Arrival of Young Talents: Send-down Movement and Rural Education in China *

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Abstract

Understanding human capital spillovers is important for both theory of economic growth and public policies in education. However, empirical evidence is sparse. Convincing identification requires an exogenous relocation of a group of better-educated people. China's send-down movement serves as an excellent natural experiment. From 1962 to 1979, the Chinese government mandated the temporary resettlement of roughly 18 million urban youth to rural areas. This study estimates the spillovers of those sent-down youths (SDYs) to the locals. From over 3,000 local gazetteers, we construct a unique county-level data set on numbers of SDYs that each county accepted during the movement. We find that the arrival of SDYs improves local residents' educational achievement. Such an effect can neither be explain by local government's endeavour to improve education nor by other historical events around the same period, such as the Great Famine (1959–1961) and the Cultural Revolution (1966–1976).

Keywords: Send-down Movement, Rural Education, Human Capital Spillovers

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All those intellectuals who can go to the countryside should go there happily. The countryside is a vast universe where there is plenty to be done.

—Mao Zedong, 1955

1 Introduction

Economists have been long showing interest in understanding the spillovers of human capital. The idea that human capital accumulation serves as an engine of economic growth can be traced back to Marshall (1890). Starting from Lucas (1988), growth theorists have emphasized that greater skill possessed by one agent may raise the productivity of others whom they interact. Understanding the existence and magnitude of human capital spillovers is also important from a policy perspective. Education is an important category of government expenditure and schools are often heavily subsidized. Large public investment in education is rationalized by the positive externality of human capital and its optimal amount is determined by social returns to human capital instead of private returns.

However, empirical studies have not yet reached a consent whether there exist significant human capital spillovers. The main challenge is identification. Think about a classic Mincerian equation that regression individual outcomes (e.g., wage) on local-average human capital after controlling for private human capital. The first attempt to estimate the human capital externalities using the Mincerian approach is Rauch (1993). Such strategy suffers from three limitations. The first is self-selection—people endogenously choose their residence according to their different personal characteristics. Follow-up studies use different instrumental variables for state/city average human capital to overcome the endogeneity.[1] The second identification challenge is the spatial equilibrium (Lange and Topel 2006). The approach investigating the effect of state/city-average human capital implicitly treats each state/city as separate economies. This is a strong assumption if there exists internal migration. Acemoglu and Angrist (2001) also admit in their paper that a drawback of their approach is "that it does not necessarily eliminate bias from state-specific wage shocks if there is substantial interstate migration in response." Lange and Topel (2006) found the association between aggregate wages and schooling declines substantially when spatial equilibrium is taken into account when replicating the previous work of Rauch (1993), Acemoglu and Angrist

[1]For example, Acemoglu and Angrist (2001) use variation in compulsory schooling laws over time in each state as an instrument for the state-average years of education. Moretti (2004) uses the (lagged) city demographic structure and the presence of a land-grant college in a city as instruments for the share of college graduates.

(2001), and Moretti (2004). The final challenge is that a person in a locality can affect others not only through spillovers but also through the labor market (Ciccone and Peri 2006). The inflow of high-skill workers can increase the wage of low-skill workers without raising their productivity if two types of workers are not perfect substitutes (Ciccone and Peri 2006; Iranzo and Peri 2009).

An ideal "experiment" that best helps us to understand human capital spillovers should satisfy three conditions. First, the relocation of the better-educated population should be exogenous (to overcome the self-selection). Second, internal migration should be difficult (to overcome the spatial equilibrium). Finally, the migrants and the locals should not compete in the same market (to overcome the effect through the labor market). We exploit China's send-down movement from early 1960s to late 1970s as a natural experiment, which nicely satisfies the above conditions because of the special political regime during the Maoist era, to understand human capital spillovers. The send-down movement is also known as "going up to the mountains and down to the villages" (*shangshan xiaxiang*), otherwise known as the "rustication movement." From 1962 to 1979, the government mandated the temporary resettlement of roughly 18 million urban youth to rural areas. They were called "educated youth" or "sent-down youth" (which we will refer to as "SDY") at that time. The youths to be sent down were mainly junior high school and senior high school graduates. During that time, the majority of children in rural China completed primary school at best,[2] not to mention the quality of schools in rural China were generally worse. Therefore, those sent-down urban middle-school-graduates were well-educated compared with the rural local residents.[3] After the decease of Mao, the movement quickly came to an end. By the 1980s, the vast majority of the SDY returned to urban areas. The question we wish to answer is, how does rural residents' temporary exposure to those better-educated SDYs during their schooling years affect their educational achievement?

The movement has three unique features that nicely fit above three conditions. First, the resettlement is mostly involuntary and the destination is determined by the government, not by SDYs themselves. If one refused to take part in the program, they could be accused of opposing the great strategy of Chairman Mao (Pan 2002), which would result in severe consequences back

[2]According to 1990 China Census of Population, 38.3% of rural people born between 1944 and 1956 (the control group we will refer to in the latter analysis) receive no schooling or did not complete primary school. 40.1% are primary school graduates. Only 3.9% pursue education beyond junior high school.

[3]In addition to fresh graduates, the rustication program also included government cadres, technically skilled person, workers, and jobless city dwellers (Pan 2003). We believe these people were also generally better educated compared with the rural residents.

then. Second, migration is highly restrictive in China at that time because of the household registration system (*hukou*). People cannot migrate freely of their wills. The 1958 codification of the household registration system decreed that all internal migration be subject to approval by the local government. Finally, China was a planned economy during the 1960s and 1970s. Therefore, there was literally no labor market during the send-down period. After the Chinese government initiated its market-oriented reform in the 1980s, the majority of SDYs had returned to the urban areas. Therefore, SDYs are unlikely to affect the local residents through the labor market.

To understand the spillovers of the SDYs to the locals, we manually compiled a county-level data set from over 3,000 book-length local gazetteers on the number of SDYs received by each county. Combining with the individual-level population census data, we evaluate how rural children's exposure to those better-educated urban youth affects their educational attainment. Our identification comes from two sources. First, different counties receive different numbers of SDYs. Second, within the same county, children from different cohorts are exposed differently depending on how their schooling years overlap with the movement. Empirical results suggest that the arrival of SDYs increases local rural children's years of schooling. Additionally, they hold a more positive opinion of education, have a higher tendency to pursue higher level education, and more likely to work as teachers after graduation. The positive effects also persist to their children. Our estimations are robust to a wide range of robustness checks and other contemporaneous historical events, including the Cultural Revolution and the Great Famine.

We highlight two mechanisms of human capital spillovers: direct instruction and the transmission of values. Because the rusticated youth were among the best educated in rural villages, many of them became teachers and instructed rural children. Teaching is the most straightforward way of knowledge transmitting. From local gazetteers, we collect information on numbers of local teachers and find its increases are closely associated with the arrival of SDYs. This channel is analogous to the work of Hornung (2014), who analyzes long-term effects of persecuted French Huguenots immigration in 1685 on firm productivity in Prussia. At that time, communication was virtually the only way of transferring technological knowledge, that took the form of Huguenot artisans instructing native apprentices and workers. Aside from direct instruction, human capital spillovers can also take the form of values and culture diffusion. We find evidence that rural residents hold a more positive attitude toward education and are less likely to believe their fates are pre-determined by family background. This channel shares a similar spirit as Barsbai et al.

(2017). Using data from Moldova, they find that migrants to Western Europe transmit different information and norms from migrants to Russia—communities with larger shares of westward migration become more pro-democracy.

Our study contributes to three strands of literature. The first strand of literature estimates the human-capital spillovers (Rauch 1993; Acemoglu and Angrist 2001; Moretti 2004; Ciccone and Peri 2006; Iranzo and Peri 2009). We contribute to the literature by exploiting the natural experiment of the send-down movement, which nicely addresses the identification issue because of the special political regime in China back to 1960s. Moreover, existing studies of human capital spillovers predominantly focus on the United States. There are few studies looking at the developing world, including China.[4]

The second strand of literature looks at the impact of the relocation of the talented. Several studies estimate how the flows of scientists affect the productivity of their collaborators (Azoulay, Graff Zivin, and Wang 2010), former colleagues (Waldinger 2012), students (Waldinger 2010), and incumbent scientists (Borjas and Doran 2012; Moser, Voena, and Waldinger 2014). The flows were driven by historical events, such as unexpected premature decease of academic superstars (Azoulay, Graff Zivin, and Wang 2010), scientists who left Germany during the Nazi era (Waldinger 2010; Waldinger 2012; Moser, Voena, and Waldinger 2014), and the influx of Soviet mathematicians after its collapse (Borjas and Doran 2012). The findings are quite mixed.[5] Our study differs from existing literature in two aspects. First, we study the internal migration within the same country, instead of international migration. Second, we study the spillover effect of those not-so-well-educated (junior or senior high graduates), if compared with the scientists in previous studies, on those even-worse-educated rural residents (primary school or below).

Finally, our research also contributes to the studies of China's send-down program. There is a large literature investigating how the send-down experience affects the SDYs themselves in various aspects, including marriage (Song and Zheng 2016), education (Meng and Gregory 2002; Xie, Jiang, and Greenman 2008; Zhou 2014), income (Xie, Jiang, and Greenman 2008; Yang

[4]To the best of our knowledge, Liu (2007) and Fan, Ma, and Wang (2015) are the only two studies estimating the externalities of human capitals in China. They use a Mincerian approach and estimate how city-average years of education (Liu 2007) and provincial share of college graduate (Fan, Ma, and Wang 2015) affect individual earnings.

[5]On one hand, there seem to exist strong positive spillovers among scientists who directly collaborate with each other (Azoulay, Graff Zivin, and Wang 2010; Waldinger 2010). On the other hand, the spillovers seem to be negligible or even negative for scientists who are not directly related (Borjas and Doran 2012; Waldinger 2012; Moser, Voena, and Waldinger 2014). The negative spillovers are often explained by the competition for limited academic resources.

and Li 2011), inter vivos transfer (Li, Rosenzweig, and Zhang 2010), subjective wellbeing (Wang and Zhou 2017), political attitudes (Harmel and Yeh 2016), beliefs and values (Gong, Lu, and Xie 2015), financial behavior (Fan 2017), and entire life course (Zhou and Hou 1999). However, the impact of SDYs on rural areas that accept them, in which over 80% of Chinese population lived in during the 1960s, remains under-explored. Kinnan, Wang, and Wang (2017) argue that temporary migration due to the program created lasting inter-province links, which results in increased access to migration decades after the program ended. Xing and Zhou (2017) provide evidence that *zhiqing* became familiar to the residents living in regions where *zhiqing* are sent down. Henceforth, there are more bilateral trust and trade between the source province and the destination province. We complement their studies by providing evidence that the effects of SDYs go beyond inter-province links and migration opportunities. Moreover, both Kinnan, Wang, and Wang (2017) and Xing and Zhou (2017) look at inter-province flow of SDYs. Our data further go down to the county-level and also include the intra-province flow of SDYs, which account for 92.1% of total SDYs (Table 1).

