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Arrival of Young Talent: The Send-Down Movement and Rural Education in China[†]

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This paper estimates the effects on rural education of the send-down movement during the Cultural Revolution, when about 16 million urban youth were mandated to resettle in the countryside. Using a county-level dataset compiled from local gazetteers and population censuses, we show that greater exposure to the sent-down youths significantly increased rural children's educational achievement. This positive effect diminished after the urban youth left the countryside in the late 1970s but never disappeared. Rural children who interacted with the sent-down youths were also more likely to pursue more-skilled occupations, marry later, and have smaller families than those who did not. (*JEL* I21, J13, J24, N35, O15, P36, R23)

In 1968, two years after the start of the Cultural Revolution, China's central government launched the "send-down movement," which mandated about 16 million urban youth to temporarily resettle in rural areas. This massive campaign lasted until the late 1970s. The villages receiving the "sent-down youths" (SDYs), typically junior and senior high school graduates,[1] were generally located in poor areas where few people received more than a primary school education.[2] Although the SDYs were expected to farm in the countryside, many of them were assigned to

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[1]Based on our calculations from the 2010 wave of the China Family Panel Studies (CFPS), 73.3 percent of the SDYs had completed junior high education, and 28.3 percent had completed senior high education by the time they were sent to the countryside.

[2]According to China's 1990 Population Census, 38.4 percent of rural people born between 1946 and 1955 (the control group in our later analysis) either received no schooling or failed to complete primary school; 41.1 percent were primary school graduates; and only 4 percent attained education beyond junior high school.

teach rural kids because of their education advantages. In this paper, we explore the movement's unintended effect on rural education, i.e., how the large-scale arrival of the SDYs benefited the approximately 245 million school-age children in rural China at the time.[3]

The send-down movement provides a unique opportunity to study how this unprecedented large-scale resettlement of talents contributed to the educational attainment of millions of rural children. It has three unique features that facilitate our empirical analysis. First, the resettlement was mobilized in a top-down and mandatory manner.[4] Most urban youth could not choose whether (or where) to go. Those who refused to take part in the program could be accused of opposing the great strategy of Chairman Mao, which would have resulted in severe consequences (Pan 2002). Second, migration was highly restricted in China at that time because of the household registration (*hukou*) system. The 1958 codification of the household registration system decreed that all internal migration was subject to approval by the local government. Finally, SDYs' resettlement was temporary. By the time rural children grew up, the vast majority of the SDYs had left the countryside, excluding possible mechanical effects that the better educated SDYs (and their offspring) were counted as rural residents.[5]

We hand-collected a county-level dataset on the number of SDYs each county received from over 3,000 book-length local gazetteers. We combined this dataset with individual-level population censuses to estimate how rural children's exposure to those better-educated SDYs affected their educational attainment. Using a cohort difference-in-differences (DID) strategy developed in Duflo (2001), we find that the arrival of the SDYs significantly increased local rural children's years of schooling. We estimate that the effect of the SDYs resulted in an increase of 17.6 million person-years of schooling in rural areas. Our main results are robust to a wide range of alternative specifications and robustness checks. The effect of the SDYs is greater among less-educated groups and regions (girls and less-developed counties), suggesting that the SDYs not only raised the overall level of rural education but also reduced socioeconomic inequality. As the movement came to an end and the SDYs gradually left the countryside, their effect declined but never vanished. We also find that the rural children who were exposed to SDYs were more likely to attain education beyond junior high level, pursued higher-skilled occupations including teachers, held more positive attitudes toward education, married later, and had smaller families. Taken together, these results imply that the SDYs contributed to both the "quantity" and "quality" of rural education.

Our identification strategy does not require the number of SDYs received in each county to be exogenous. The central requirement for identification in our cohort DID strategy is the parallel-trend assumption: in the absence of the movement, the cohort trends in education should not be related to the intensity of the treatment

[3] This number is based on the number of rural children born between 1956 and 1969 (the treatment group in our later analysis), according to our calculation from the 1982 China Population Census.

[4] The mandatory nature of the movement does not necessarily imply that the flows of the SDYs were exogenous. Nor does the top-down arrangement rule out the possibility that the upper-level government assigned the SDYs based on strategic considerations. Nonetheless, our identification strategy is not based on the random assignment of the SDYs. More details are provided below.

[5] It is true that a small proportion (5 percent) of SDYs remained in the countryside after the movement. We explain in Section IVF why this small proportion cannot drive our main results.

(here, the local density of SDYs). Our evidence supports this assumption. First, we use the 1982, 1990, and 2000 population censuses to show that there were no heterogeneous preexisting cohort trends with respect to the density of SDYs after controlling for a set of regional and cohort characteristics. Second, we examine the possible influences of certain local characteristics, such as the grain production level and local government efforts to improve education, and from other contemporaneous historical events, such as rural education expansion, the Cultural Revolution, and the Great Famine of 1959–1961. China's rural education (especially at the secondary level) rapidly expanded since the late 1960s, a period that largely overlapped with the send-down movement. To control for this confounding factor, we collected county-by-year information on the number of local primary and secondary schools during the study period from local gazetteers. We show that although the educational expansion did improve rural children's education, the estimated coefficients on the SDYs remain almost the same. We also controlled for the local intensity of the Cultural Revolution (measured as the number of victims, which comes from Walder 2017) and the Great Famine (calculated as 1 minus the ratio of the cohort size of the famine cohort over that of the non-famine cohort, following Meng, Qian, and Yared 2015).

