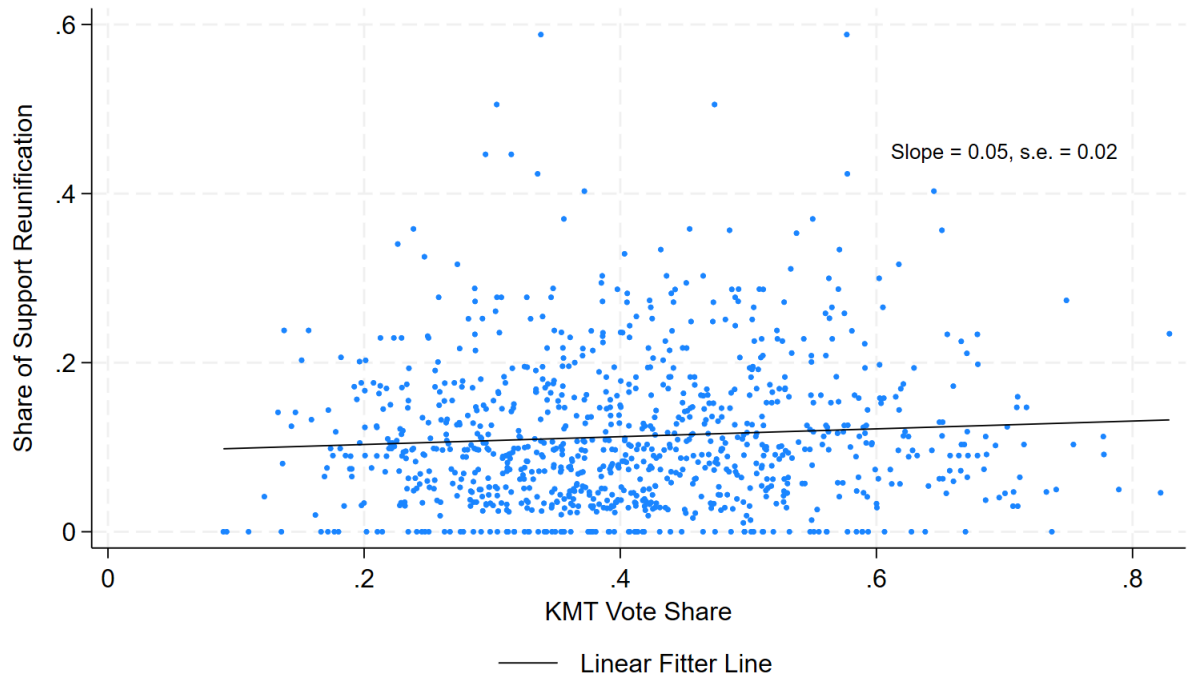
KMT and DPP differences in their economic policies mirror the differences on the One China policy. On average, the KMT favors businesses and economic integration with the mainland. For example, KMT president Ma Ying-jeou (2008-16) advocated for direct flights, more tourism, liberalization of investments, and in general to increase engagement of Taiwan in global and mainland trade. The DPP usually favors labor, less integration with the mainland and less globalization in general. For example, DPP president Chen Shui-bian's initial economic policy in his first term was "No Haste, Be Patient" and imposed a 50-million investment limit from the mainland [Chiu and Law, 2017].

The KMT advocates for closer cross-strait ties, that is voting to KMT means support reunification or status quo; while the DPP supports official independence. The positive correlation between KMT vote share and support reunification is plotted in Figure 3.5.

We use a refined baseline specification 3.1 to examine whether mainland growth affects voting outcomes in town-year-election level, and the heterogeneous effects driven by education in township level measured in the 1990 Taiwan Census. The other controls are also measured in the 1990 Taiwan Census and we interact them with mainland growth. We present results in Table 3.8. The results closely parallel the survey findings, especially for outcomes in the presidential election. Columns (1)-(3) present that the interaction is positively associated with KMT vote share, which is consistent with baseline estimates in support reunification. Similarly, columns (4)-(6) a negative association for the DPP, consistently with baseline estimates in support independence. These patterns are robust to different definitions of education, average years of schooling and high school education share. Columns (7)-(9) show no consistent effects for other parties vote shares, suggesting the shift of voting mainly occurs between KMT and DPP.

To interpret the estimates, note that the mean of KMT (resp. DPP) vote share is 0.419 (resp. 0.426), with inter-quartile range of average years of schooling is 1.27 years and 5% mainland growth rate, our estimates imply that KMT vote share in a township at the 75th percentile of education is 2% ($(0.128 \times 0.05 \times 1.27) / 0.419 = 0.02$) higher than for those in a township at the 25th percentile. The variations of education in township level is much lower than the individual level so that the inter-quartile change of magnitudes in Table 3.8 is smaller than in Table 3.2.

Figure 3.5: The Correlation of Share of Support Reunification and KMT Vote Share



Note: The figure shows the correlation between Share of Support Reunification and KMT Vote Share. The Share of Support Reunification is aggregated from individual and year level to the town and year level in TSCS. The KMT Vote Share is the election outcome of nearest election (current or future). The correlation is positive and significant at the 5% level.

Table 3.4: The Effect of China Growth on Visiting or Staying in Mainland and Primary Issues

	Dependent Variables								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	A. Visited or Stayed on Mainland			B. Primary Issues					
				Primary Issue: Economy			Primary Issue: Geopolitics		
	All	Locals	Migrants	All	Locals	Migrants	All	Locals	Migrants
Dep. Variable Mean	0.264	0.249	0.391	0.344	0.344	0.344	0.123	0.116	0.173
Growth X Edu	0.144 (0.032)	0.132 (0.033)	0.213 (0.130)	0.099 (0.022)	0.108 (0.024)	0.027 (0.061)	-0.043 (0.017)	-0.039 (0.017)	0.016 (0.067)
Growth	-0.373 (0.451)	-0.210 (0.459)	-1.379 (1.798)	-1.304 (0.296)	-1.348 (0.314)	-0.996 (0.857)	0.649 (0.205)	0.619 (0.209)	-0.274 (0.944)
Edu	0.009 (0.004)	0.010 (0.004)	-0.008 (0.014)	-0.006 (0.002)	-0.007 (0.002)	-0.002 (0.008)	0.014 (0.002)	0.013 (0.002)	0.007 (0.007)
Obs.	18361	16274	2067	39529	34551	4933	39529	34551	4933
Adj. R-sq.	0.087	0.084	0.086	0.063	0.066	0.056	0.039	0.035	0.077

Notes: We use Taiwan's Election and Democratization Study (2001-2020) in the analysis. Observations are on the individual and year level. Growth in the columns (1) - (3) is the three-year moving average of growth as the dependent variable is within last three years activity. All regressions include town fixed effects, linear and quadratic year trends, and individual controls (age, age squared, sex, marriage). Standard errors are clustered at the town level. The "Primary Issue: Economy" in columns (4)-(6) are the issues with words: "Economy", "Finance", "Investment", "Industry", and "Entrepreneur". The "Secondary Issue: Geopolitics" in columns (7)-(9) are the issues with words: "Chinese Communist Party", "Mainland", "Cross-Strait", "Reunification", "Independence", "Military Defense", "Sovereignty", and "United Nation".