To our knowledge, two studies that are closely related to our paper are Wantchekon, Klašnja, and Novta (2014) and Rocha, Ferraz, and Soares (2017). Wantchekon, Klašnja, and Novta (2014) track down the first students in regional schools in colonial Benin in the early twentieth century. They find large village-level human capital externalities—descendants of the uneducated in villages with schools perform better than those in villages without schools. The exogenous shock in their study originates from the establishment of colonial schools. Our study exploits the arrival of better-educated sent-down-youth from urban areas. Moreover, the scope of the event in our study is much larger. The movement reallocated 18 million people from cities to countryside. If taking into account SDYs' families and the villages that accepted them, almost the entire country got involved. Rocha, Ferraz, and Soares (2017) study the persistent effect of state-sponsored settlements located in the Brazilian state of São Paulo in the late nineteenth and early twentieth century, which attracted immigrants with higher levels of schooling. They find the initial shock persisted all the way up to 2000—municipalities that had received a state-sponsored settlement have higher average education and income. However, immigrants attracted to Brazil were voluntary. In contrast, the majority of China's rusticated youths did not go to the countryside at their will.

The remainder of this paper is organized as follows. Section 2 briefly reviews the relevant

institutional background. In Section 3, we introduce the data set used in this study. Section 4 discusses the econometric set ups and Section 5 reports the main results. Section 6 discusses the possible mechanisms of human capital spillovers. Section 7 concludes.

2 Institutional Background

This section provides a brief overview of the send-down movement and we concentrate on the institutional details that are most relevant to the human capital spillovers of the SDYs. The first subsection reviews the timeline of the movement, whose scope and purpose vary in different stages. The remaining subsections answer three questions. Who were those SDYs? Where were they sent to? What did they do in rural China? Those are important questions for understanding the exogeneity of the SDY flows and their possible externalities in the destination counties.

2.1 Send-Down Movement: A Brief History

The send-down movement began in 1953, reached its height during the Cultural Revolution (1966–1976), and ended only in 1980. The official goal of the rustication program was two-fold: solving the urban unemployment and developing rural areas (Pye 1986). In the early 1950s, the newly founded People's Republic of China faced severe urban unemployment problems. It was government's duty to assign jobs during the era of planned economy. In response, starting from 1953, the government began to encourage rural school-leavers to go back to their home villages instead of staying in the urban areas.[6] The program was enthusiastically supported by the Chairman Mao Zedong, who commented in December 1955 that "All those intellectuals who can go to the countryside should go there happily. The countryside is a vast universe where there is plenty to be done." The *Guangming Daily* on 11 September 1957 reported that there had been two million middle school graduates who did not go on to a higher level of education and joined the agricultural production in their home villages. These people were called "returned youth" (*huixiang qingnian*).[7] From 1953 to 1961, very few youth originated from urban areas were sent to rural sites. The estimated number is only about 15,000 (Liu 2009).

[6] This happened before the official issuance of the household registration system, which came into effect in 1958. After that it became very hard for rural students to stay in urban areas.

[7] "Returned youth" usually refers to those rural students who received education in urban areas and went back to rural areas after their graduation. "Educated youth" (*zhiqing*) refers to those students who originated from urban areas.

The large-scale rustication program that targeted urban youth began in 1962, after the Great Leap Forward in 1958–1961. With the disastrous Great Famine, the government was aware of the failure of the Great Leap Forward and decided to adjust its policy. One measure was to reduce the number of industrial workers and send people to the countryside to reduce the burden of providing food to non-agricultural population. About 20 million people were sent back to the countryside (Liu 2009). The urban youths were also affected by a reinforced rustication program. There were two important forms of enforcement. First, the organization was transferred from local governments to the central government. Second, the political significance of the program was emphasized. The media stressed more that the movement as a great social revolution to bridge three major differences: between town and countryside, workers and peasants, and mental and manual labor (Liu et al. 1995). Between 1962 and 1966, the rustication program sent an estimated 1.29 million urban youths to the countryside (Bernstein 1977). At this stage, the urban youths going to the countryside were still mostly voluntary.

With the outbreak of the Cultural Revolution in 1966, the movement entered an entirely different stage—over 16 million urban youths were mandatorily sent to the countryside against their wills. Three motivations drive the massive send-down movement. First, students could not continue their education with the severe disruption in the function of educational institutions. All schools were shut down for 2–3 years at the beginning of the Cultural Revolution. College entrance exam was suspended for 11 years. Second, unemployment soared in the urban areas. China's economy suffered greatly, with its industry output fell by 13.8% in 1967 and 4.2% in 1968. With the national-wide turmoil, fresh graduates from middle schools were almost impossible to get jobs in urban areas, which were previously assigned by the government. As a result, urban students graduated during the years 1966–1968 had neither opportunities of continuing education nor employment. "Going up to the mountains and down to the villages" became their only option. In Chinese, there is a special term for the graduating classes of 1966, 1967, and 1968—"three old classes" (*laosanjie*). The third motivation was to discharge the Red Guards and end the chaos in urban areas. The Red Guard organization was formed by teenagers, most of whom were junior or senior high school students. The Red Guards were used as a political weapon to fight those persons opposed to Mao's policies during the first few years of the Cultural Revolution. However, the revolution had spiralled out of control and turned into "red terror." To resolve the violence, Chairman Mao issued instructions to send millions of urban youth down to the countryside for

"re-education." The large-scale send-down movement was made official in December 1968, when Chairman Mao stated in a speech that "it is very necessary for the urban educated youth to go to the countryside to be re-educated by the poor farmers!" (*People's Daily* on 22 December 1968). Figure 1 shows that about 4.7 million urban youth were sent down within three years from 1967 to 1969. After three years' intensive mobilizations, the government allowed a larger proportion of the middle school graduates to enter the urban labor force. A second peak of the movement arrived in 1974, one year after the National Work Conference on the Educated Youth, which re-emphasized the political importance of the movement.

There was ample anecdotal evidence that most SDYs at the time were reluctant to go (Bernstein 1977; Unger 1979; Gold 1980; Chen and Cheng 1999; Zhou and Hou 1999).[8] The reason is simple: the *hukou* system categorized people into urban or rural based on parents' place of origin and directly tied social welfare to their *hukou* status. It has been well documented that urban *hukou* holders enjoyed significantly better social welfare at that time (Bian 2002; Wu and Treiman 2004).

After Chairman Mao's decease in September 1976, the ideological pressure for continuing the program vanished gradually. In 1978, the new central leadership began considering to end the program. The year 1978 also witnessed a sudden decline in rusticated youths (Figure 1). Meanwhile, there were large-scale protests from the SDYs, who were motivated by their endeavor to return home. The protests began in Yunnan in late 1978 and were quickly spread to Xinjiang, Shanghai, and other places (Deng 1993). The protests exerted severe pressure on the government. Eventually, in September 1980, the central government decided to discontinue the movement (Gu 2009). The vast majority of the SDY returned to urban areas afterward. Only about 5 percent of SDYs never returned because they were married to local farmers or were assigned nonagricultural local jobs (Liu et al. 1995).

[8] Although many youths were claimed to go "voluntarily" to the countryside. However, many of them were overwhelmed by the severe social pressure. During the Cultural Revolution, the movement was no longer just an economy issue trying to alleviate the urban unemployment. It became a more political issue. People belonging to the "red class" wanted to show their loyalty to Mao, even if that meant being rusticated. On the other hand, youth in the "black classes" also wanted to seize the opportunity to make a break from their parents class (Pan 2003).

2.2 The Flow of the SDYs

Table 1 summarizes the total number of SDYs sent and accepted by each province. A vast majority were reallocated within the province and only 7.9% (1.4 million) were sent outside the province. This implies the inter-province flow of SDYs, that is highlighted in Kinnan, Wang, and Wang (2017) and Xing and Zhou (2017), is only a small part of the movement. Among the 1.4 million inter-province SDYs, the three municipalities—Beijing, Tianjin, and Shanghai—account for 87.3% of it (0.87 million). This signals that youths in more developed urban areas were more likely to get involved in the rustication program and had a higher chance of being sent far away. One justification for such design is that those cities were more urbanized and did not have sufficient rural areas to absorb all urban youths in the locality.

Rusticated urban youths from the same places could be sent to vastly different places across the entire country. Some urban youths were sent to rural areas near their home city. But others, especially those from large cities, were sent to other provinces, sometimes thousands of kilometers away. For example, 0.72 million out of 1.26 million Shanghai SDYs were sent outside Shanghai. Among those SDYs, some were sent to provinces close to Shanghai (e.g., 150 thousand were sent to Anhui, a province about 300 kilometers away), while others were sent very far away, such as Yunnan (60 thousand, 4,000 kilometers away), Heilongjiang (170 thousand, 1,700 kilometers away), and Xinjiang (100 thousand, 3,900 kilometers away) (Gu 2009). The destination of the SDYs was also partially related to a military purpose because of China's intense international relationship with the Soviet Union, Mongolia and Vietnam from the late 1960s to early 1970s. From Table 1, we see that four provinces—Inner Mongolia, Heilongjiang, Yunnan, and Xinjiang—received 0.75 million out of the 1.42 million (53%) inter-province relocated SDYs. One common feature of those four provinces is that they are on the border of the country. Many of the SDYs there worked in army farms on the frontiers (Shi and He 1996). In addition to the border provinces, two other types of provinces also received many inter-province SDYs: (1) major grain producing provinces (Anhui, Sichuan, Jiangsu, and Hunan) (2) old liberated provinces (Shannxi and Jiangxi). The former type of provinces are able to secure the food need of the extra population and the latter serves the purpose of political re-education.

One important feature of the movement is that neither the urban youth nor the local government can determine the flow of SDYs. Both the send-down quota and the destinations of the

urban youths were planned by the central government in a top-down manner (Bernstein 1977; Pan 2002). Therefore, the coerciveness not only applies to the rusticated youth but also applies to counties that received them. At the early stage of the movement, the locals in the country often refused to accept those educated youths because they were viewed as a burden—the SDYs could not do farming but only consume food. Things changed in 1968. In his 1968 speech, Chairman Mao not only highlighted the importance of "re-education" to the urban youth, but also emphasized that "the comrades in the countryside should welcome them" to the locals. Meanwhile, the central government started to distribute settlement allowance for each sent-down youth to their destination places. The primary takeaway here is that local government had little control over how many SDYs to receive.

2.3 What did SDYs do in Rural China?

There were three major approaches that the SDYs are resettled: to rural villages (also known as *chadui*), to collective farms, and to state farms (see Figure 1). Rural villages absorbed the majority of the SDYs (12.8 million out of 17.7 million). 2.0 million SDYs were sent to collective farms and 2.9 millions were sent to state farms (Gu 2009). During that period, agricultural production in rural China took the form of production teams (*shengchandui*). In the production teams, people earn "work points" according to their amount of farming work. The production team shares food and income according to the work points at the end of the year.