Our study reveals the important consequences of a historical event on rural education and sheds new light on the contribution of human capital accumulation in rural areas to China's subsequent economic growth. Heckman and Yi (2014) and Heckman and Feng (2018) found that a large stock of medium-skilled labor (with primary or secondary education) acquired before China's market-oriented reforms has fueled its rapid economic growth in recent decades. Most of the affected rural children in our analysis were in their twenties or thirties in the mid-1990s, when the country's economic reforms allowed them to migrate to cities to become manufacturing workers or to work in the vibrant Township and Village Enterprises in rural areas. Combined with these observations, our empirical findings suggest a potential link between the increase in rural human capital stock due to the arrival of the SDYs and China's rapid economic growth in the reform era.

Our study contributes to three strands of literature. The first examines the channels of supplying human capital and their consequences in developing countries. Economists have uncovered a number of important supply-side factors, such as school infrastructure (Duflo 2001, Indonesia), conditional transfers such as PROGRESA (Schultz 2004, Mexico), child health (Miguel and Kremer 2004, Kenya), and the availability of qualified teachers (Banerjee et al. 2007, India). Our study is most related to Andrabi, Das, and Khwaja (2013), which finds that girls' secondary schools increase the local supply of low-cost teachers in Pakistan, which leads to more private schools. Our results also demonstrate that increasing the local supply of teachers is an important channel through which SDYs improved local children's education. Unlike Andrabi, Das, and Khwaja (2013), our paper examines the individual-level outcomes and investigates the persistent effects on the affected children after the SDYs left the countryside, such as the likelihood of going to senior high school, attitudes toward education, marriage age, and occupational choices. In addition, our empirical results show that the formation of human capital during this period might have laid down an important foundation for China's economic growth in the reform era.

The second literature investigates the social and economic consequences of China's send-down movement on the SDYs. The consequences include almost every aspect of one's life course (Zhou and Hou 1999), such as marriage (Song and Zheng 2016); education and income (Xie, Jiang, and Greenman 2008); inter vivos transfer (Li, Rosenzweig, and Zhang 2010); subjective well-being (Wang and Zhou 2017); political attitudes (Harmel and Yeh 2016); beliefs and values (Gong, Lu, and Xie 2015); and financial behavior (Fan 2020). However, the program's impact on the rural areas that accommodated the SDYs remains understudied. Kinnan, Wang, and Wang (2018) and Xing and Zhou (2018) were among the first to explore the program's effects on destination provinces. They studied how the lasting inter-provincial links created by SDYs' temporary resettlement affected current migration (Kinnan, Wang, and Wang 2018) and bilateral trade (Xing and Zhou 2018) decades after the program ended. Our study contributes to the scholarship of the send-down program in two ways. First and foremost, we uncover the effects of the SDYs on rural human capital accumulation and their persistence. Second, our data go further down to the county level and include the intra-province flow of SDYs, which accounted for 92.1 percent of total SDYs (Table 1). In a study developed independently from ours,[6] You (2018) examined a sample of 61 counties in one province (Heilongjiang) and estimated how the densities of SDYs during the movement affected local people's education, employment, and social values. We analyze a sample of nearly 2,000 counties (which include the majority of counties affected by the movement) to provide a nationally representative estimate and a more thorough discussion of robustness, mechanisms, and potentially confounding factors of the effects of the SDYs.

Third, our paper adds to the literature on the persistence of human capital spillovers (Waldinger 2010, 2012; Borjas and Doran 2012; Moser, Voena, and Waldinger 2014). Wantchekon, Klašnja, and Novta (2014) examined human capital externalities within a village by exploiting the establishment of colonial schools in Benin. Rocha, Ferraz, and Soares (2017) studied human capital persistence by exploiting a state-sponsored settlement policy in Brazil that attracted educated immigrants. The resettlement program we investigate differs from those assessed in previous studies of human capital spillovers in at least three ways. First, as previously discussed, the resettlement was temporary and mandatory, and there were few opportunities for internal migration for local people at that time. Second, the large scale of the resettlement and the number of local residents affected were unprecedented. Third, the main motivation for the send-down movement was not to improve rural education but to address severe urban unemployment. Therefore, the improvement in rural education brought about by the SDYs was an unintended consequence of the movement.

The remainder of this paper is organized as follows. Section I briefly reviews the relevant institutional background. In Section II, we introduce our dataset and discuss the econometric setups. Section III reports the main results about how exposure to SDYs affected the educational attainment of rural residents. Section IV discusses alternative interpretations that may confound our main results. Section V

[6] The working paper versions of both papers were available online in early 2018.

presents the lasting impact of the SDYs after they left the countryside. Section VI concludes.