Table 3.5: The Effect of Chinese Growth on National Identity

	Dependent Variables								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	A. Chinese			B. Exclusively Taiwanese			C. Others		
	All	Locals	Migrants	All	Locals	Migrants	All	Locals	Migrants
Dep. Variable Mean	0.380	0.340	0.715	0.591	0.631	0.253	0.029	0.029	0.032
Growth X Edu	0.070 (0.029)	0.069 (0.031)	0.133 (0.102)	-0.066 (0.030)	-0.066 (0.032)	-0.133 (0.098)	-0.003 (0.014)	-0.003 (0.014)	-0.000 (0.085)
Growth	0.018 (0.003)	0.014 (0.003)	0.003 (0.011)	-0.017 (0.003)	-0.013 (0.003)	-0.001 (0.010)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.008)
Edu	0.607 (0.471)	0.646 (0.509)	-0.861 (1.564)	-0.984 (0.471)	-1.059 (0.508)	0.882 (1.528)	0.377 (0.189)	0.413 (0.186)	-0.021 (1.144)
Obs.	20241	17980	2226	20241	17980	2226	20241	17980	2226
Adj. R-sq.	0.126	0.111	0.115	0.125	0.111	0.128	0.022	0.025	0.001

Notes: We use Taiwan Social Change Survey (1995-2022) in the analysis. Observations are on the individual and year level. "Chinese" in columns (1)-(3) equals to one if individuals identify themselves as "Exclusively Chinese" or "Both Chinese and Taiwanese". All regressions include town fixed effects, linear and quadratic year trends, and individual controls (age, age squared, sex, marriage). Standard errors are clustered at the town level.

Table 3.6: The Effect of Chinese Growth on National Identity

	Dependent Variables			
	Reunification	Status Quo	Independence	Income
	(1)	(2)	(3)	(4)
Growth X Edu	0.077 (0.018)	0.038 (0.037)	-0.067 (0.031)	3.322 (0.365)
Growth	-1.177 (0.284)	-0.850 (0.601)	0.266 (0.415)	-56.812 (6.378)
Taiwan Growth x Edu	-0.058 (0.037)	0.229 (0.059)	-0.205 (0.045)	2.438 (0.648)
Taiwan Growth	0.202 (0.508)	-4.551 (1.117)	3.079 (0.820)	-12.096 (9.644)
U.S. Growth X Edu	0.022 (0.070)	0.031 (0.127)	-0.025 (0.083)	3.591 (1.059)
U.S. Growth	-2.527 (0.801)	1.370 (1.760)	-2.552 (1.124)	-39.483 (16.072)
Japan Growth X Edu	0.128 (0.036)	-0.432 (0.075)	0.357 (0.053)	-5.225 (0.756)
Japan Growth	1.241 (0.639)	4.501 (1.304)	-2.494 (0.840)	56.618 (13.199)
Education	0.002 (0.002)	-0.009 (0.004)	0.012 (0.003)	-0.222 (0.039)
Obs.	22095	22095	22095	20406
Adj. R-sq.	0.036	0.032	0.040	0.133

Notes: We use Taiwan Social Change Survey (1995-2022) in the analysis. Observations are on the individual and year level. The dependent variables are all shown in the previous Tables. There are fewer observations in column (4), as the 1998 survey did not ask questions about income. All regressions include town fixed effects, linear and quadratic year trends, and individual controls (age, age squared, sex, marriage). Standard errors are clustered at the town level.

Table 3.7: The Effects of China Growth on Support Reunification

	Baseline (1)	Control Growth x Distance to Mainland (2)	Control Growth x Urban Area (3)	Control DPP in Power x Edu (4)	Control log Mainland GDP x Edu (5)	Control log Mainland GDP per capita x Edu (6)	Cluster s.e. at county level (bootstraps) (7)	Conley s.e (cutoff = 25 km) (8)
A. Dependent Variable: Support Reunification								
Growth X Edu	0.067*** (0.018)	0.065*** (0.018)	0.066*** (0.019)	0.070*** (0.018)	0.063*** (0.020)	0.062*** (0.020)	0.067*** (0.013)	0.067*** (0.015)
Growth	-0.848*** (0.291)	0.333 (0.594)	-0.839* (0.439)	-0.908*** (0.286)	-0.896*** (0.294)	-0.901*** (0.295)	-0.848*** (0.232)	-0.848*** (0.234)
Edu	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)	0.005 (0.009)	0.005 (0.008)	0.002 (0.001)	0.002 (0.001)
Obs.	22095	22095	22095	22095	22095	22095	22095	22095
Adj. R-sq.	0.031	0.032	0.031	0.032	0.033	0.033	0.031	0.031
B. Dependent Variable: Support Status Quo								
Growth X Edu	0.044 (0.037)	0.045 (0.037)	0.046 (0.036)	0.049 (0.038)	-0.009 (0.040)	-0.009 (0.040)	0.044 (0.039)	0.044** (0.019)
Growth	-0.818 (0.587)	-1.748* (0.995)	-0.971 (0.704)	-0.870 (0.609)	-0.133 (0.629)	-0.125 (0.628)	-0.818 (0.673)	-0.818 (0.581)
Edu	-0.002 (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.003 (0.004)	0.058*** (0.017)	0.048*** (0.015)	-0.002 (0.004)	-0.002 (0.002)
Obs.	22095	22095	22095	22095	22095	22095	22095	22095
Adj. R-sq.	0.025	0.026	0.026	0.026	0.027	0.027	0.025	0.025
C. Dependent Variable: Support Independence								
Growth X Edu	-0.070** (0.032)	-0.069** (0.032)	-0.068** (0.032)	-0.084*** (0.032)	-0.013 (0.034)	-0.012 (0.034)	-0.070** (0.031)	-0.070*** (0.010)
Growth	0.441 (0.440)	-0.225 (0.790)	0.839 (0.515)	0.626 (0.443)	-0.227 (0.476)	-0.235 (0.476)	0.441 (0.432)	0.441 (0.309)
Edu	0.006** (0.003)	0.006** (0.003)	0.006** (0.003)	0.009*** (0.003)	-0.059*** (0.013)	-0.049*** (0.011)	0.006** (0.003)	0.006*** (0.002)
Obs.	22095	22095	22095	22095	22095	22095	22095	22095
Adj. R-sq.	0.034	0.034	0.035	0.035	0.036	0.036	0.034	0.034
D. Dependent Variable: Log (income + 1)								
Growth X Edu	3.007*** (0.350)	3.007*** (0.348)	2.988*** (0.350)	3.298*** (0.358)	1.072*** (0.387)	1.070*** (0.386)	3.007*** (0.389)	3.007*** (0.351)
Growth	-53.118*** (5.945)	-53.537*** (10.624)	-52.092*** (8.196)	-57.672*** (6.105)	-32.664*** (6.376)	-32.715*** (6.377)	-53.118*** (8.405)	-53.118*** (7.361)
Edu	-0.087*** (0.030)	-0.087*** (0.030)	-0.085*** (0.030)	-0.149*** (0.036)	1.910*** (0.203)	1.601*** (0.172)	-0.087*** (0.028)	-0.087*** (0.021)
Obs.	20406	20406	20406	20406	20406	20406	20406	20406
Adj. R-sq.	0.127	0.127	0.128	0.129	0.135	0.135	0.127	0.127