Life was hard for the SDYs because they grew up in urban areas and had never worked as farmers before. SDYs still could not earn enough work points to feed themselves because of the lack of experience in the agricultural production. Chen and Cheng (1999) wrote that "To many urban youth, including us, the send-down episode remains among the most difficult experiences in our lives—we suffered from a lack of material supplies, removal from our families, an unfamiliar environment, harsh physical labor, and so on." Because of such reality, SDYs started to be assigned more technical jobs instead of traditional manual jobs. According to a report published by the Office of Educated Youth (*zhiqingban*) under the State Council titled "Summary of the National Sent-Down-Youth from 1962 to 1972," about 11.7% of the SDYs were assigned such type of jobs from 1962 to 1972. The share grew steadily during the rustication movement. For example, Liu (2009) documented that in Spring 1976, Huaide county in Jilin province reported that 7,000 SDYs were taking cultural or technical jobs, accounting for 70% of total SDYs in that

county. Gu (2009) documented that in the year 1975, 32,421 SDYs in Jilin province worked as study counselors, agricultural technicians, bare-foot doctors, community school teachers, et al. Moreover, many SDYs grew up to become local leaders. Office of Educated Youth reported in 1981 that 2.93 millions SDYs worked as cadres at various levels in the year 1974, accounting for 4.3% of SDYs at that time.

The SDYs were not simply inferior manual labors in the farmland. They bridged urban and rural areas by taking non-agricultural jobs, which were not prevalent in rural China back then. They exerted externalities onto the local residents by bringing new technique, knowledge, and ideology from urban China. Kinnan, Wang, and Wang (2017)'s and Xing and Zhou (2017)'s studies also confirm that the SDYs flow created persistence connections between the source and destination provinces of SDYs.

3 Data

Understanding the spillover effects of SDYs flow on local rural population requires two sets of information—that on the SDYs and that on the rural residents. First, from over 3,000 book-length local gazetteers, we construct a unique county-level data set on the number of received SDYs during the rustication movement. Second, we match the county-level information on SDYs to various micro-level survey data. The main outcome variable of interest is educational attainment, which comes from the 1990 census of population. We use other micro-level data to complement our analysis. For example, we use the 2010 wave of China Family Panel Study to understand the influence on attitudes toward education and use 2010 census to estimate the persistent effect on the second generation.

3.1 Local Gazetteers

The main source of SDYs flow at the county level is local gazetteers (*xianzhi*). These are book-length volumes of local history documenting the major events ever happened in the county. Therefore, it is often regarded as the "encyclopedia" of a locality. Most local governments pay great attention to the compilation of local gazetteers and update them periodically because they are viewed as a type of local pride. Often, a committee composed of dozens will be in charge. The gazetteers we collected are mostly published in the 1990s and 2000s. We focus on the information

related to SDYs. For example, local gazetteers of Taihu county in Anhui province published in 1995 documented that

> "*From 1968 to 1977, we received 3,697 educated-youth from Shanghai, Hebei, Anqing, and urban area within the county. Among them, 366 are from Shanghai, 1,596 are from Anqing, 1,498 are local, 237 are from Hefei and other places.*"

From above description, we can collect (1) the total number of SDYs received by each county during 1968–1977 and (2) the number of SDYs from the urban areas within the same county (local SDYs) and the number from outside the county (inflow SDYs). We divide the county-level received SDYs by its population in 1964, that is obtained from the second census of population, to generate the density of SDYs. We choose the year 1964 because this is the only year during the 1960s in which county-level population is available. Because year 1964 is ahead of the Cultural Revolution as well as the massive rustication program, the 1964 county-level population is unlikely to be reversely affected by the flow of SDYs.

We manually collect 3,153 gazetteers for all 2,865 county-level division in China.[9,10] We exclude 52 counties/districts in Beijing, Tianjin, and Shanghai. We also drop 819 city-governed districts (*shixiaqu*) in other provinces and because those districts/counties are more developed areas and we are mainly interested in rural areas. Finally, we manage to find information about SDYs for 1,715 counties out of the remaining 1,994 counties (86%). Figure 2 illustrates the regional variation in the number of received SDYs in those counties.

People may have concerns about the accuracy of those numbers of SDYs in local gazetteers. We argues those numbers are trustworthy for following reasons. First, during the period when the local gazetteers were compiled, the send-down movement is not a sensitive topic, as opposed to more politically sensitive topics such as the local fatalities during the Great Famine and victims during the Cultural Revolution. An interesting supporting evidence is that there are no official statistics about the fatalities during the Great Famine and the Cultural Revolution. In contrast, there are numerous official documents about the send-down movement (see Gu (2009) for a comprehensive collection). Second, many local governments are thankful for the SDYs and proud for their

[9]Two reasons explain why the number of gazetteers exceed that of counties. First, it is possible that there are multiple gazetteers for the same county on different topics. Second, some counties compiled one gazetteer during the 1990s and another during the 2000s.

[10]We cross-verify our data from the local gazetteers with seven volumes of "Sent-Down Movement Historical Data Collection" (Jin and Jin 2015). Note that Jin and Jin (2015) missed 171 counties in their compilation.

contribution made in the countryside, as discussed in the previous section. Third and most importantly, local government usually kept a good record of SDYs because settlement allowance was distributed according to how many SDYs the locality accepted.

To understand the representativeness of our county-level data, we compares our county-aggregation at the province level to the numbers from a national report which is documented in Gu (2009) in Table 2. The ratio varies from 60%–80% for most provinces. Three reasons can account for the gap. First, the national statistics cover a longer span than the county-aggregate (1962–1979 versus 1968–1977). If we take into account the differential length in span, the ratio becomes 72%–96%. Moreover, provinces who first started receiving SDYs would be affected more. For example, Heilongjiang and Xinjiang are among the first to receive SDYs because there were thinly populated areas with large unreclaimed arable land (Zhang 1986). Second, the local gazetteers only cover SDYs received by the local government. 2.9 millions out of 17.7 million SDYs were sent to state farms during the movement. State farms did not distribute evenly across the country. The largest army farm organization was the Xinjiang Production and Construction Army Group (*Xinjiang Jianshe Bingtuan*). We verified that the local gazetteers in Xinjiang province do not count SDYs sent there. Heilongjiang also had many state farm because of the intense relationship between China and the Soviet Union during the 1960s. The SDYs sent there were separately recorded in the farm chronicles (*nongchangzhi*). The above two reasons explain why the ratios are especially low in Xinjiang (42%) and Heilongjiang (26.5%). The third reason is that we exclude more developed city-governed districts.

We complement our main analysis with two additional county-level variables—victims during the Cultural Revolution and the numbers of teachers during the 1960s and 1970s. The Cultural Revolution is arguably the most relevant historical event associated with the send-down movement. We take the numbers of victims in each county from the "China Political Events Dataset, 1966-1971" (Walder 2017), that was also constructed from local gazetteers. Teaching is the most direct approach that the urban youths pass their knowledge to the local children. Therefore, the numbers of teachers are helpful in understanding what SDYs did in the countryside and the mechanisms of human capital spillovers. We find this piece of information from local gazetteers for 606 counties. A subset of them have very detailed descriptions, that allow us to separate teachers into primary school teachers and secondary school teachers; into public (*gongban*) school teachers and community (*minban*) school teachers.

3.2 Census of Population

We use the 1% sample from the 1990 China's Census of Population (census 1990 hereafter) to evaluate how rural people's individual exposure to the SDYs affect their educational outcomes. As previously mentioned, the majority of rural children back then finished primary education at best. Therefore, we define individuals' exposure according to whether their primary schooling years overlap with the massive send-down movement. We focus on cohorts born between 1944 and 1969. Among them, we define 1957–1969 cohorts as the treatment group and 1944–1956 cohorts as the control group. Cohort 1957 is the first affected cohort because they are supposed to be at their fifth year of primary school in the year 1968, the year in which the massive rustication movement began. Cohort 1969 is the last affected cohort because they start their primary education in the year 1976. Starting from 1977, the SDYs gradually returned to the urban areas. Two rationales make census 1990 suitable for this study. First, the majority of the affected cohorts should have completed their education by 1990. Earlier census does not satisfy this condition. The third census of population took place in 1982. In that year, the youngest cohort in our analysis (born in 1969) only aged 13, which is too young for the analysis of educational outcome. Second, migration was still in limited scopes in 1990. Migration can threaten our identification if people do not live in the same county as when they were students. China's mass migration had not started in 1990. The migrant size grew rapidly during the 1990s because of the huge demand for unskilled labor as a result of the influx of the foreign direct investment. The government also loosened its control over rural-urban during the 1990s (Meng 2014). The estimated number of migrants in China rose from 22.6 million in 1990 to 78.8 million in 2000 (Fan 2008), and to 242.2 million in 2010 (National Bureau of Statistics of China 2011).

To increase the variations in schooling outcomes, we not only code the highest level of education received, but also code the completion status. Before the enforcement of China's Compulsory Education Law in 1986, school dropouts were prevalent in rural China. For example, in our sample, 13.8% of those who attended primary school did not complete it. The rate is even higher for higher-level education. We assume that people receive six years of education if they graduate from a primary school. If they drop from primary schools, we will code the schooling years to be three. We code higher-level schooling years in a similar approach.[11] We also use dummy variables

[11]Note that such way of coding is to approximate the genuine years of education, which are difficult to compute precisely because of the historical shifts in China's education system. For example, prior to the outbreak of the

indicating whether people completed primary/junior high education as alternative measures of schooling outcomes.

After combining the census data with the county-level data on SDYs and excluding the migrants who do not live in their *hukou* registration county/prefeture,[12] we end up with a rural sample of 2,768,635 and an urban sample of 415,058. The rural sample is of primary interest and the urban sample serves for the comparison purpose. Table 3 presents the summary statics of census 1990, which displays a huge rural-urban gap (column (1) versus column (3)) in educational attainment. Urban sample of our control cohorts (1944–1956) on average receive 9.0 years of schooling, but their rural counterparts only receive 60% of that amount (5.4 years).

We would like to add one remark before we proceed further. The comprehensiveness of information related to SDYs varies across counties. Whereas some counties record in great detail (e.g., total number, separate numbers from each source, when they arrived, when they left) in the local gazetteers, other counties only mention the aggregate number. For example, we would lose about 20% of the sample if we wish to separate inflow-SDYs from local-SDYs. We are subject to sample selection problem if the comprehensiveness of the information is not random. To evaluate such possibility, we report in column (2) of Table 3 the summary statistics of a subsample that allows the separation between inflow-SDYs from local-SDYs. The numbers in column (2) are almost identical to those in column (1), suggesting a limited scope of sample selection.

4 Empirical Strategy

Our identification strategy builds on two sources of variation. First, counties received different numbers of SDYs during the movement. Second, within the same county, children from different cohorts are exposed differently depending on how their schooling years overlap with the movement.

Cultural Revolution in 1966, primary-secondary education generally took the form of 6-3-3, which means 6 years of primary school, 3 years of junior high school and 3 years of senior high school. The system was compressed to 5-2-2 during the Cultural Revolution and gradually restored to 6-3-3 after its end (Hannum 1999). In summary, if we observe a positive effect of SDYs on our imputed "years of education," we can interpret it as either more advanced education level or higher probabilities of graduation.