I. Institutional Background

A. *The Send-Down Movement: A Brief History*

The origins of the send-down movement can be traced back to the 1950s. Chairman Mao Zedong declared in December 1955 that "[a]ll 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." In 1962, when the country struggled to overcome the Great Famine, the central government encouraged urban youth to relocate to rural areas to alleviate food shortages in the cities. Before the Cultural Revolution, the program operated on a relatively small scale, and participation was largely voluntary. A large proportion of the SDYs at the time went to either state farms or collective farms. Between 1962 and 1966, the rustication program sent about 1.29 million urban youths to the countryside (Bernstein 1977), accounting for 7.3 percent of the total 17.7 million SDYs during 1962–1979.

After the outbreak of the Cultural Revolution, the send-down movement made a decisive turnaround and mandated about 16 million urban youths to go to the countryside. Three motivations drove this extension of the program. First, high school students could not continue their education due to severe disruptions in the early years of the Cultural Revolution. In addition, the college entrance exams were abolished in 1966, and high school graduates had no regular chance of pursuing higher education. Second, urban unemployment soared in the chaos created by the Cultural Revolution. Industrial output fell by 13.8 percent in 1967 and 4.2 percent in 1968. Thus, high school graduates found it almost impossible to find jobs in urban areas, which were previously assigned by the government. In other words, urban students who graduated between 1966 and 1968 could not find jobs or continue their education. The third motivation was to discharge the Red Guards to end the chaos in urban areas. Mao mobilized the Red Guards, mostly junior or senior high school students, during the first few years of the Cultural Revolution as a political weapon to fight against the party establishment. However, the Red Guard-led campaigns gradually spiraled out of control and turned into "red terror." To resolve the violence, Mao decided to send millions of urban youths to the countryside for "re-education" in April 1968. Following Mao's decision and the central guideline, local governments started to make arrangements to support the send-down campaign.

To give a push for such a massive campaign, In December 1968, Mao issued an important instruction in the *People's Daily*, the party's leading newspaper, that reshaped the nature of the send-down movement. The instruction was composed of three sentences, each of which targeted a different group. The first sentence spoke to the urban youth: "It is very necessary for the urban educated youth to go to the countryside to be re-educated by the poor farmers!" The second targeted urban youth's family: "We must persuade the cadres and others to send their sons and daughters who have graduated from middle school and university to the countryside.

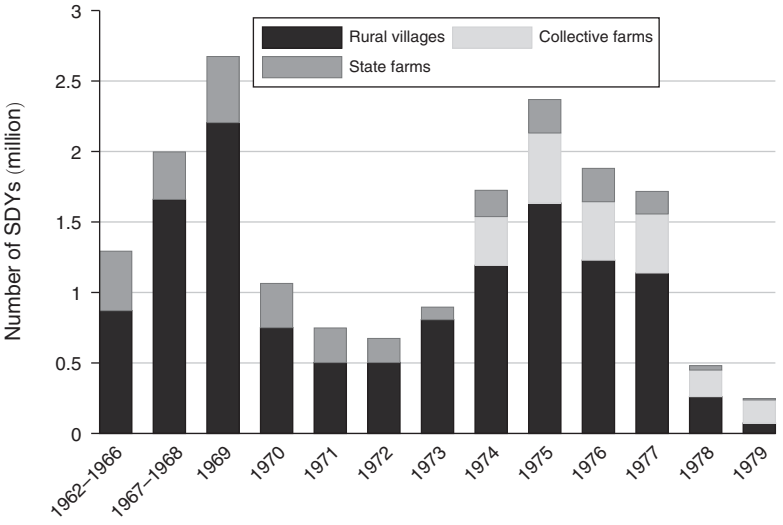

FIGURE 1. NUMBER OF SDYS BY RESETTLEMENT, 1962–1979

Source: Gu (2009)

Let's mobilize!" The last addressed rural villagers: "The comrades in the countryside should welcome them."

Figure 1 shows that approximately 4.7 million urban youths were sent down from 1967 to 1969.[7] After three years of intensive mobilization, the government allowed a larger proportion of urban graduates to work in the cities.[8] A second peak occurred in 1974, one year after the National Work Conference on Educated Youth, which reemphasized the movement's political importance.

There is ample anecdotal evidence that most SDYs at the time were reluctant to go, due to the poverty and hardship associated with the move and especially the (potentially permanent) loss of their urban *hukou* status. China's household registration system categorized people into urban or rural *hukou* status, which determined the social welfare to which they were entitled. Urban *hukou* holders enjoyed much better social welfare than their rural counterparts. However, severe social pressure pushed urban youths to participate in the campaign (Bernstein 1977, Zhou and Hou 1999). Participation signaled a youth's political loyalty toward Mao, especially for those who belonged to the desirable "red classes."[9] Youth in the undesirable

[7] To the best of our knowledge, the publicly available official sources only reported the combined number of SDYs for 1967–1968; annual data for each year are not available. Our calculations based on 2010 China Family Panel Studies show that of the 825 survey respondents who claimed to be SDYs, only 13 were sent down in 1967 while 104 were sent in 1968. Likewise, Gu (2009) claimed that almost all of the SDYs during 1967–1968 came in 1968. We therefore have good reason to believe that the SDYs sent down in 1968 accounted for an absolute majority of the combined number in 1967–1968.