Notes: We use Taiwan Social Change Survey (1995-2022) in the analysis. Observations are on the individual and year level. There are fewer observations in the Panel D, as the 1998 survey did not ask questions about income. All regressions include town fixed effects, linear and quadratic year trends, and individual controls (age, age squared, sex, marriage). The respective lower order terms are controlled in each specification. Standard errors are clustered at the town level in columns (1)-(6).

Table 3.8: The Effect of China Growth on Voting

	Dependent Variables								
	KMT Vote Share			DPP Vote Share			Others Vote Share		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	President	Legislative	All	President	Legislative	All	President	Legislative
Dep. Variable Mean	0.419	0.417	0.421	0.426	0.442	0.410	0.187	0.171	0.199
A. Years of Educational Attainment									
Growth X Average Edu, 1990	0.128 (0.034)	0.198 (0.033)	0.097 (0.055)	-0.070 (0.030)	-0.110 (0.020)	-0.028 (0.057)	-0.067 (0.091)	0.110 (0.017)	-0.217 (0.150)
Growth	-2.497 (4.495)	-5.165 (3.201)	0.433 (8.213)	-1.630 (2.670)	1.706 (1.597)	-6.069 (5.345)	10.252 (9.571)	3.509 (1.807)	16.790 (13.961)
Obs.	5980	2866	3114	6014	2866	3148	5147	2150	2997
Adj. R-sq.	0.369	0.513	0.307	0.708	0.879	0.656	0.210	0.412	0.188
B. High School Education									
Growth X High School Education Share, 1990	1.110 (0.336)	1.825 (0.341)	0.823 (0.532)	-0.665 (0.299)	-1.021 (0.204)	-0.259 (0.558)	-0.380 (0.926)	1.053 (0.168)	-1.641 (1.551)
Growth	-1.733 (4.700)	-3.655 (3.334)	0.959 (8.430)	-2.228 (2.808)	0.841 (1.729)	-6.288 (5.620)	10.608 (9.928)	4.437 (1.839)	16.357 (14.796)
Obs.	5980	2866	3114	6014	2866	3148	5147	2150	2997
Adj. R-sq.	0.369	0.513	0.307	0.708	0.879	0.656	0.210	0.412	0.188

Notes: We use use election dataset (1995-2024) provided by Central Election Comission of Taiwan in the analysis. Observations are on the town-year-election level. High school education refers to people who have at least high school education attainment. All regressions include town fixed effects, linear and quadratic year trends, mainland growth interacts with town controls in 1990 (average age, average age squared, female share, marriage share, and urban dummy), and the uninteracted term of town controls. Estimates are all weighted by the number of eligible voters in town and year level. Standard errors are clustered at the town level.

3.6 Conclusion

This paper shows that economic growth increases support, or at least tolerance, for autocratic regimes. This can explain why the economic development of countries such as China, India and Turkey, to the surprise of many observers, have not led to increased political democratization.

While our findings seemingly contradict modernization theory, which posits that economic development leads to democratization, it is important to keep in mind that the long-run process which motivated modernization theory can be very different from the short-run one that we study. This is for at least two reasons. The first is that it takes time to change political preferences or political identity, both of which will affect an individual's support for a given regime.¹¹ The second is that in the long run, autocracies may have a disadvantage in maintaining growth [Acemoglu et al., 2019]. If true, then the same forces which increased the popularity of autocracy when growth is high will reduce its popularity when growth is low, and the question of how growth affects tolerance for autocracy in the long run becomes not very meaningful. These are important questions for future research.

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¹¹For example, Cantoni et al. [2017] show that a change in school curricula was associated with changing political attitudes of students in China. Paglayan [2025] presents thenon-democratic education discourage long-term political participation in Mexico.

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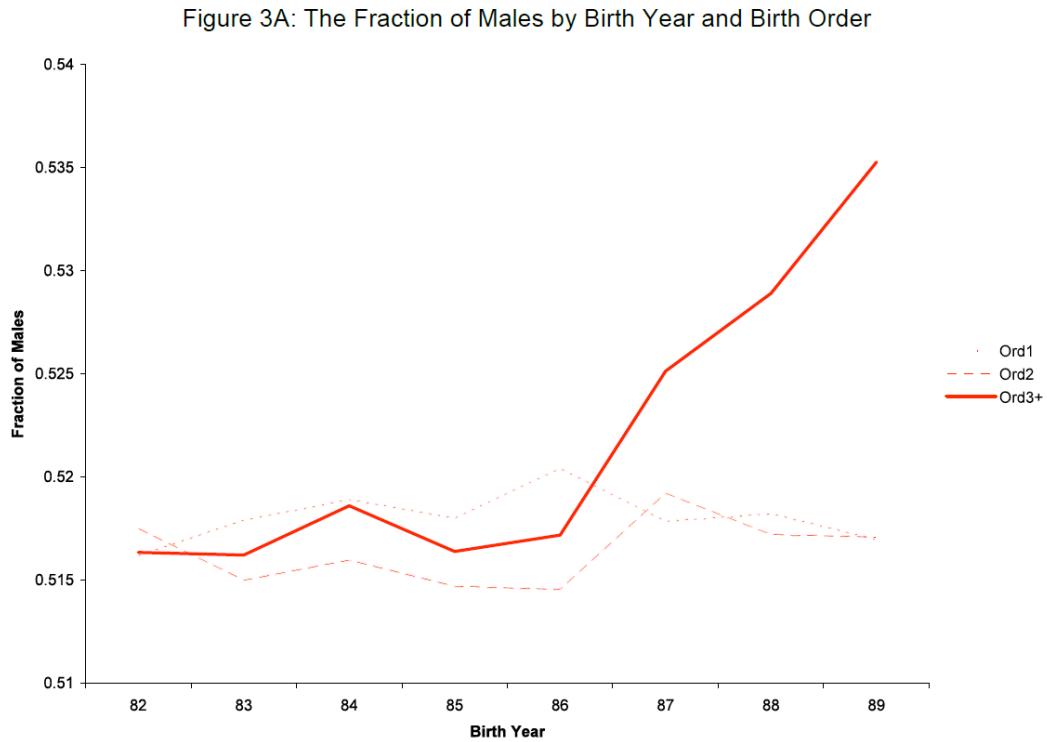
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A Supplementary Figures and Tables to Chapter 1