[12] Our key dependent variable (education) comes from 1990 census and the send-down movement took place in the 1960s and 1970s. Therefore, we implicitly presume people live in the same county 20 years ago. This assumption is less likely to hold for the migrant sample. Note that no-migrant restriction is much weaker for the rural sample—the restriction excludes 2.0% of the rural sample and 9.3% of the urban sample.

More specifically, our main estimating equation is the following:

$$\text{Y\_Edu}_{i,g,c,p} = \beta_0 + \beta_1 \%\text{SDY}_{c,p} \times I\left(1957 \leq g \leq 1969\right) + \beta_2 X_{i,g,c,p} + \lambda_c + \mu_{g,p} + \varepsilon_{i,g,c,p}, \quad (1)$$

where $\text{Y\_Edu}_{i,g,c,p}$ refers to the years of education of individual i of cohort g in county c of province p. $\%\text{SDY}_{c,p}$ is the density of received SDYs in county c during the movement, which is calculated as the ratio of received SDYs to the county population in 1964. We also try an alternative specification that using the level of SDYs (instead of ratio) and control for the county population in 1964. The results are very similar. $X_{i,g,c,p}$ is a vector of individual-level controls, including gender and ethnic. λ_c are county fixed effects, which absorb all county-level characteristics that are invariant across time, geographic for example. $\mu_{g,p}$ are the province-cohort fixed effects, which allow different provinces to have different cohort trend. Standard errors are clustered at the county level.

The primary parameter of interest in this study is β_1 in front of $\%\text{SDY}_{c,p} \times I\left(1957 \leq g \leq 1969\right)$. Note that $\%\text{SDY}_{c,p}$ is included in the county fixed effects λ_c and $I\left(1957 \leq g \leq 1969\right)$ is included in the province-cohort fixed effects $\mu_{g,p}$. Therefore, equation (1) can be viewed as a difference-in-difference specification. By introducing province-cohort fixed effects, we not only make no assumption on the functional form of cohort trend, but also allow the trend to be different across provinces. This specification also excludes any possible influence from changes in educational policies at the province level. We can further test the hypothesis that the SDYs from far away exert larger spillover effects than do the local SDYs with a similar specification:

$$\begin{aligned} \text{Y\_Edu}_{i,g,c,p} \quad = \quad & \beta_0 + \beta_{1,1} \%\text{SDY\_inflow}_{c,p} \times I\left(1957 \leq g \leq 1969\right) \\ & + \beta_{1,2} \%\text{SDY\_local}_{c,p} \times I\left(1957 \leq g \leq 1969\right) \\ & + \beta_2 X_{i,g,c,p} + \lambda_c + \mu_{g,p} + \varepsilon_{i,g,c,p}. \end{aligned} \quad (2)$$

Our estimation should be interpreted as the lower bound of the spillover effects of the SDYs for two reasons. First, we treats cohort born between 1944–1956 as the control group. Even if they had passed the age of primary education, they could still benefit from those better-educated SDYs (e.g., went back to school if previously dropped out) or benefit from their younger rural peers in the same village. We would underestimate the spillovers in this scenario. Second, our

specification implicitly assumes rural people who received their primary education from the 1960s to 1970s stay in the same county when 1990 population census took place. Overall, this is not a strong assumption given China's rigid household registration system. According to the 1% sample from the 2000 China's Census of Population,[13] 86% of the rural people born between 1944 and 1969 lived in the same county as their birthplace. 83.3% of these people (71.2% of the cohorts) even did not move out of the township, a smaller administrative unit than county. We believe those numbers to be even larger in 1990. However, it is true that the best-educated in rural areas are significantly more likely to migrate (Zhao 1997). Therefore, our specification is likely to miss those best-educated rural children who go beyond junior-high-school level.

5 Empirical Results

5.1 Main Results

Table 4 presents the main results of the paper. We separately report the rural sample and the urban sample. Most ideally, we should divide our sample according to their *hukou* status in 1966. However, such information is not available in the census 1990. Because the changes in *hukou* status are predominantly rural-to-urban, we can safely assume the rural sample in 1990 also held rural *hukou* back in 1966. For completion purpose, we also report the results using the 1990 urban sample as a comparison.[14]

Table 4 presents the main results of the paper. Column (1) shows that the SDYs have strong spillover effects. The coefficient is 2.226 and is positively significant. The average density of SDYs is 1.84% (184 SDYs per 10,000 locals). This implies exposure to SDYs raises rural children's education by 0.041 years. The effect is not trivial and the magnitude is comparable to the effect of Compulsory Education Laws in the United States in the first half of the 20th century,[15] not to mention that the rustication movement never targeted at improving the education in rural China and our estimates only provide a lower-bound estimate.

[13] We calculate hose numbers using the 2000 census because such information is not available in the 1990 census.

[14] But those results should be interpreted with caution. On the one hand, those people might still be affected if they lived in rural areas during the rustication movement and moved to urban areas afterward. On the other hand, we treat cohorts born between 1944–1956 as the control group. However, urban cohorts could be the direct targets of the SDY movement. For example, the most severely-affected cohorts—"three old classes"—were born between 1947–1952.

[15] The range of the estimates is between 0.025 and 0.05 (Angrist and Keueger 1991; Acemoglu and Angrist 2001; Lleras-Muney 2005).

Table 4 column (3) compares the differential spillover effect of SDYs from urban areas within the same county (local-SDYs) and SDYs from outside the county (inflow-SDYs).[16] The spillovers of inflow-SDYs are about 30% higher than that of the local SDYs. There are several possible explanations. First, inflow-SDYs can be better educated. As introduced in the background section, urban youths in more developed cities were more likely to be sent far-away. Put it more formally, the 2010 wave of China Family Panel Study (CFPS) covers 815 who self-report to be sent-down during the movement. People who were sent outside their home province receive 0.91 year of education conditional on gender, ethnic and birth cohorts. Second, knowledge carried with the inflow-SDYs was more likely to be new to the local people. China is a large country. People in different regions share very different culture, language, and technology. Therefore, inflow-SDYs may make larger contributions to the local stock of knowledge. Finally, inflow-SDYs increase local people's access to the outside world (Kinnan, Wang, and Wang 2017; Xing and Zhou 2017), and therefore, increase the returns to education (Zhao 1997).

The result using the urban sample (Table 4 column (4)–(6)) also gives the expected sign. However, the effect is mainly driven by the baseline cohort (1944–1956) instead of "treatment" cohort (1957–1969). For the urban people, living in a county with high $\%\text{SDY\_local}_{c,p}$ implies that they have a higher probability of being sent-down, which negatively affect their educational attainment because they are less likely to complete the corresponding level of education (Meng and Gregory 2002). Cohorts born between 1957–1969 are less affected by $\%\text{SDY\_local}_{c,p}$ because they were too young to be sent-down. This explains why the coefficient in front of $\%\text{SDY\_local}_{c,p} \times I\left(1957 \leq g \leq 1969\right)$ is large. Meanwhile, $\%\text{SDY\_inflow}_{c,p}$ has no such effect and its coefficient is much smaller, lending support to our conjecture.

For brevity, we only report the results using rural sample in the remainder of this paper. The urban sample tells a different and more complicated story. Appendix A shows our main results are robust to various robustness checks, including: (1) different bandwidth of treated cohorts, (2) allowing junior high school education to be affected by SDYs, and (3) imposing stronger assumptions on migration.

[16] Column (3) implicity imposes the restriction that the information from local gazetteers allow the separation between inflow-SDYs and local-SDYs. The comparison between the first two columns indicates the restriction has little effect on our estimation.

5.2 Tests of Common-Trend Assumption

The most important assumption for a difference-in-difference specification is the common-trend assumption. Although we rule out all possible heterogenous trends at the province level by controlling for province-cohort dummies, we cannot eliminate the possibility that there exists heterogenous trends at the county level within the province.To test the common-trend assumption, we run following regression (cohort 1944 serves as the baseline),

$$\text{Y\_Edu}_{i,g,c,p} = \beta_0 + \sum_{\gamma=1945}^{1969} \beta_{1,\gamma} \%\text{SDY}_{c,p} \times I\left(g = \gamma\right) + \beta_2 X_{i,g,c,p} + \lambda_c + \mu_{g,p} + \varepsilon_{i,g,c,p}. \quad (3)$$

Figure 3 plots the coefficient $\beta_{1,\gamma}$ for each cohort. The figure lends strong support to the common-trend assumption. The coefficients fluctuate around zero before cohort 1956, suggesting that after controlling for province-cohort dummies, there were no heterogenous cohort trend in education with regard to the share of SDYs prior to the rustication movement. The coefficients gradually become larger starting from cohort 1957 and peak during the cohorts 1959–1964, whose primary schooling years almost entirely overlap with the movement. The effect declines afterward as the movement was coming to an end and the SDYs were returning to the urban areas.

5.3 Heterogeneity

Table 5 estimates the heterogenous effect of the SDYs on the locals by different education levels (primary school versus junior high school), by different gender (male versus female, with male receive significantly more education[17]), and by different level of development (more developed counties versus less developed counties, with the level of development approximated by the share of urban population in 1964[18]). The SDYs have larger effects on the probabilities of completing education (Panel A columns (1) and (2)). Moreover, the spillovers are much larger on the less-educated groups—the effect on girls are more than triple that on boys (Panel A columns (3) and (4)); the effect in less developed counties are about triple that in more developed counties (Panel A columns (5) and (6)).

[17]The male sample in our reference group (1944–1956) on average receive 6.54 years of education and women's schooling years are only about 2/3 of that amount (4.26 years)

[18]We set the threshold to 6%, that about bisects the sample. Note that although we use share of urban population as the proxy for level of development, we stick to the rural sample. Our assumption is that rural areas in counties with more urban population are more developed.

The heterogeneous analysis in Panel B, that separates inflow- and local-SDYs, reveals an even more interesting findings. The better-educated inflow-SDYs have larger spillovers on the higher end (junior high education, boys, more developed counties), while local-SDYs have larger effects on the lower-end (primary education, girls, less developed counties). The evidence suggests the existence of optimal knowledge gap that maximizes human capital spillovers. If the knowledge gap is too small, there would be little transmission of new information. On the contrary, if the gap is too large, it would be difficult for both parties to understand each other. Therefore, a mixture of people with an appropriate knowledge gap helps to harvest the benefits of human capital externality.

5.4 Endogeneity and Confounding Events

The remainder of this section discusses other competing stories which can also generate a positive association between SDYs and rural children's education. Note that our identification in equation (1) does not require the exogeneity of the flow of SDYs because county fixed effects would absorb any time-invariant local characteristics. Therefore, we focus on the confounding factors (1) whose local intensities are systematically correlated with the send down movement and (2) that share similar treated cohorts as our main specification.

Local Government Demand more SDYs to Improve Local Education?