[8] If a household had multiple children of high school age, parents could choose one to send, as described in Li, Rosenzweig, and Zhang (2010). Using a twin sample, they found that parents selected children with lower endowments, which may have attenuated the effects of the SDYs on educational attainment in the countryside.

[9] During the Cultural Revolution, households were categorized according to their political identities. There were "five red classes" and "five black classes" (*wuhong wuhei*). The five red classes included revolutionary

"black classes" had no employment opportunities in urban areas, which motivated them to make a break from their parents' class by participating in the movement (Pan 2003).

After Mao's death in September 1976, the ideological impetus to continue the program declined. In 1978, the new central leadership considered ending the program; there was a sharp decline in sending down rusticated youth that year (Figure 1). Large-scale protests from SDYs first appeared in Yunnan in late 1978 and quickly spread to Xinjiang, Shanghai, and elsewhere (Deng 1993). The central government discontinued the movement in September 1980. Most SDYs returned to urban areas afterward; roughly 5 percent of SDYs never returned home because they were married to local farmers or assigned local nonagricultural jobs (Liu et al. 1995).

B. *Flows of SDYs*

The key variation used in this paper comes from different numbers of SDYs received across counties during the send-down period. While our identification strategy does not require those numbers to be exogenous, it is important to understand the factors that affected the flow of SDYs.[10]

We conceptualize the flows of SDYs in a pushing–pulling framework. The most important "pushing" factor from the SDYs hometowns is the urbanization rate, because the movement explicitly targeted urban youth. Table 1 shows that the three most urbanized municipalities, i.e., Beijing, Tianjin, and Shanghai, together accounted for 13.2 percent of the total SDYs but only 3.4 percent of the national population in 1966 (NBS 2010).

Three "pulling" factors determined the number of SDYs received: the rural area's distance from the originating place, its capacity to absorb incoming urban youth, and its need for more laborers. Relocating millions of young people from urban to rural areas was a great challenge for the Chinese government. For practical reasons, most rusticated urban youth were sent to villages near their hometowns. Only 7.9 percent (1.42 million) of the SDYs were sent outside their home province. Thus, the inter-province flow of SDYs, which is highlighted in Kinnan, Wang, and Wang (2018) and Xing and Zhou (2018), accounted for only a small part of the movement. Of the 1.42 million inter-province SDYs, 87.3 percent (1.24 million) were from three municipalities: Beijing, Tianjin, and Shanghai (Gu 2009). When choosing the destination, the government took the SDYs' survival into account and generally avoided the poorest counties.[11] At the 1973 National Work Conference on Educated Youth, Premier Zhou Enlai instructed that the destination should enable the educated youth to survive on their own without long-term subsidies (Liu et al. 1995, 512).

Local demand for labor also played a role in receiving SDYs. For example, four border provinces, i.e., Inner Mongolia, Heilongjiang, Yunnan, and Xinjiang,

cadres, revolutionary soldiers, revolutionary martyrs, workers, and poor and lower-middle peasants. The five black classes were landlords and rich peasants, counter-revolutionaries, bad elements, rightists, and capitalists.

[10] Columns 1 and 2 in online Appendix Table B2 report the correlation between the densities of received SDYs and some local county characteristics.

[11] A 1964 central government document recommended that the destinations should have strong leadership, many alternatives of production, prospects of development, and stable income sources (Liu et al. 1995).

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

Province	SDY received (thousands)			SDY sent (thousands)		
	Total	Inside	Outside	Total	Inside	Outside
Beijing	384.2	384.2	0.0	636.3	384.2	252.1
Tianjin	193.6	193.6	0.0	465.1	193.6	271.5
Hebei	510.5	377.8	132.7	384.4	377.8	6.6
Shanxi	312.9	264.3	48.6	264.3	264.3	0.0
Inner Mongolia	299.3	193.8	105.5	193.8	193.8	0.0
Liaoning	2,018.0	2,013.4	4.6	2,013.4	2,013.4	0.0
Jilin	1,052.6	991.4	61.2	991.4	991.4	0.0
Heilongjiang	1,922.2	1,519.2	403.0	1,519.2	1,519.2	0.0
Shanghai	532.3	532.3	0.0	1,252.2	532.3	719.9
Jiangsu	861.2	810.2	51.0	828.4	810.2	18.2
Zhejiang	595.9	563.9	32.0	646.2	563.9	82.3
Anhui	725.5	576.5	149.0	576.5	576.5	0.0
Fujian	372.3	372.3	0.0	372.3	372.3	0.0
Jiangxi	622.5	504.5	118.0	504.5	504.5	0.0
Shandong	492.7	492.7	0.0	512.9	492.7	20.2
Henan	673.0	673.0	0.0	673.0	673.0	0.0
Hubei	878.6	878.6	0.0	886.6	878.6	8.0
Hunan	635.8	635.8	0.0	635.8	635.8	0.0
Guangdong	973.2	973.2	0.0	973.2	973.2	0.0
Guangxi	434.8	434.8	0.0	434.8	434.8	0.0
Sichuan	1,427.4	1,427.4	0.0	1,472.4	1,427.4	45.0
Guizhou	224.1	213.5	10.6	213.5	213.5	0.0
Yunnan	339.1	232.5	106.6	232.5	232.5	0.0
Tibet	3.4	3.4	0.0	3.4	3.4	0.0
Shaanxi	490.3	463.1	27.2	463.1	463.1	0.0
Gansu	264.3	245.2	19.1	245.2	245.2	0.0
Qinghai	51.0	43.6	7.4	43.6	43.6	0.0
Ningxia	57.5	49.2	8.3	49.2	49.2	0.0
Xinjiang	416.6	277.6	139.0	277.6	277.6	0.0
Total	17,764.8	16,341.0	1,423.8	17,764.8	16,341.0	1,423.8