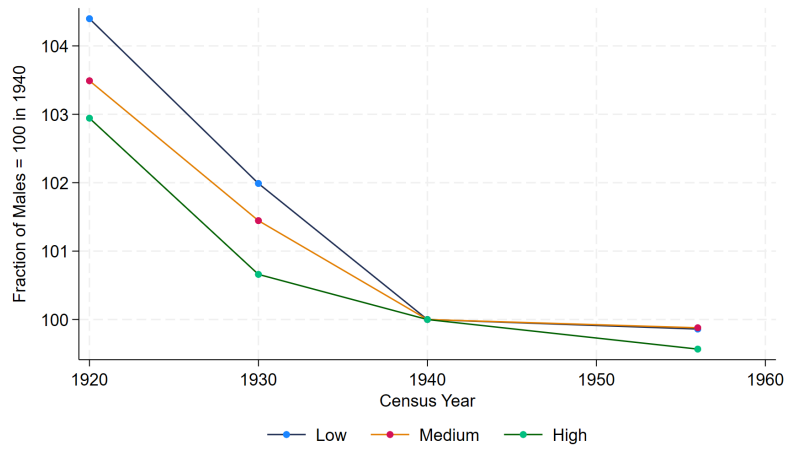
A.1 Appendix Figures and Tables

Figure A.1: Fraction of Male of Births by Birth Order (1982-1989) by [Lin, Liu, and Qian \[2014\]](#)

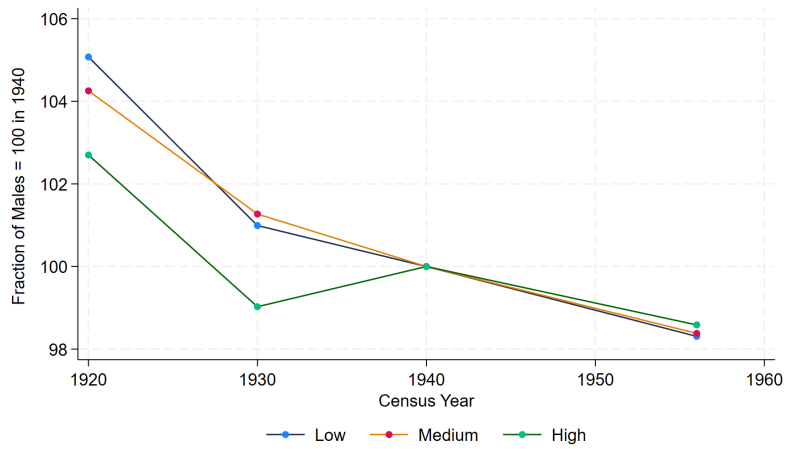


Note: Relative trends of fraction of males and fraction of local males across groups of 116 towns with high, medium, and low ancestor worship (migrants) in 1920-1956 Taiwan census.

Figure A.2: Trends of Fraction of Males in total and of locals (1920-1956)

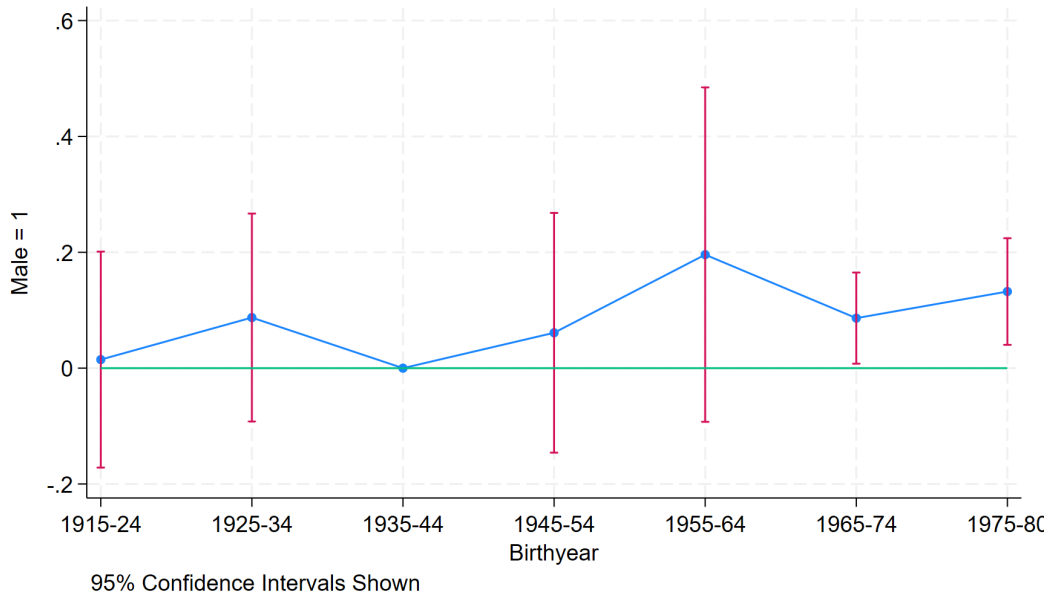


(a) Fraction of Males



(b) Fraction of Local Males

Figure A.3: Estimates Ancestor Worship (Migrants) by Cohorts (1915-1980)



Note: I add town fixed effects, county-birthyear fixed effects, and origin-birthyear fixed effects in this analysis. The 1935-44 birth cohort is the comparison group in the graph. No clear culture selection patterns in determining the sex of residents before and during the 1945-54 KMT Retreat period. Ancestor worship (migrants) only has positive and significant effects on 1965 and later cohorts.