The first alternative story is the reverse causality: it is not that SDYs improve local education, but that local government with greater attention to education actively accepted more urban youths. In this scenario, the local education would become better even without the SDYs. However, this is unlikely to happen according to our introduction in the background section. Both the quota and the destination of SDYs were determined by the higher-level government and the local government had little control.

In addition to the anecdotal evidence, we also present statistical evidence. The idea is: if the improve in education comes from top to bottom, we should observe the government actively employs more teachers in public schools and fiscal expenditures on education should increase. In contrast, if the improvement comes from the grass roots, we do not expect to see the two phenomena. To formally test the idea, we collect provincial-level information from National Bureau of Statistics of China (2010)[19]: fiscal expenditures on education and number of primary &

[19]We cannot find the fiscal information at the county level from the local gazetteers. Therefore, we carry out the

secondary teachers. We regress the changes in those variables on the number of received SDYs as a share of population in 1964 at the provincial level from 1968–1979. Table 6 reports the results. Provinces that received more SDYs did not experience higher growth in educational expenditures. An interesting contrast is that more SDYs are associated with a higher growth in number of teachers. The growth is especially strong for the secondary schools. The pattern echoes the findings in Table 5 that the send-down movement had larger effect on junior high education than on primary education. How to reconcile the increase in teachers with no increase in educational expenditures? Our county-level analysis, that we will discuss formally in the succeeding section (Table 8), gives an answer—the increase in teachers took place in community schools but not in public schools.

Cultural Revolution and Violence

The most important contemporaneous historical event with the rustication movement is the Cultural Revolution. Two out of three main purposes of the send-down movement—to discharge Red Guards and to relieve urban unemployment—are the direct results of the Cultural Revolution. It is possible that there exists a correlation between the local severity of the violence during the Cultural Revolution and the number of received SDYs. For example, counties which experienced less violence during the revolution maintained a better government function and were able to receive more SDYs. In that scenario, our findings could be interpreted in an alternative way—rural residents did not benefit from more SDYs, but from less violence.

To control for the influence of the Cultural Revolution, we follow the strategy of Bai and Wu (2017). We approximate the county-level severity of the Cultural Revolution with the numbers of victims, obtained from the "China Political Events Dataset, 1966-1971" (Walder 2017), as a share of county population in 1964. We first define cohorts 1954–1968 to be the treated group because their years in primary school overlapped with the decade of the Cultural Revolution (1966–1976). Table 7 column (2) seemingly suggests greater exposure to the revolution does not suppress educational achievement. However, after taking into account that a majority of the violence events and negative shocks to educational institutions took place in the first few years

analysis at a more aggregated level.

of the Cultural Revolution,[20,21] we re-define the treatment group according to whether they were in primary schools during the first three years of the revolution. Table 7 column (3) shows the expected result: the Cultural Revolution had a negative consequences on education. However, the effect of the SDYs remains almost unchanged among columns (1)–(3), suggesting the robustness of our main result against the inclusion of the Cultural Revolution.

Great Famine

In addition to the Cultural Revolution, another possible confounding historical event is China's Great Famine, which took place from 1959 to 1961 and caused estimated fatalities of 16.5 to 45 million (Meng, Qian, and Yared 2015).[22] Our study covers cohorts born between 1944 and 1969. Therefore, some of them were exposed to this catastrophic event. There is a large literature discussing the long-run negative impact of the Great Famine on various socioeconomic outcomes, including health, education, earning, labor supply, et al. (Chen and Zhou 2007; Meng and Qian 2009; Shi 2011). Moreover, it is possible the local severity of the Great Famine is correlated with the number of accepted SDYs.

To control for the influence of the Great Famine, we construct county-level severity of the famine following the idea of Meng, Qian, and Yared (2015), who use the birth cohort sizes of survivors observed in 1990 as the proxy for famine severity at the county level. We define the local severity of the famine as the ratio of cohort size of 1959–1961 over that of 1955–1957. Table 7 column (4) reports the estimation results which additionally control for the interaction between local famine severity and a dummy variable indicating born during the period 1957–1969. Consistent with the previous literature, we also find a strong negative impact of the Great Famine on education. However, the estimated impact of SDYs' arrival remains almost unchanged, suggesting our results are robust to the inclusion of the Great Famine.

[20] Walder and Su (2003) collected information on violence events during the Cultural Revolution for 1,530 counties. While there were 836 armed battles recorded in 1967 and 215 battles in 1968, there were only 26 battles in 1969 and zero afterward.

[21] At the beginning of the Cultural Revolution, all schools in urban China were closed for about 2–3 years. Schools were reopened during 1968–1969 and the standard school curriculum was gradually resumed starting from 1972 (Deng and Treiman 1997).

[22] The estimated number of excess fatalities varies a lot in different studies. See footnote 1 in Meng, Qian, and Yared (2015) for details.

6 Discussion

We probe into the mechanisms of human capital spillovers in this section. More specifically, how does the arrival of the urban youths increase the education of rural children? We highlight two channels. First, the better educated SDYs can transmit their knowledge to the locals by direct instruction. One specific way of instruction is working as teachers. Second, the communications with young people from urban areas change the values in the locality—the rural children hold more positive attitudes toward eduction and are less likely to believe their fate is predetermined by family background. Our analysis of the effect on outcomes other than years of education also supports the channel of values. Locals who are more exposed to SDYs have a higher tendency to pursue higher level education, and more likely to work as teachers after graduation. The positive effects also persist to their children.

6.1 Direct Instruction

There is abundant anecdotal evidence that some SDYs worked as teachers in rural villages. Gu (2009) documented that SDYs worked as study counselors and community school teachers in Jilin and Shaanxi. Gu (2009) commented that

> "*Working as community school teachers (or substitute teachers) is an important experience of many educated youths. They dedicated themselves to the cause of education in rural China, especially in the remote areas.*"

The increase in the supply of teachers was timely and important if taking into account the political background during the Cultural Revolution. China was suffering from a shortage of teachers during the Cultural Revolution because intellectuals were being attacked and labeled as "bad classes" (Bernstein 1977; Walder 1989).

To formally test the hypothesis that the arrival of SDYs increases the supply of teachers in rural villages, we collect historical information on number of teachers from local gazetteers. We are able to find such information for 606 counties out of 1,715 counties in our sample. We restrict our analysis to the period 1955–1977 and obtain 8,073 county-year observations with either numbers of primary school teachers or numbers of secondary teachers available. Note that number of available years varies across counties. For example, in Guangxi province, the gazetteer of Nandan county

only contains such information for the year 1976, while the gazetteer of Donglan county covers the entire 1955–1977 period. To estimate how the arrival of SDYs affect the number of local teachers during the period of rustication movement, we adopt the following difference-in-difference strategy that shares a similar spirit as the main specification.

$$\begin{aligned}
\%\text{Teachers}_{t,c,p} &= \beta_0 + \beta_1 \%\text{SDY}_{c,p} \times I\left(t \geq 1968\right) + \lambda_c + \mu_{t,p} + \varepsilon_{t,c,p} \\
\%\text{Teachers}_{t,c,p} &= \beta_0 + \beta_{1,1} \%\text{SDY_inflow}_{c,p} \times I\left(t \geq 1968\right) + \\
&\quad + \beta_{1,2} \%\text{SDY_local}_{c,p} \times I\left(t \geq 1968\right) + \lambda_c + \mu_{t,p} + \varepsilon_{t,c,p}. \qquad (4)
\end{aligned}$$

Here $\%\text{Teachers}_{t,c,p}$ represents the number of primary/secondary teachers of county c in province p in year t as a share of the county population in 1964. Analogous to our main specification, we not only control for county fixed effects λ_c but also include provincial heterogeneous time trend $\mu_{t,p}$. Equation (4) requires common-trend assumption. The assumption can be tested in a similar fashion as equation (3) :

$$\%\text{Teachers}_{t,c,p} = \beta_0 + \sum_{\gamma=1956}^{1977} \beta_{1,\gamma} \%\text{SDY}_{c,p} \times I\left(g = \gamma\right) + \lambda_c + \mu_{t,p} + \varepsilon_{t,c,p}. \qquad (5)$$

Figure 4 plots the coefficient $\beta_{1,\gamma}$ for each year. Panel A suggests the positive correlation between the increase in primary school teachers and the number of received SDYs gradually emerge since 1968, the year in which massive rustication movement begun. Panel B presents a more clean pattern for secondary school teachers—the line is almost flat prior to 1968 and rises steadily afterwards.

Table 8 reports the results of equation (4). Column (1) indicates that the arrival of the SDYs significantly increase the number of local teachers. The share of primary school teachers in the population was 5.1‰ in 1967 and the share almost doubled in 1977 (9.6‰). The SDYs account for 20.4% of the increase.[23] The number is smaller for secondary school teachers (7.5%). There are two other important takeaways from Table 8. First, column (2) suggests that local SDYs have larger effects on the number of primary teachers, while inflow SDYs increase the supply of secondary school teachers to a larger extent. This corresponds to our findings in the heterogeneity

[23] In the subsample that contains infomation on teachers, the density of SDYs is 21.4 per thousand locals. $\frac{0.043 \times 21.4‰}{9.6‰ - 5.1‰} = 20.4\%$

analysis (Table 5) that local (inflow) SDYs more affect the primary (secondary) education of the rural children. Second, columns (3) and (4) reveal the increase in local teachers mostly took place in primary schools, but not in public schools. This explains why in Table 6 we observe an increase in teachers but not that in public educational expenditures. It also confirms that the positive human capital spillovers from SDYs to rural residents cannot be explained by local government's endeavour to improve local education.

6.2 Attitude towards Education

Can the effect of SDYs be simply interpreted as the effect of additional teachers? We believe the answer is no. The arrival of urban youths not only brought their knowledge but also their ideology and value. For example, people living in urban areas generally put a greater emphasis on education. The question is—will such value pass from SDYs onto rural children? To answer this question, we use the 2010 wave of China Family Panel Study (CFPS), which was launched by the Institute of Social Science Survey of Peking University in China. CFPS is a national representative survey covering 25 out of 34 provinces in China. In CFPS 2010, there are subjective questions asking people to what extent they believe and statement "more education, more chances of success." The answers range from "1 = strongly disagree" to "5 = strongly agree." As a comparison, we also examine the SDY's effect on their attitude toward family wealth.

There are 162 counties in the CFPS sample. After excluding three municipalities (Beijing, Tianjin, and Shanghai) and city-governed districts, we are able to match 95 CFPS counties with our county-level data set compiled from local gazetteers. We evaluate how exposure to the better-educated SDYs affects local resident's attitude toward education in Table 9. Rural residents who are more affected by the movement value education as a more important determinant of future success (column (1)), as opposed to predetermined factors, such as family wealth (columns (3), (5)). Part of the changes in attitudes can be explained by changes in education and income. But a larger proportion of the effects remain even after we control for education and income (columns (2), (4), (6)).