Source: Gu (2009)

received 0.75 million of the 1.42 million inter-province relocated SDYs (Table 1). Many SDYs worked in state farms on the frontiers (Shi and He 1996). These reallocations were also partially motivated by military considerations due to China's intense foreign policy relationships with the Soviet Union, Mongolia, and Vietnam from the late 1960s to the early 1970s (Pan 2002, 363). Heilongjiang and Xinjiang also received many SDYs because they were thinly populated but rich in arable land (Zhang 1986). All these pieces of evidence imply that improving education in rural China was not the main motivation for relocating SDYs.

The flow of SDYs from Shanghai nicely illustrates the pushing–pulling framework. Shanghai had a total of 1.25 million urban youths to be rusticated. Although it was highly urbanized and lacked rural land to absorb these youths, it still tried to resettle 0.53 million urban youths in its already crowded suburb areas. Of the 0.72 million SDYs who were sent outside the city, popular destinations were either close to Shanghai or on the border of China. Anhui and Jiangxi, the two closest inland provinces to Shanghai,[12] received 0.15 and 0.12 million Shanghai SDYs, respectively. Three border provinces, Heilongjiang, Yunnan, and Xinjiang, received

[12] Shanghai has only two adjacent provinces, Jiangsu and Zhejiang. Both were relatively developed coastal provinces.

0.17, 0.06, and 0.1 million Shanghai SDYs, respectively. These five provinces accepted 82.5 percent of the Shanghai SDYs who were relocated outside Shanghai.[13]

C. *What Did SDYs Do in Rural China?*

There were three major destinations for SDY resettlement: rural villages (*chadui*), collective farms, and state farms (see Figure 1). From 1962 to 1979, rural villages absorbed most of the SDYs (12.8 million of 17.7 million). Two million SDYs were sent to collective farms, and 2.9 million to state farms (Gu 2009). Because our study focuses on rural children who had some overlap with SDYs in 1968–1977, we use the number that went to rural villages during that period (11.5 million) when we calculate the aggregate effect of SDYs. When the SDYs were sent to the countryside, the rural economy was collectivized, and agricultural production took the form of production brigades (*shengchan dadui*).[14] Within the production brigade, people earned "work points" based on the amount of farming work they engaged in. The production brigade shared 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, and thus struggled to earn enough work points to feed themselves. Given their advantage in education, SDYs started to be assigned to more technical jobs. Approximately 11.7 percent of the SDYs were assigned more technical jobs from 1962 to 1972, and the share grew steadily during the rustication movement.[15] In Spring 1976, Huaide County in Jilin Province reported that 7,000 SDYs worked in cultural or technical jobs, accounting for 70 percent of the total SDYs in that county (Liu 2009). In 1975, 32,421 SDYs in Jilin Province worked in jobs such as study counselors, agricultural technicians, barefoot doctors, *minban* (non-state-funded) teachers (Gu 2009).

Thus, the SDYs were not simply working on farms; they served as a bridge between urban and rural areas by taking nonagricultural jobs, which at the time were less prevalent in rural China. They could benefit local residents by introducing new urban techniques, knowledge, and values. The fact that many SDYs were originally expected to farm but ended up in nonagricultural jobs supports our argument that improving education in rural China was an unintended consequence of the movement.

II. Data and Empirical Strategy

Our study involves two sets of information about the SDYs and rural residents. First, we gathered information from over 3,000 local gazetteers (described in more detail in the next subsection) to construct a unique county-level dataset on the number of SDYs each county received during the Cultural Revolution. In a second

[13] These statistics come from Gu (2009).

[14] In the Maoist regime, people's communes (*renmin gongshe*) were usually composed of several thousand households. Communes were divided into production brigades and production teams (*shengchandui*).

[15] Office of Educated Youth (*zhiqingban*) under the State Council, "Summary of the National Sent-Down-Youth from 1962 to 1972."

step, we matched this county-level information to various micro-level survey data. The main outcome variable comes from the 1990 population census.