Table A.1: Summary Statistics of Town Level Characteristics

	Obs.	Mean	SD
Ancestor worship (migrants), 1956	348	0.300	0.0148
Ancestor worship (locals), 1926	348	0.331	0.132
Fraction of males aged 0-10, 1920	348	0.512	0.0143
Fraction of males, 1940	348	0.508	0.0162
Fraction of Japanese, 1940	348	0.0405	0.0625
Population density (per km ²), 1940	348	3164.8	12599.6
Fraction of males of migrants, 1956	348	0.653	0.0975
Fraction of migrants, 1956	348	0.0614	0.0915
Ln cotton suitability	348	6.901	1.955
Ln maize suitability	348	7.277	1.497
Ln tea suitability	348	8.039	1.165
Ln wet rice suitability	348	7.627	1.953
Ln white potato suitability	348	7.157	1.341
Ln wheat suitability	348	7.350	1.404
Ln distance to seashore	348	2.699	0.725
Ln distance to Taipei	348	4.777	1.047

Table A.2: Summary Statistics of Aged 0-9 Children with 3+ Birth Order in 1990 Census

	Obs.	Mean	SD
Male	353,136	0.527	0.499
Birth order	353,136	3.482	0.972
Father's age at child's birth	353,136	28.80	3.121
Father's birthyear	353,136	1958.38	2.962
Father's year of schooling	353,136	8.887	2.665
Mother's age at child's birth	353,136	26.38	3.327
Mother's birthyear	353,136	1960.96	3.417
Mother's year of schooling	353,136	7.938	2.545

Table A.3: Individual Preferences on Son and Ancestor in 1994 and 1999 Taiwan Social Change Survey

	All			Male		
	Obs.	Mean	SD	Obs.	Mean	SD
The importance of having at least one son	2,263	0.417	0.369	1,115	0.457	0.371
The importance of being memorized and worshipping after death	2,315	0.738	0.287	1,066	0.753	0.278
The importance of bringing honor to your family clan	2,263	0.593	0.319	1,115	0.615	0.314

Table A.4: Migrants and Home Characteristics

Dependent variable	Log Migrant population			
	(1)	(2)	(3)	(4)
Log Population of home province	1.38*** (0.14)	1.36*** (0.11)	1.26*** (0.17)	1.24*** (0.18)
Log Population density of home province		38.89*** (10.45)	37.58*** (10.80)	31.40*** (11.59)
Ancestor worship density			2.69 (2.86)	2.28 (3.09)
Confucian scholars density				-0.01 (0.04)
Clan density				0.90 (0.67)
Social organization density				0.01 (0.01)
# of Provinces	48	48	48	48
Adj. R^2	0.612	0.689	0.690	0.691

Notes: The sample is provinces in mainland China. This table reports coefficients from regressing log migrant population on log home population in 1953, home population density in 1953, ancestor worship density, Confucian scholars density, clan density in 1911, and social organization density in 1935. Robust standard errors are in parentheses. *** Significant at the 1 percent level. ** 5 percent level. * 10 percent level.

Table A.5: Robustness: The Effect on the Sex of the 3+ Birth Order

Dependent variable	Male = 1					
	County clustering (1)	Two-way clustering (2)	Parents' origins (3)	Year 1985 as pre-period (4)	Logit (5)	Probit (6)
Ancestor worship (migrants) X Post	0.32*** (0.07)	0.32*** (0.08)	0.34*** (0.08)	0.24*** (0.09)	0.32*** (0.08)	0.32*** (0.08)
Parents' origins-birtheyear FEs	No	No	Yes	No	No	No
# of Counties	21	21	21	21	21	21
# of Towns	354	354	354	354	354	354
# of Observations	358,287	358,287	358,287	358,287	358,287	358,287
Outcome mean	0.527	0.527	0.527	0.527	0.527	0.527
Ancestor worship (migrants) s.d.	0.018	0.018	0.018	0.018	0.018	0.018

Notes: This table reports coefficients from estimating Specification (2) plus different variants, on the sample of 3rd+ birth order aged 0-9 children whose parents are both locals. *Geographic characteristics*: the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (ln)distance to seashore, (ln)distance to Taipei. *Family controls*: birth order of the child, age of parents at child's birth, and years of schooling of parents. Standard errors are all clustered at the town level. Standard errors robust are clustered at town level, except in column 1, where I allow for clustering at county level and in column 2, where I allow for two-way clustering at town level and county-birtheyear level. In column 3, I include parents' origin-birtheyear fixed effects to control the heterogeneous effects of family culture. In column 4, I change *Post* to 0 if the birtheyear is 1985. In column 5 and 6, I report the marginal effects of Logit and Probit model at the mean of covariates.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 1 percent level.

Table A.6: Correlation of Ancestor Worship (Migrants) with Itself Generated by Population and Area Weights and Ancestor Worship Festivals

Dependent variable	Ancestor worship (migrants)		Ancestor worship (festivals)		
	Pop	Area	None	Pop	Area
Weights	(1)	(2)	(3)	(4)	(5)
Ancestor worship (migrants)	1.09*** (0.01)	0.87*** (0.01)	9.29*** (0.71)	10.55*** (0.83)	7.71*** (0.74)
Towns (Observations)	354	354	354	354	354
Adj. R^2	0.939	0.912	0.328	0.314	0.235

Note: The table is to present the correlation between different statistics of ancestor worship culture, i.e. aggregating ancestor worship density and the number of ancestor worship festivals from county to province with weighted in population and area and without weights. Population data is from the 1953 China Population Census. Area data is from the China Historical Geographic Information System. Standard errors are in parentheses.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 1 percent level.

Table A.7: Alternative measures of Ancestor Worship Culture Brought by Chinese Migrants

Dependent variable	Male = 1					
	Ancestor worship (migrants)			Ancestor worship (festivals)		
Variable Z	None	Pop	Area	None	Pop	Area
Weights of Z	(1)	(2)	(3)	(4)	(5)	(6)
Variable Z X Post	0.32*** (0.08)	0.28*** (0.08)	0.35*** (0.08)	0.03*** (0.01)	0.02** (0.01)	0.03*** (0.01)
Outcome mean	0.527	0.527	0.527	0.527	0.527	0.527
Explanatory variables s.d.	0.018	0.018	0.017	0.241	0.270	0.236

Notes: This table replicates column 6 of Table 3 with alternative measures of ancestor worship culture brought by Chinese migrants. The alternative measures are mentioned in Table A.6. All the fixed effects and covariates are controlled in each column. Estimate in the column 1 is the baseline estimate in column 4 of Table 3. *Geographic characteristics*: the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (ln)distance to seashore, (ln)distance to Taipei. *Family controls*: birth order of the child, age of parents at child's birth, and years of schooling of parents. Standard errors are all clustered at the town level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 1 percent level.