There can be other channels that SDYs influenced rural residents' education. Health is one possible channel. As mentioned in the background section, some rusticated youths became bare-foot doctors in rural villages. There is a large literature highlighting the importance of childhood health on future educational attainment (Bleakley 2007; Smith 2009; Case and Paxson 2010; Baird

et al. 2016). By providing better health services, SDYs could improve the health status of rural children and indirectly increase their educational attainment. Unluckily, we are not able to test this hypothesis formally because of the data limitation, which requires health-related information during childhood back to 1960s and 1970s.[24]

6.3 Other Outcomes

In this subsection, we investigate SDYs' effect on local residents' other outcomes to further understand human capital spillovers. This subsection serves for two purposes. First, we are interested in the persistent effect of the send-down movement in rural areas. We find evidence that the effect remains even after a majority of SDYs returned to urban areas in the late 1970s—the students of SDYs are more likely to become teachers and educate future generations; their children are also better educated. Second, we wish to provide further supporting evidence on the mechanisms. For example, analysis in the previous subsection focus on what rural residents think. We complement the analysis with what they do. Table 10 reports the results.

Seeking Higher Level Education

Table 9 show that people subjectively think they value more education, but do they act so? To answer this question, we estimate whether people pursue further education after they complete junior high school. The idea is that local senior high education should not be directly affected by the arrival of SDYs. Most of SDYs were junior high or senior high graduates themselves and, therefore, were not educated enough to serve as senior high school teachers. Therefore, the decision of pursuing education beyond junior high level can reflect local people' valuation toward education. Table 10 column (1) confirms that local junior high graduates are more likely to seek more-advanced education.

Occupational Choice

People's valuation of education not only affects how much education to receive but also influences what they do after graduation. If people value education more, they are also more likely to choose education-related occupations. The occupational choice of the directly affected cohort-

[24]We cannot simply replace childhood health with current health status for two reasons. First, unlike education, which remains mostly unchanged once a person finishes his education, health varies a lot at different stages of life. Second, it is well-acknowledged that education is beneficial to health (see Galama, Lleras-Muney, and van Kippersluis (2018) for a recent review of empirical evidence). Therefore, even if we observe a positive effect of SDYs on adulthood health, it may capture the effect of more education instead of better childhood health.

s also influence how persistent human capital spillovers would be after the SDYs left the rural villages. Census 1990 provides detailed occupation code and we can define the dummy variables of teacher occupation accordingly. Table 10 column (2) estimate whether the arrival of educated youths encourages local children to work as teachers when they grow-up. The results suggest a statistically significant effect. Column (3) additionally controls for schooling. The coefficients of the SDYs fall by about one-fourth, which is not surprising because people have to be educated enough to serve as a teacher. However, still three-fourth of the effect stays, which suggests the positive effect does not merely come from more qualified students as a result of more years of education.

Persistent Effect across Generations

So far we have shown that the arrival of SDYs has important spillover effects onto the rural residents. They receive more years of schooling and hold a more positive attitude toward education. One important question here is: how persistent the effect is? The social value of human capital spillovers would be much larger if the spillovers apply not only to the directly-affected cohorts but also to their offsprings. There are abundant studies about the intergenerational transmission of human capital (Currie and Moretti 2003; Black, Devereux, and Salvanes 2005; Black and Devereux 2011). Two China-related studies, Huang, Guo, and Song (2016) and Meng and Zhao (2016), find evidence that the negative consequences of the Cultural Revolution passed onto the second generation.

To estimate SDYs' spillover effect on the second generation, we use 1‰ sample from the 2010 China's census of population and approach as follows. First, we construct parent-children pairs by taking out the household head (parent) and members who report their relationship to the head as son/daughter (child). Second, we restrict the sample to the children whose parents were born between 1944 and 1969. The children of cohorts 1957–1969 become the treatment group. Finally, we estimate the following equation,

$$\text{Y\_Edu}_{i,g,c,p} = \beta_0 + \beta_1 \%\text{SDY}_{c,p} \times I\left(1957 \leq P_{i,g,c,p} \leq 1969\right) + \beta_2 X_{i,g,c,p} + \lambda_c + \mu_{g,p} + \varepsilon_{i,g,c,p}, \quad (6)$$

whereas $P_{i,g,c,p}$ represent parents' year of birth. The key difference from our main specification (equation (1)) is that now we are interested in understanding how parents' exposure to the arrival of SDYs affect children's education.

Table 10 column (4) reports the estimation results.[25] We find evidence that arrival of SDYs during the 1960s and 1970s still has a persistent spillover effect to the second generation 40 years later. We also note that the coefficients in Table 10 using census 2010 are quite comparable to those in Table 4 using census 1990 despite a gap of twenty years. Previous studies estimated an intergenerational transition in schooling years of about 0.6 (Huang, Guo, and Song 2016; Meng and Zhao 2016), which means if parents' receive one more year of education, children's school years would be increased by 0.6. A first glance at our results seemingly suggests a coefficient exceeding one. But notice that parents' exposure to the arrival of rusticated youths affect their children's educational outcome not only through parents' schooling years, but also through their valuation towards education (Table 9) and through supply of teachers (Table 10, columns (2) and (3)).

7 Conclusions

Understanding human capital spillovers is challenging because of the difficulty in the identification issues. In this paper, we exploit China's send-down movement as a natural experiment. From 1962 to 1979, the government mandated the temporary resettlement of 17.7 million urban youths to rural areas. The majority of those urban youths were reluctant but forced to go because of the special political regime during that period. The movement provides an opportunity of looking into human capital spillovers by estimating how the arrival of those better-educated urban youth affected the rural residents.

To understand how the arrival of SDYs affect the local population, we compile a unique county-level data set on the flow of SDYs from over 3,000 book-length local gazetteers. We find that rural children who were more exposed to urban SDYs during their schooling ages ended up with more years of education. Neither local government's endeavour to improve education nor other contemporaneous events (e.g., the Cultural Revolution, the Great Famine) can explain such an effect. We also highlight two channels of spillovers. First, the SDYs instruct the local people and share their knowledge by working as teachers. Second, they share their ideology and values—

[25]There is one concern. Some children might still have not completed their education. For example, if a parent was born in 1969 and had the child at the age of 25, the child would be of age 16 in the year 2010. But our estimation is still meaningful because we control for children's birth cohort fixed effects. At the age of 16, while some children are attending senior high school, others may decide not to seek further education after their graduation from junior high school. As a robustness check, we exclude the current students sample and obtain similar results.

locals who are more exposed to SDYs hold more positive attitudes toward education and are less likely to believe their fate is predetermined by family background.

Despite our study looks at a historical event took place half a century ago, it still contains implications for the current policies. We list two policies as examples: College Volunteers to the West Program (*daxuesheng zhiyuan fuwu xibu jihua*) and international immigration policy in the United States. All those policies involve the migration of a group of better educated people. First, the College Volunteers to the West Program encourages the fresh college graduates to serve in western China to help the development of education, health, technology, and economy in the locality. The program was initiated in 2003 and has involved about 270,000 students till 2017.[26] Unlike the send-down movement, the program is voluntary. Students will serve in western areas for 1–3 years and receive preferential policies during the admission in graduate schools. Second, the international immigration policy in the United States favors the well-educated. U.S. Citizenship and Immigration Services (USCIS) sets different caps of H-1B visas, which allows U.S. employers to employ foreign workers, for workers who have a masters degree or higher from a U.S. institution and those without such a degree. Our study helps to understand the effect of those education-biased policies on the local residents. Of course, more delicate studies are necessary to evaluate their effectiveness.

[26] http://xibu.youth.cn/

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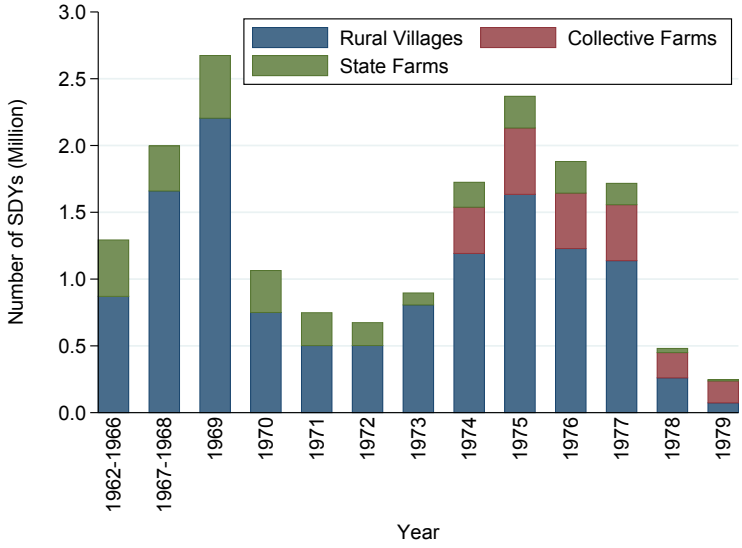
Figures

Figure 1: Number of Sent-Down-Youth by Resettlement, 1962–1979



Note: Data source is Gu (2009) "Chinese Educated City Youth: The Whole Story."