The flows of SDYs involved both the sending (urban) and receiving (rural) counties; however, we only focus on the receiving counties. For this purpose, we excluded socioeconomically advantaged county-level divisions (e.g., counties/districts in Beijing, Tianjin, and Shanghai, and all city-governed districts of prefectural cities) and mainly focus on the sample with rural *hukou* in the population census.

A. *Local Gazetteers*

The information on the number of received SDYs at the county level comes from local gazetteers, which are book-length volumes of local history documenting the county's major events. They are often regarded as a locality's "encyclopedia." Most local governments formed task forces to compile local gazetteers and updated them periodically because they were considered a source of local pride. The gazetteers we collected were mostly published in the 1990s and 2000s, and we focus on information related to SDYs. For example, the local gazetteers of Taihu County in Anhui province (Commission of Taihu Gazetteer 1995, p. 520) documented that "From 1968 to 1977, we received 3,697 educated-youths from Shanghai, Hebei, Anqing, and urban areas within the county. Among them, 366 came from Shanghai, 1,596 were from Anqing, 1,498 were local, 237 were from Hefei and other places."

We collected the total number of SDYs each county received from 1968 to 1977.[16] For example, we recorded 3,697 SDYs for Taihu County. We then divided the number of SDYs by the county population in 1964 to generate the density of SDYs. We chose 1964 because China's second population census was conducted that year, and it is the only year in the 1960s for which the county-level population is available. Additionally, since 1964 came before the Cultural Revolution and the massive rustication program, the 1964 county-level population was unlikely to be affected by the flow of SDYs.

We digitized 3,153 gazetteers for all 2,868 county-level divisions in China.[17] Panel A of online Appendix Table B1 illustrates the selection process of core counties. A total of 2,521 counties were recorded in the 1990 population census.[18] We excluded 52 counties/districts in Beijing, Tianjin, and Shanghai and dropped 430 city-governed districts (*shixiaqu*) in other provinces during the movement because they were more likely to be the sending districts. We were interested in the rural destination areas that received SDYs in this study. We found information on SDYs for 1,843 of the 2,039 remaining counties (90.4 percent). Figure 2 illustrates the regional variation in the number of received SDYs in those counties. Finally,

[16] Since data on the stock of SDYs for each year are not available, we use those numbers to proxy for the average stock in the locality during this period.

[17] The number of gazetteers exceeds the number of counties for two reasons. First, a county may have multiple gazetteers on different topics. Second, some counties compiled one gazetteer during the 1990s and another in the 2000s.

[18] County merges or splits explain this gap. In those scenarios, we could not uniquely link counties in which the gazetteers were compiled to those in the 1990 population census. Note that if a county changed its code without changing its boundary, we treat it as the same county.

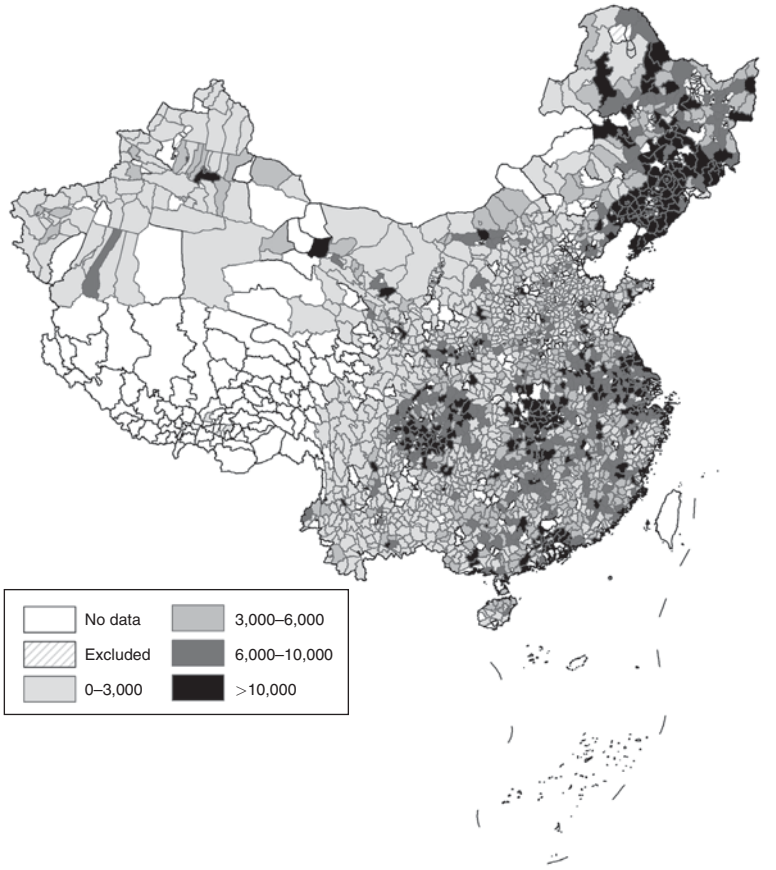

FIGURE 2. NUMBER OF RECEIVED SDYS IN EACH COUNTY

70 counties were excluded due to a lack of population information in 1964, which prevented the calculation of the local densities of SDYs.