Table A.8: Horse Racing: Cultures introduced by Chinese Migrants

Dependent variable	Male = 1						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ancestor worship (migrants) X Post	0.32*** (0.08)						0.37*** (0.11)
Clan (migrants) X Post		0.01 (0.01)					-0.01 (0.01)
Confucian scholars (migrants) X Post			0.00 (0.00)				-0.00 (0.00)
Tea (migrants) X Post				0.00 (0.01)			-0.03* (0.02)
Wet rice (migrants) X Post					0.03* (0.01)		0.04* (0.02)
Wheat (migrants) X Post						0.03 (0.02)	-0.04 (0.03)
# of Towns	354	354	354	354	354	354	354
# of Observations	358287	358287	358287	358287	358287	358287	358287
Outcome mean	0.527	0.527	0.527	0.527	0.527	0.527	0.527

Notes: This table replicates column 4 of Table 3 with measures of other placebo cultures brought by Chinese migrants. The placebo cultures are family clan culture, Confucian culture, tea culture, rice culture, and wheat culture. The constructions of placebo cultures are similar to the ancestor worship (migrants) except replacing ancestor worship density by the corresponding measures of cultures in equations. The Estimate in column 1 is the baseline estimate in column 4 of Table 3. All the fixed effects and covariates are controlled in each column. *Geographic characteristics*: the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (ln)distance to seashore, (ln)distance to Taipei. *Family controls*: birth order of the child, age of parents at child's birth, and years of schooling of parents. Standard errors are all clustered at the town level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 1 percent level.

Table A.9: The Heterogeneous Effect by Migrant Share and Cultural Distance

Dependent Variable	Male = 1					
	Fraction of migrants		Distance to Confucian School		Foot-binding Rate	
	< median	> median	< median	> median	< median	> median
	(1)	(2)	(3)	(4)	(5)	(6)
Ancestor worship (migrants) X Post	0.29 (0.17)	0.35*** (0.09)	0.46*** (0.06)	0.05 (0.31)	0.17 (0.18)	0.56*** (0.10)
# of Towns	177	177	177	177	177	177
# of Observations	128,920	229,367	237,586	120,701	144,850	213,437
Outcome mean	0.525	0.529	0.527	0.527	0.528	0.527
Ancestor worship (migrants) s.d.	0.015	0.018	0.019	0.011	0.015	0.018

Notes: This table reports OLS coefficients from estimating Specification (2) with different subsamples. All columns contain county-birthyear fixed effects, town fixed effects, and a set of historical controls, as well as a series of geographic characteristics and family controls. *Geographic characteristics*: the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (\ln) distance to seashore, (\ln) distance to Taipei. *Family controls*: birth order of the child, age of parents at child's birth, and years of schooling of parents. Standard errors are all clustered at the town level. *** Significant at the 1 percent level.

Table A.10: The Effect of Migrant Mother’s Ancestor Worship on the Sex of 3+ Birth Order Children

Dependent variable	Male = 1			
	(1)	(2)	(3)	(4)
Ancestor worship (mother) X Post	-0.23 (0.22)	-0.42 (0.39)	-0.42 (0.38)	-0.64 (0.64)
Town-birthyear FEs	Yes	Yes	Yes	Yes
Mother’s origin FEs	Yes	Yes	Yes	Yes
Father’s origin-birthyear FEs	Yes	Yes	Yes	Yes
Origin controls (mother) X Post	No	Yes	Yes	Yes
Family controls X Post	No	No	Yes	Yes
# of Mother’s origins	45	45	45	40
# of Towns	283	283	283	234
# of Observations	20,193	20,193	20,193	12,159
Outcome mean	0.534	0.534	0.534	0.529
Ancestor worship (mother) s.d.	0.033	0.033	0.033	0.033

Notes: This table reports coefficients from estimating Specification (3) on the sample of 3rd+ birth order aged 0-9 children whose mother is a second-generation migrant in columns 1-3. The sample is restricted to parents who are both migrants in column 4. The results from regressing male indicator on town-birthyear fixed effects, mother’s origin fixed effects, father’s origin fixed effects, and origin controls (mother) as well as a series of family controls. *Origin controls (mother)*: Imperial scholars density, Confucian clan density, and suitability index of wheat, wet rice, and tea of mother’s origin. *Family controls*: birth order of the child, age of parents at child’s birth, and years of schooling of parents, as well as whether parents are from the same origin. Standard errors are all clustered at the town level and migrant mother’s origin level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level.

* Significant at the 1 percent level.

Table A.11: The Effect of Ancestor Worship of Migrant Neighbors from Other Origins than Mother on the Sex of 3+ Birth Order Children

Dependent variable	Male = 1		
	(1)	(2)	(3)
Ancestor worship (neighbors, mother) X Post	0.20 (2.28)	0.36 (2.33)	2.11 (3.34)
Ancestor worship (neighbors, mother) X Post X Fraction of migrants from other origins			7.16 (13.05)
Town-birthyear FEs	Yes	Yes	Yes
Parents' ancestry-birthyear FEs	Yes	Yes	Yes
Family controls X Post	No	Yes	Yes
# of Mother's origin	37	37	37
# of Towns	274	274	274
# of Observations	12115	12115	12115
Outcome mean	0.529	0.529	0.529
Ancestor worship (neighbors, mother) s.d.	0.006	0.006	0.006

Notes: This table reports coefficients from estimating Specification (4) on the sample of aged 0-9 children whose parents are both migrants. The results from regressing male indicator on town-birthyear fixed effects, parents' ancestry-birthyear fixed effects, and a series of family controls. *Family controls*: birth order of the child, age of parents at child's birth, and years of schooling of parents, as well as whether parents are from the same origin. Standard errors are three-way clustered at the town level, migrant father's origin level and migrant mother's origin level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level.

* Significant at the 1 percent level.