Figure 2: Number of Received Sent-Down-Youth in Each County

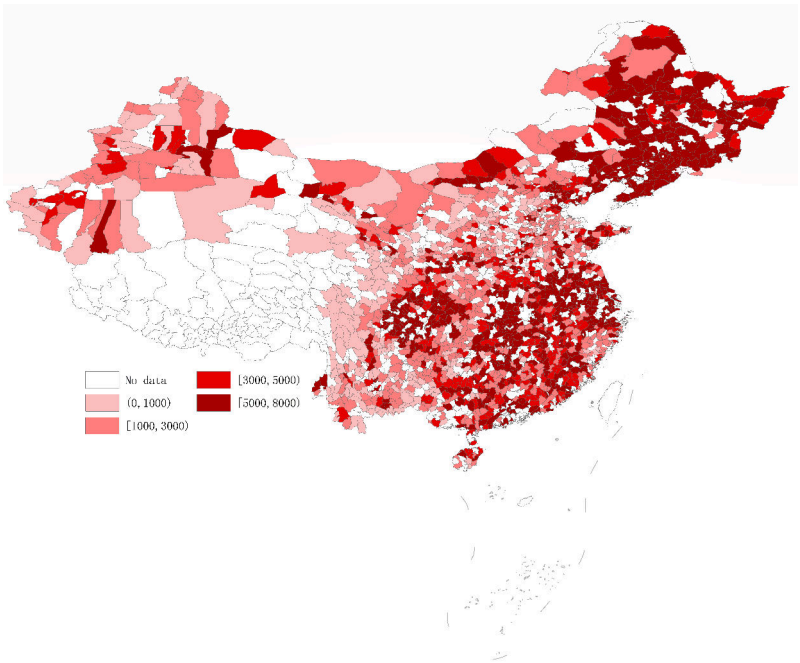
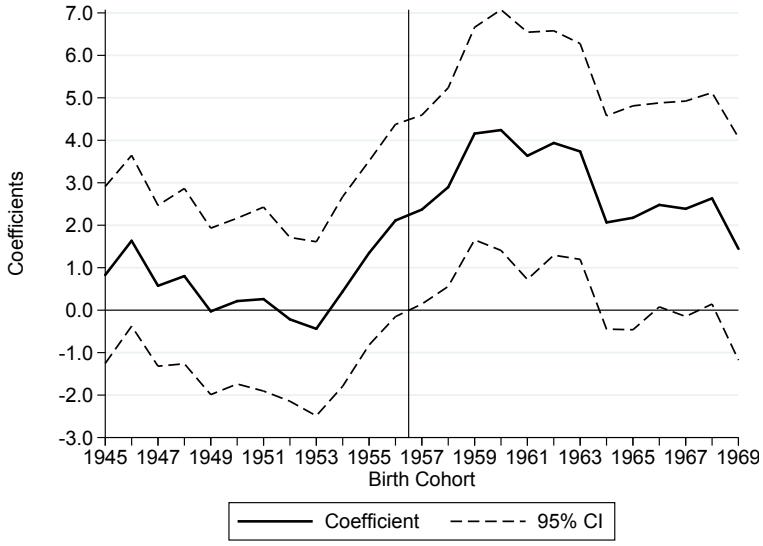
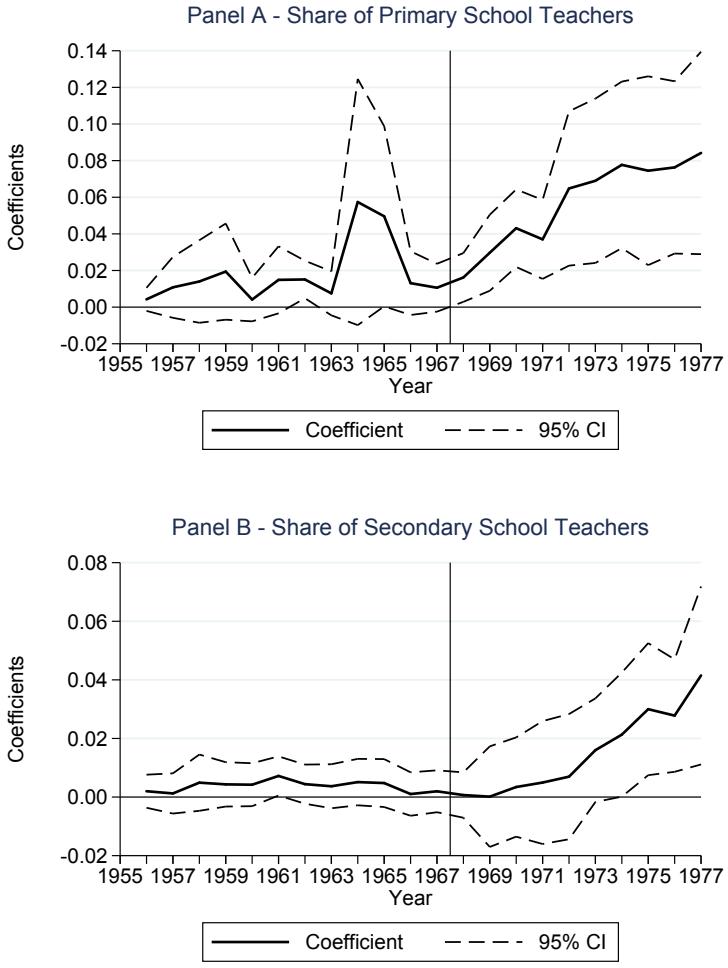


Figure 3: The Coefficients of the Interaction Terms between County SDYs densities with Cohort Dummies



Note: y axis represents the coefficients from equation (3), which captures the effect of SDYs densities on different cohorts.

Figure 4: The Coefficients of the Interaction Terms between County SDYs densities with Year Dummies



Note: y axis represents the coefficients from equation (5), which captures the effect of SDYs densities on number of teachers in different years.

Tables

Table 1: Total Number of Sent and Received SDYs in Each Province, 1962–1979

Province	SDY Sent (Thousand)			SDY Received (Thousand)		
	Total	Inside	Outside	Total	Inside	Outside
Beijing	636.3	384.2	252.1	384.2	384.2	
Tianjin	465.1	193.6	271.5	193.6	193.6	
Hebei	384.4	377.8	6.6	510.5	377.8	132.7
Shanxi	264.3	264.3		312.9	264.3	48.6
Inner Mongolia	193.8	193.8		299.3	193.8	105.5
Liaoning	2013.4	2013.4		2018.0	2013.4	4.6
Jilin	991.4	991.4		1052.6	991.4	61.2
Heilongjiang	1519.2	1519.2		1922.2	1519.2	403.0
Shanghai	1259.2	532.3	719.9	532.3	532.3	
Jiangsu	828.4	810.2	18.2	861.2	810.2	51.0
Zhejiang	646.2	563.9	82.3	595.9	563.9	32.0
Anhui	576.5	576.5		725.5	576.5	149.0
Fujian	372.3	372.3		372.3	372.3	
Jiangxi	504.5	504.5		622.5	504.5	118.0
Shandong	512.9	492.7	20.2	492.7	492.7	
Henan	673.0	673.0		673.0	673.0	
Hubei	886.6	878.6	8.0	878.6	878.6	
Hunan	635.8	635.8		635.8	635.8	
Guangdong	973.2	973.2		973.2	973.2	
Guangxi	434.8	434.8		434.8	434.8	
Sichuan	1472.4	1427.4	45.0	1427.4	1427.4	
Guizhou	213.5	213.5		224.1	213.5	10.6
Yunnan	232.5	232.5		339.1	232.5	106.6
Tibet	3.4	3.4		3.4	3.4	
Shaanxi	463.1	463.1		490.3	463.1	27.2
Gansu	245.2	245.2		264.3	245.2	19.1
Qinghai	43.6	43.6		51.0	43.6	7.4
Ningxia	49.2	49.2		57.5	49.2	8.3
Xinjiang	277.6	277.6		416.6	277.6	139.0
Total	17771.8	16341.0	1423.8	17764.8	16341.0	1423.8

Note: Data source is Gu (2009) "Chinese Educated City Youth: The Whole Story."

Table 2: Comparing the Number of Received SDYs from County-aggregate and from National Report in Each Province

Province	SDY Received (Thousand)		
	County Aggregate 1968–1977	National Report 1962–1979	Ratio (%)
Beijing	-	384.2	-
Tianjin	-	193.6	-
Hebei	280.1	510.5	54.9
Shanxi	135.8	312.9	43.4
Inner Mongolia	306.5	299.3	102.4
Liaoning	1256.2	2018.0	62.3
Jilin	657.4	1052.6	62.5
Heilongjiang	509.6	1922.2	26.5
Shanghai	-	532.3	-
Jiangsu	575.3	861.2	66.8
Zhejiang	436.8	595.9	73.3
Anhui	498.3	725.5	68.7
Fujian	319.7	372.3	85.9
Jiangxi	399.7	622.5	64.2
Shandong	389.6	492.7	79.1
Henan	448.9	673.0	66.7
Hubei	635.1	878.6	72.3
Hunan	563.1	635.8	88.6
Guangdong	554.0	973.2	56.9
Guangxi	277.0	434.8	63.7
Sichuan	1284.6	1427.4	90.0
Guizhou	156.5	224.1	69.8
Yunnan	177.8	339.1	52.4
Tibet	-	3.4	-
Shaanxi	373.1	490.3	76.1
Gansu	164.8	264.3	62.3
Qinghai	33.1	51.0	64.9
Ningxia	21.3	57.5	37.1
Xinjiang	174.8	416.6	42.0
Total	10629.0	17764.8	59.8

Note: county aggregate number are computed based on authors' collection of data from local gazetteers. Numbers from national report are the same as those in Table 1.

Table 3: Summary Statistics of the 1% sample from the 1990 China's Census of Population

Cohort	Reference Group (1946–1955)			Treatment Group (1956–1969)		
Hukou	Rural	Rural'	Urban	Rural	Rural'	Urban
	(1)	(2)	(3)	(4)	(5)	(6)
Years of Education	5.372	5.346	8.909	7.222	7.210	10.488
	(3.419)	(3.408)	(3.233)	(3.071)	(3.053)	(2.458)
Complete Primary School	0.615	0.609	0.910	0.804	0.801	0.973
	(0.486)	(0.488)	(0.286)	(0.397)	(0.399)	(0.161)
Complete Junior High	0.213	0.209	0.674	0.457	0.453	0.908
	(0.410)	(0.407)	(0.469)	(0.498)	(0.498)	(0.290)
Male = 1	0.507	0.507	0.594	0.505	0.505	0.564
	(0.500)	(0.500)	(0.491)	(0.500)	(0.500)	(0.496)
Han Ethnic = 1	0.921	0.937	0.926	0.912	0.928	0.919
	(0.269)	(0.243)	(0.261)	(0.283)	(0.259)	(0.274)
Age	39.277	39.272	39.519	26.158	26.157	26.558
	(3.636)	(3.633)	(3.699)	(3.653)	(3.654)	(3.638)
Observations	1,022,922	838,213	175,643	1,627,284	1,186,341	239,485

Note: "Rural′" means a sub-sample that additionally allows for the separation between inflow SDYs and local SDYs.

Table 4: The Effect of SDY Densities on the Educational Attainment of Local Children (census 1990)

Dependent Variables	Years of Education					
	Rural	Rural'	Rural'	Urban	Urban'	Urban'
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Total received SDYs	2.226***	2.010**		0.0901	0.685	
*Affected Cohort (Born 1957–1969)	(0.771)	(0.905)		(0.424)	(0.566)	
Share of Inflow SDYs			2.210**			0.430
*Affected Cohort (Born 1957–1969)			(1.027)			(0.515)
Share of Local SDYs			1.699			1.903
*Affected Cohort (Born 1957–1969)			(1.651)			(1.952)
Male	1.916***	1.936***	1.936***	0.714***	0.756***	0.756***
	(0.0289)	(0.0345)	(0.0345)	(0.0279)	(0.0346)	(0.0346)
Han Ethnic	0.135**	0.0805	0.0804	-0.0474	-0.103	-0.103
	(0.0579)	(0.0726)	(0.0726)	(0.0840)	(0.0996)	(0.0997)
Observations	2,768,635	2,024,554	2,024,554	415,058	294,857	294,857
R-squared	0.297	0.294	0.294	0.215	0.229	0.229
County FE	✓	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓	✓

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the county level. "Rural′" and "Urban′" means a sub-sample that additionally allows the separation between inflow SDYs and local SDYs. Share of total/inflow/local SDYs is computed from dividing the number of total/inflow/local SDYs by the county population in 1964.