We collected other information from local gazetteers to complement our analysis, including the number of teachers/schools, grain production, educational expenditures, and the number of victims during the Cultural Revolution.[19] Local gazetteers do not record historical information in a uniform way: one piece of information may be available in some counties but not in others. This may lead to sample selection bias. We examine the pattern of missing values in online Appendix Section B. Online Appendix Section C provides a thorough discussion of the data quality of SDYs documented in local gazetteers. We first use Benford's Law to detect possible statistical anomalies and then compare three sources of data: our county-level data, national reports documented in Gu (2009), and estimates from the 2010 wave of the China Family Panel Studies (CFPS).

[19] The data source of the Cultural Revolution is Walder (2017). We self-collected other county-level information available at http://doi.org/10.3886/E119690V1.

B. *Population Census*

We use the 1 percent sample from China's 1990 Population Census (NBS, n.d.) to evaluate how rural children's exposure to the SDYs affected their educational outcomes. As previously mentioned, most rural children at most completed primary education before the arrival of the SDYs. Therefore, we define exposure to SDYs according to whether their primary schooling years overlapped with the massive send-down movement, and re-run this analysis with junior high education in our robustness checks. We focus on cohorts born between 1946 and 1969. We define the 1956–1969 cohorts as the treatment group and the 1946–1955 cohorts as the control group. The 1956 cohort was the first to be affected because they were supposed to be in their last year of primary school in 1968, when the massive rustication movement began. The 1969 cohort was the last to be affected because they started primary school in 1976, the year before SDYs gradually began returning to urban areas.

The 1990 census is suitable for this study for three reasons. First, most affected cohorts should have completed their education by that year. Earlier censuses do not satisfy this condition. An earlier population census took place in 1982, but the youngest cohort in our analysis (born in 1969) were aged only 13 that year: too young for an analysis of educational outcomes.[20] Second, using data from 1990 naturally rules out a mechanical effect that better-educated SDYs were categorized as rural residents during their sent-down period. By 1990, most SDYs had returned to their urban homes. Third, migration was still strictly limited in 1990. Migration could threaten our identification if people were not living in the same county as where they received their education. China's mass migration did not start until the mid-1990s, when the rise of private domestic firms and the influx of foreign direct investment in China's coastal areas created a huge demand for cheap labor. The government also loosened its control over rural–urban migration after the mid-1990s (Meng 2014). The number of migrants within China rose from 22.6 million in 1990 to 78.8 million in 2000 (Fan 2008) and 242.2 million in 2010 (NBS 2011). We use two additional data sources in our supplementary analysis. The first is the 1982/2000/2010 population censuses. The second is the 2010 wave of the China Family Panel Studies (CFPS), which is a nationally representative survey administered by Peking University's Institute of Social Science that covers 25 out of 34 provinces and samples 162 counties (Institute of Social Science Survey 2015).

We coded our key dependent variable, *years of education*, according to the highest level of education an individual received and whether they completed each tier of schooling. The completion status was very informative at that time. Before the enforcement of China's Compulsory Education Law in 1986, dropouts were prevalent in rural China. In our sample, 13.8 percent of those who attended primary school did not complete it. The rate is even higher for higher-level education. We assume that people received 6 years of education if they graduated from primary school. If they dropped out of primary school, we coded the number as 3. We coded

[20] We use the 1982 census to check the pretrend with respect to the density of SDYs and find no evidence for its existence.

higher-level schooling years in a similar fashion.[21] We also use dummy variables indicating whether people completed primary/junior high education as alternative measures of educational outcomes.

We combined the census data with the county-level data on SDYs and excluded migrants who did not live in their *hukou* registration counties/prefectures. Our key dependent variable (*education*) comes from the 1990 census, and the send-down movement took place in the 1960s and 1970s. Therefore, we implicitly assume that people lived in the same county 20 years ago. This assumption is less likely to hold for the migrant sample. Note that the no-migration restriction was much weaker for the rural sample, for which the restriction only excludes 2.0 percent of the rural sample. The same restriction excludes 9.3 percent of the urban sample. Our final rural sample was 2,775,879, and the urban sample was 419,847 for the 1946–1969 cohorts. The rural sample is of primary interest, and the urban sample is for comparison purposes. Table 2 presents the summary statics of the 1990 census, and displays a huge rural–urban gap in educational attainment. The urban sample of our control cohorts received 8.9 years of schooling on average, but their rural counterparts only received 60 percent of that amount (5.4 years).