Table A.12: Impacts on Women's Fertility and Marriage

Dependent variable	Lifetime	Childless	Never	Age at
	fertility		married	1 st marriage
	(1)	(2)	(3)	(4)
Ancestor worship (migrants)	5.02*** (1.60)	-0.20*** (0.04)	-0.79*** (0.10)	-22.51*** (4.25)
Birthyear FEs	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes
Geographic characteristics	Yes	Yes	Yes	Yes
# of Counties	23	23	23	23
# of Observations	5,581	5,581	5,581	5,252
Outcome mean	2.25	0.027	0.06	23.47
Ancestor worship (migrants) s.d.	0.012	0.012	0.012	0.012

Notes: The sample is women born in 1954-1963 in the Taiwan Knowledge, Attitudes, and Practice of Contraception Survey (2003). The dependent variables are the number of children ever born to the women (column 1), the probability of being childless (column 2), the probability of keeping unmarried (column 3), and age at the first marriage (column 4). All specifications include birthyear fixed effects, a set of historical controls, and a series of geographic characteristics *Geographic characteristics*: the suitability index of cotton, maize, wet rice, white potato, wheat, and tea; (ln)distance to seashore, (ln)distance to Taipei. Standard errors are all clustered at the county level.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

A.2 Ancestor Worship and Son Preference in China

Ancestor Worship and Missing Girls

Figure A.4 and A.5 jointly suggest that $AW_Density$ is positively correlated with fraction of males at birth. I first use the location-based approach to regress the fraction of males at birth on $AW_Density$ at the county level from the 2000 China Population Census. The estimation function is as followed:

$$Y_c = \alpha + \beta AW_Density_c + \mathbf{X}_c^G + \mathbf{X}_c^C + \lambda_g + \epsilon_c \quad (3.2)$$

where Y_c is the fraction of male at birth in county c on 2000. $AW_Density_c$ (mean = 0.28, s.d. = 0.13) is at the county level, \mathbf{X}_c^G is a matrix with geographical characteristics which includes the suitability index of wheat, wet rice, maize, white potato, cotton, and tea. λ_g absorbs the prefecture fixed effects. As the pre-modern historical controls are all at the prefecture level, it is absorbed by λ_g . Standard errors are allowed to be correlated within prefecture.

Estimates are reported in Table A.13. Comparing column 1 and 2, it implies that about 70% impact of ancestor worship on missing girls can be explained by unobserved factors among prefectures. For the rest of the 30% effect, which is consistent with added controls from column (2) to column (3). They show that one s.d. increase in the $AW_Density$ is associated with a 0.1 p.p. increase in the fraction of males at birth. Considering the fraction of males at birth is 53.5 p.p., 2.5 p.p. higher than biological normal; the estimator of $AW_Density$ is modest. However, as we cannot have an exogenous variant in generating ancestor worship and distract it from the mixture of cultures and institutions, the estimator could be over or under reported. A series of communist movements in the 1950s to 1970s in improving gender gaps and changed the social norms a lot which may explain the relatively small effects of ancestor worship in

China. Booth, Fan, Meng, and Zhang [2019] and Lippmann, Georgieff, and Senik [2020] both show that communist movements in mainland China and East Germany improve gender gaps in multi-dimensions.

Ancestor Worship and Beliefs of Son and Patrilineality

I test the effects of ancestor worship on individual beliefs, with the use of 2010 and 2014 China Family Panel Survey (CFPS).¹² As ancestor worship emphasizes the consistency of a patrilineal family and the importance of afterlife, people with higher ancestor worship prevalence should naturally think of the patrilineal family continuation, after death life, ancestors and sons are more important. In 2010 CFPS, people are asked questions about the importance of the continuation of your male family line (hereafter, patrilineality) and the importance of you will be remembered and venerated by your offspring (hereafter Memorial after death). In 2014 CFPS, people are asked questions about the importance of bring honours to your ancestors (hereafter, ancestors' honour) and the importance of you should have at least one son (hereafter, at least one son). The importance index in the both survey are ranged 0, 0.25, 0.5, 0.75, and 1. The higher the value, the more important they are for individuals. I estimate the following specification:

$$Y_i = \alpha + \beta AW_Density_c + \mathbf{X}_c^G \Omega + \mathbf{X}_c^C \Theta + \mathbf{X}_g^H \Phi + \mathbf{X}_i^I \Delta + \gamma_t + \Psi_p + \epsilon_{ic} \quad (3.3)$$

Where Y_i is the variables of interest for individual beliefs i . \mathbf{X}_c^G is a matrix with geographical characteristics which includes the suitability index of wheat, wet rice, maize, white

¹²CFPS is a large-scale, almost nationally representative panel data survey conducted by the Institute of Social Science Survey at Peking University. Through a multi-stage probability sampling procedure, CFPS completes interviews with a total of 14,960 sampled households and all individuals living in these households, amounting to 42,590 completed individuals. The 25 provinces of China covered by CFPS represent about 95% of the Chinese population in mainland China, with Hainan, Inner Mongolia, Ningxia, Qinghai, Tibet and Xinjiang excluded from the overall sample.

potato, cotton, and tea. \mathbf{X}_i^I is a matrix of individual controls including han ethnic, gender, years of schooling, and Chinese communist party membership. \mathbf{X}_g^H is a matrix of historical human and social capital accumulation in the g prefecture level, which includes the density of imperial scholars (*jinshi*), and Confucian clan. γ_t and Ψ_p are birthyear fixed effects the province fixed effects. I allow error term ϵ_{ic} to be correlated within county.

I report the results in Table A.14. It shows that people in the areas with higher ancestor worship prevalence, care more about and have a higher desire for patrilineal family continuation, being memorial after death, and ancestors' honours as well as the existence of sons. These results also provide support for *AW_Density* as a proper proxy for ancestor worship belief and practices.