Table 5: Heterogeneous Effect of SDY Densities (census 1990)

Dependent Variables	Complete Primary	Complete Junior High	Years of Education			
Sub-sample			Male	Female	Less Urbanized Counties	More Urbanized Counties
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A:						
Share of Total received SDYs	0.335***	0.630***	1.003	3.496***	4.411**	1.574*
*Affected Cohort (Born 1957–1969)	(0.0995)	(0.128)	(0.611)	(1.051)	(1.814)	(0.856)
Observations	2,768,635	2,768,635	1,400,672	1,367,959	1,504,040	1,253,113
R-squared	0.257	0.211	0.199	0.317	0.307	0.286
Panel B:						
Share of Inflow SDYs	0.152	0.706***	1.706*	2.418*	3.081	2.115*
*Affected Cohort (Born 1957–1969)	(0.144)	(0.174)	(0.878)	(1.452)	(2.582)	(1.118)
Share of Local SDYs	0.659***	0.628**	0.740	3.063	12.31**	0.406
*Affected Cohort (Born 1957–1969)	(0.209)	(0.254)	(1.394)	(2.161)	(5.513)	(1.591)
Observations	2,024,554	2,024,554	1,023,941	1,000,612	1,071,247	943,618
R-squared	0.254	0.209	0.193	0.313	0.301	0.286
Individual Controls	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓	✓

Note: Only rural sample is used. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the county level. Ethnic and gender are controlled in all regressions. More/Less urbanized counties are defined as whether the share of urban population in the county exceeds 6%. Share of total/inflow/local SDYs is computed from dividing the number of total/inflow/local SDYs by the county population in 1964.

Table 6: SDYs and the Growth of Educational Expenditures at the Province Level

Dependent Variables	Δ Edu. Expenditures as a Share of GDP	Δ Edu. Expenditures as a Share of Fiscal Expenditures	Δ Primary Teachers per ten thousand	Δ Secondary Teachers per ten thousand
	(1)	(2)	(3)	(4)
Share of Total received SDYs	0.007	-0.027	0.962	20.783**
	(0.007)	(0.045)	(23.133)	(8.928)
Δ Share of Non-agricultural Population	0.023	0.409**	55.597	65.496
	(0.034)	(0.207)	(90.238)	(41.547)
Δ Share of Secondary Industry in GDP	-0.011**	-0.122***	10.074	-6.529
	(0.005)	(0.032)	(15.588)	(6.679)
Δ Share of Tertiary Industry in GDP	0.002	-0.158	-6.001	-11.874
	(0.016)	(0.124)	(37.583)	(19.701)
Δ GDP per capita	-0.114***	-0.207***	-29.664	-3.261
	(0.014)	(0.078)	(34.203)	(14.962)
Observations	226	226	183	196
R-squared	0.727	0.798	0.137	0.532
Year FE	✓	✓	✓	✓

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in the bracket.

Table 7: The 1959–1961 Great Famine as a Possible Confounding Event (census 1990)

Dependent Variables	Years of Education			
	(1)	(2)	(3)	(4)
Share of Total received SDYs	2.932***	2.926***	2.930***	1.892**
*Affected Cohort (Born 1957–1969)	(0.865)	(0.866)	(0.865)	(0.780)
Local severity of **Cultural Revolution**		0.0856		
*Affected Cohort (Born 1954–1968)		(0.484)		
Local severity of **Cultural Revolution**			-0.726**	
*Affected Cohort (Born 1954–1961)			(0.290)	
Local severity of **Great Famine**				-0.529***
*Affected Cohort (Born 1957–1969)				(0.0838)
Observations	2,386,593	2,386,593	2,386,593	2,768,635
R-squared	0.299	0.299	0.299	0.297
Information on Cultural Revolution	✓	✓	✓	
Individual Controls	✓	✓	✓	✓
County FE	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the county level. Individual controls include gender and ethnic. Share of total SDYs is computed from dividing the number of total SDYs by the county population in 1964. Local severity of Cultural Revolution is proxied by dividing the number of victims by the county population in 1964. The data source is Walder (2017). Local severity of Great Famine is proxied by the ratio of 1959–1961 cohort size over 1956–1958 cohort size, following Meng, Qian, and Yared (2015).

Table 8: SDY and Number of Teachers, 1955 – 1977

School Types	Both Public and Private		Public	Private
	(1)	(2)	(3)	(4)
Panel A: Share of Primary School Teachers as the Dependent Variable				
Share of Total received SDYs*Post 1968	0.043***		0.005	0.054**
	(0.009)		(0.010)	(0.024)
Share of Inflow SDYs*Post 1968		0.024***		
		(0.008)		
Share of Local SDYs*Post 1968		0.052***		
		(0.016)		
Observations	6,521	4,469	1,795	1,536
R-squared	0.841	0.874	0.833	0.881
Number of Counties	481	341	149	139
Panel B: Share of Secondary School Teachers as the Dependent Variable				
Share of Total received SDYs*Post 1968	0.014**		0.013	0.022*
	(0.006)		(0.020)	(0.012)
Share of Inflow SDYs*Post 1968		0.022***		
		(0.006)		
Share of Local SDYs*Post 1968		-0.001		
		(0.013)		
Observations	6,294	4,413	1,215	561
R-squared	0.803	0.834	0.742	0.821
Number of Counties	487	353	105	85
County FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the county level. We collect both county-level information on number of teachers and county-level information on number of SDYs from local gazetteers. Share of total/inflow/local SDYs is computed from dividing the number of total/inflow/local SDYs by the county population in 1964. Share of primary/secondary school teachers is computed from dividing the number of primary/secondary school teachers by the county population in 1964.

Table 9: The Effect of SDY Densities on Local Incumbents' Attitude Toward Education (CFPS 2010)

Dependent Variables	Do you agree with following statements? 1 = strongly disagree, 5 = strongly agree					
	More education, more chances of success.		Children from higher SES families achieve higher.		Children from poorer families achieve lower.	
	(1)	(2)	(3)	(4)	(5)	(6)
Share of Total received SDYs	0.931	0.949	-2.710**	-2.358*	-2.710**	-3.617*
*Affected Cohort (Born 1957–1969)	(1.801)	(1.808)	(1.360)	(1.333)	(1.360)	(2.152)
Years of Education		-0.002		-0.026***		-0.045***
		(0.003)		(0.004)		(0.004)
log(income)		0.005		-0.016		-0.026**
		(0.008)		(0.012)		(0.012)
Observations	6,350	6,350	6,040	6,040	6,040	6,318
R-squared	0.134	0.134	0.147	0.154	0.147	0.176
Individual Controls	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓	✓

Note: Only rural sample is used. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the county level. Individual controls include gender and ethnic. Share of total SDYs is computed from dividing the number of total SDYs by the county population in 1964.

Table 10: The Effect of SDY Densities on Other Outcomes

Dependent Variables	Beyond Junior High (conditional on Junior High Graduate)	Teacher as an Occupation		Second Genderation's Years of Education
Data	Census 1990	Census 1990		Census 2010
	(1)	(2)	(3)	(4)
Share of Total received SDYs	0.348***	0.0372***	0.0272***	2.967***
*Affected Cohort (Born 1957–1969)	(0.0787)	(0.0108)	(0.0105)	(0.622)
Years of Education			0.00450***	
			(8.36e-05)	
Observations	1,110,936	2,768,635	2,768,635	112,278
R-squared	0.073	0.005	0.024	0.669
Individual Controls	✓	✓	✓	✓
County FE	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓

Note: Only rural sample is used. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the county level. Individual controls include gender and ethnic. Share of total SDYs is computed from dividing the number of total SDYs by the county population in 1964. See Section 6.3 for the detailed construction of data which combine two generations (columns (4)).

Appendix A: Robustness Check

This appendix is devoted to discussing the robustness of our main findings, which is shown in Table 4.

Different Bandwidth of Cohorts.

Our main specification focuses on cohort born between 1944 and 1969 and cohorts 1957–1969 are defined as the treatment group. That is to say, our bandwidth is 12 years. The rationale of such choice is that cohort 1957 was receiving their last year of primary education at the beginning of the massive rustication movement, while cohort 1969 just started their primary school when the movement came to an end. Table A1 columns (1)–(3) replicates the results from Table 4 using different bandwidths (9 years, 6 years, and 3 years, respectively). In terms of statistical significance, Table A1 yields exactly the same results regardless of the choice of bandwidth. In terms of the magnitude of the coefficients, the results also match the findings from Figure 3, that displays a reversed-U-shaped pattern. Exclusion of the last few SDY-affected cohorts (bandwidth = 9, 6 years) makes the coefficients larger because those cohorts were exposed to SDYs only for several years at the start of primary education. Following the same logic, only focusing on the first few affected cohorts (bandwidth = 3 years) make the coefficients smaller.

Allow SDYs to Affect Junior High Education.

Currently, we define exposure to the SDYs according to whether rural children's years in primary school overlap with the massive send-down movement. The justification is based on the fact that the majority of rural children in China during that period received at most primary-level education. Still, about one-fourth went to junior high school.If we allow the flow of SDYs not only affects primary school but junior high school as well, the treatment cohorts would be extended by three years (1954–1969). Table A1 column (4) reports the results using the alternative definition of exposure. The coefficients become larger, which is not surprising because now we allow SDYs flow to influence a broader range of education.

Stronger Assumptions on Migration.

Our empirical analysis combines the census 1990 to the historical data on the SDYs flow during the period 1968–1977. One implicit assumption is that people live in the same county at those two points in time. Although 1% sample from the 2000 China's Census of Population suggest that 86% of the sample in this study lived in the same county as their birthplace, we cannot rule out the possibility that the remaining small proportion has an important influence on our results. In our main analysis, we exclude the sample whose residence county differ from their registration county/prefecture. In this Appendix, we impose an even stronger assumption: people resided in the locality on July 1st, 1985. Note that this is an approximation to our ideal experiment, which is to exclude those whose current residence county differ from their birth county. Unluckily, such information is not available in census 1990. If migration is a real issue, the extra restriction should have important influence on our results. Table A1 columns (4) gives almost identical results as those in Table 4. With the addition assumption, we lose less than 1.0% of the sample. This is not surprising because migration in China is still in limited scope before 1990.

Table A1: Robustness Check with Different Cohort Bandwidth (census 1990)

Dependent Variables	Years of Education				
Robustness	Different Bandwidth			Junior High Affected	Stayed in the County/Prefecture for at Least 5 Years
	N=9	N=6	N=3	N=12	N=12
	(1)	(2)	(3)	(4)	(5)
Share of Total received SDYs	2.551***	3.041***	2.443***	2.533***	2.140***
*Affected Cohort (1957–1957+N)	(0.759)	(0.731)	(0.658)	(0.789)	(0.778)
Observations	2,107,440	1,421,382	779,793	3,093,485	2,744,250
R-squared	0.298	0.297	0.279	0.327	0.298
Individual Controls	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the county level. Individual controls include gender and ethnic. In columns (1)–(3), the reference cohorts are those born between the year 1956-N and 1956. In columns (4), the treatment group is cohorts 1953–1969 and the reference group is cohorts 1938–1952. Both groups are extended by three cohorts because we allow junior high eduction to be affected. In columns (5), the treatment group is cohorts 1957–1969 and the reference group is cohorts 1944–1956. Share of total SDYs is computed from dividing the number of total SDYs by the county population in 1964.