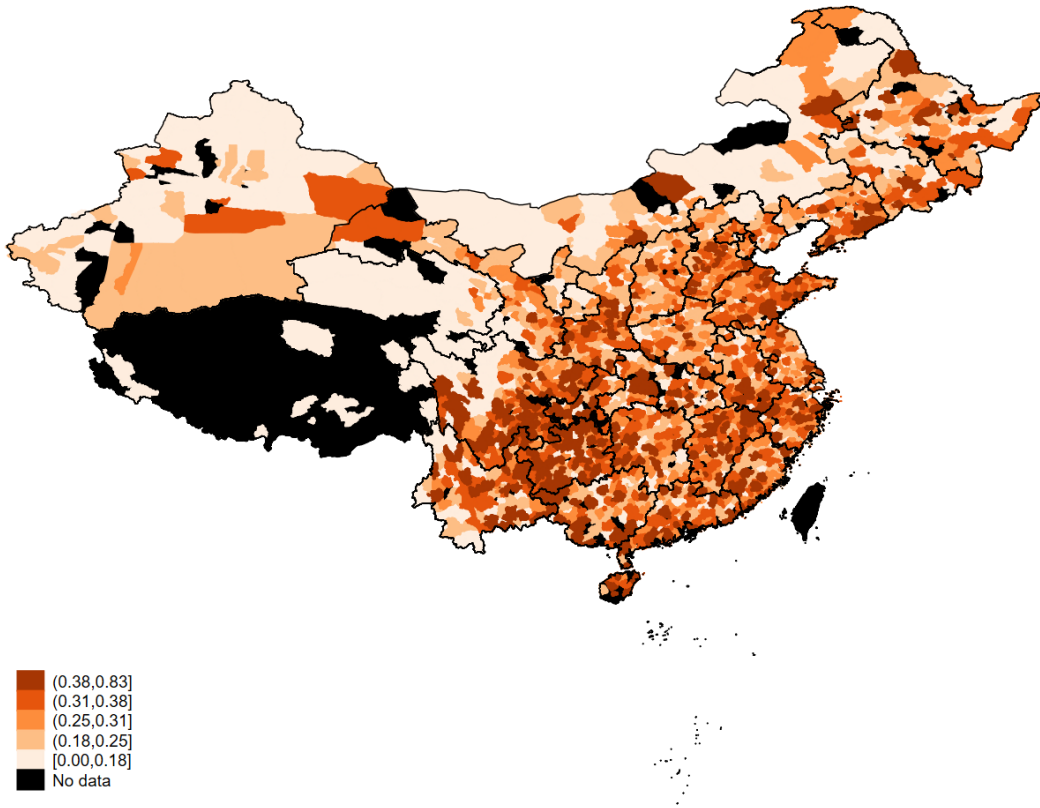


Figure A.4: Distribution of Ancestor Worship Density across Counties in China

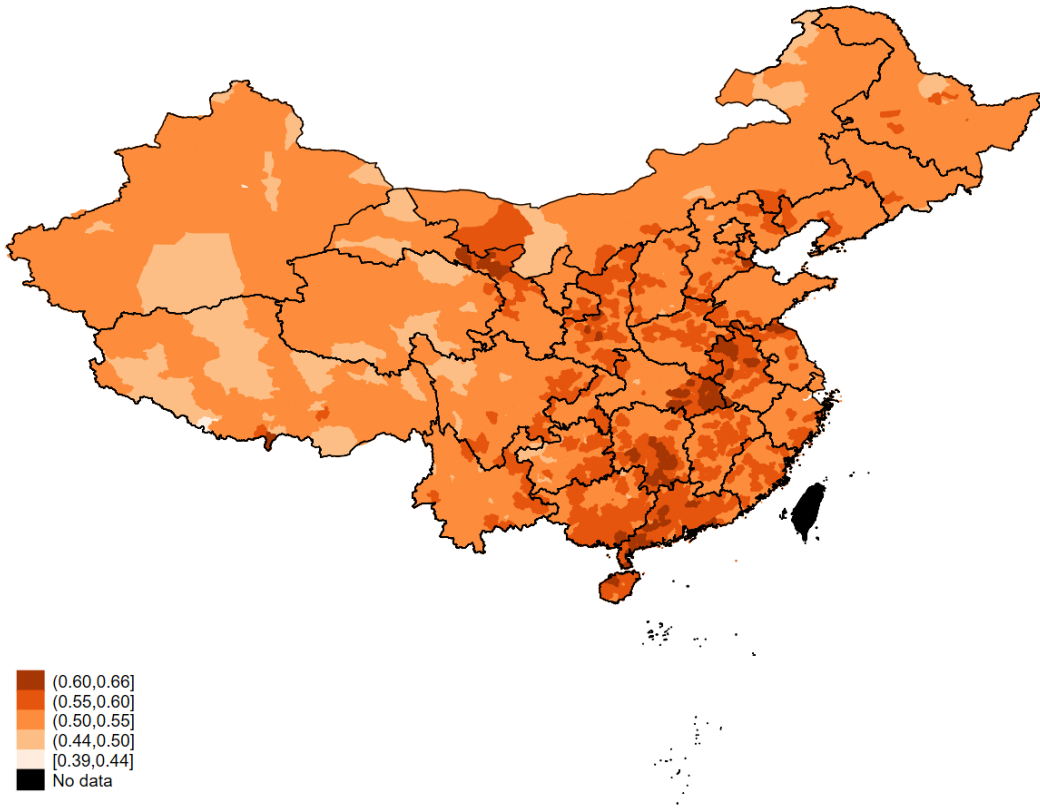


Figure A.5: Fraction of Male at Birth in China (2000)

Table A.13: The Impact of Ancestor Worship on Fraction of Male at Birth in China

Dependent Variable	Fraction of Male at Birth		
	(1)	(2)	(3)
AW_Density	0.031*** (0.006)	0.009** (0.004)	0.008** (0.004)
Prefecture FEs	No	Yes	Yes
Geographic characteristics	No	No	Yes
# of Prefectures	324	324	324
Observations (Counties)	2,365	2,365	2,365
Outcome mean	0.535	0.535	0.535
Outcome s.d.	0.027	0.027	0.027

Notes: This table reports OLS coefficients of AW_Density on fraction of male at birth in China Population Census 2000. *Geographic characteristics*: the suitability index of wet rice, wheat, white potato, maize, cotton and tea.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A.14: The Impact of Ancestor Worship on Beliefs in China

Dependent Variable: Importance of	Patrilineality	Memorial	Ancestors'	At least
	after death	honours	one son	
	(1)	(2)	(3)	(4)
AW_Density	0.16*** (0.06)	0.26*** (0.08)	0.13** (0.05)	0.23*** (0.08)
Province FEs	Yes	Yes	Yes	Yes
Birthyear FEs	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes
Geographic characteristics	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes
# of Counties	94	94	92	92
Observations	20,124	20,124	9,838	9,838
Outcome mean	0.770	0.612	0.766	0.660
Outcome s.d.	0.273	0.318	0.276	0.360

Notes: This table reports OLS coefficients of AW_Density on individual beliefs. The first two columns are estimated from CFPS 2010 and the last two columns are estimated from CFPS 2014. *Patrilineality* is the continuation of the patrilineal family line. *Memorial after death* is individual will be remembered and venerated by their descendants after death. *Ancestors honours* is individual should do things which make their ancestors and family glory rather than ashamed. *At least one son* is individual should have at least a son. The values of dependent variables in column 1-4 range from 0 to 1; the higher the value, the more important they are. *Individual controls*: han ethnic, gender, Chinese Communist party membership, and years of schooling. *Geographic characteristics*: the suitability index of wet rice, wheat, white potato, maize, cotton, and tea. *Historical controls*: both imperial scholars density and Confucian clan density. Standard errors are all clustered in the county level. Estimates are computed using the sample weights provided in CFPS 2010 and 2014.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 1 percent level.