C. *Empirical Strategy*

We use a cohort difference-in-differences (DID) identification strategy that 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 were exposed differently depending on how their schooling years overlapped with the movement. Following Duflo (2001), we start our analysis by separately estimating the effects of SDYs on each cohort using the following equation (the 1941–1945 cohorts serve as the baseline):

$$(1)\qquad Y\_Edu_{i,g,c,p} = \beta_0 + \sum_{\gamma=1946}^{1969} \beta_{1,\gamma} \%SDY_{c,p} \times I(g = \gamma) + \beta_2 \mathbf{X}_{i,g,c,p} + \lambda_c + \mu_{g,p} + \mathbf{\Lambda}_c \times \mu_g + \varepsilon_{i,g,c,p},$$

where $Y\_Edu_{i,g,c,p}$ refers to the years of education of individual i of cohort g in county c of province p; $\%SDY_{c,p}$ 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; $\mathbf{X}_{i,g,c,p}$ is a vector of individual-level controls, including gender and ethnicity; λ_c are county fixed effects, which absorb all time-invariant county-level characteristics. Unobservable heterogeneous cohort trends that may be correlated

[21] This coding method is designed to approximate the true number of years of education, but it is difficult to precisely compute because of the historical shifts in China's education system. Prior to the start of the Cultural Revolution in 1966, primary/secondary education generally followed the pattern of 6-3-3: 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; Chen, Jiang, and Zhou 2020). If we observe that SDYs have a positive effect on our imputed "years of education," we should interpret it as either a higher education level or a higher probability of graduation. Moreover, in our empirical settings, we control for county fixed effects as well as province-cohort fixed effects to help capture all policy changes that were applied uniformly to the same cohort within a province.

Table 2—Summary Statistics of the 1 Percent Sample from the 1990 Census

Cohort:	Control group (1946–1955)		Treatment group (1956–1969)	
Hukou:	Rural (1)	Urban (2)	Rural (3)	Urban (4)
Years of education	5.372	8.881	7.190	10.536
	(3.365)	(3.178)	(3.100)	(2.511)
Complete primary school	0.617	0.911	0.799	0.972
	(0.486)	(0.285)	(0.401)	(0.164)
Complete junior high	0.205	0.670	0.454	0.904
	(0.404)	(0.470)	(0.498)	(0.294)
Male = 1	0.507	0.592	0.505	0.567
	(0.500)	(0.492)	(0.500)	(0.495)
Han ethnic = 1	0.924	0.930	0.914	0.925
	(0.266)	(0.255)	(0.280)	(0.264)
Age	39.031	39.208	26.638	26.993
	(2.823)	(2.862)	(4.004)	(3.966)
Observations	960,127	148,244	1,815,752	271,603

Note: Standard deviations are in parentheses.

with the densities of SDYs are of crucial concern to the cohort DID strategy. To alleviate this concern, we introduce province-cohort fixed effects ($\mu_{g,p}$) and the interaction terms between county base education before the SDYs' arrival and cohort dummies ($\mathbf{\Lambda}_c \times \mu_g$). The county base education is calculated as the primary and junior high graduation rates of the control group in each county using the 1990 census. By introducing $\mu_{g,p}$ and $\mathbf{\Lambda}_c \times \mu_g$, we not only allow the trends to differ across provinces; we also allow the trends to be related to the county's initial education level. Of course, it is not possible to control for all kinds of differential trends since many county characteristics are not observable. In online Appendix Section E, we apply an alternative empirical method to check the robustness of our results: the Abadie synthetic control method (Abadie and Gardeazabal 2003; Abadie, Diamond, and Hainmueller 2010), which does not require the parallel-trend assumption.

After presenting a by-cohort specification, we use a standard cohort DID specification, which is more efficient. We use the following main estimation equation (the control group are cohorts 1946–1955):

$$(2)\quad Y\_Edu_{i,g,c,p} = \beta_0 + \beta_1 \%SDY_{c,p} \times I(1956 \le g \le 1969) + \beta_2 \mathbf{X}_{i,g,c,p} + \lambda_c + \mu_{g,p} + \mathbf{\Lambda}_c \times \mu_g + \varepsilon_{i,g,c,p}.$$

The primary parameter of interest in this study is β_1. Our identification strategy critically hinges on the parallel-trend assumption: for the affected cohorts (1956–1969), each county's cohort trend in education should not be correlated with $\%SDY_{c,p}$ in the absence of the movement. While the counterfactual is certainly unobservable, we provide evidence in Sections IIIA and IV to support the parallel-trend assumption.

Because our identification comes from a cohort DID strategy, a potential concern is the confounding age effect, which is typically hard to separate from cohort effects in a cross-sectional dataset. This concern can be greatly alleviated in our setting because our main outcome variable, *basic education*, changes little with age once someone completes his/her formal education. Therefore, if we restrict our analysis to those who were aged at least 20 at the time of each census, the confounding age effect is not a major issue.

Our estimation should be interpreted as a conservative lower-bound estimate of the SDYs' effect on rural education for two reasons. First, our baseline specification defines cohorts born between 1946 and 1955 as the control group, but some of them might have also been affected by the arrival of the SDYs. Even if they had passed the age of primary education, they could still have benefited from those better-educated SDYs (e.g., going back to school if they had previously dropped out) or from their younger rural peers in the village. We would underestimate the effect of the SDYs on the treated group in this scenario. Second, our specification implicitly assumes that rural people who received their primary education during the 1960s and 1970s still lived in the same county when the 1990 population census was conducted. Although it is not a strong assumption given China's rigid household registration system,[22] it is true that the best-educated individuals in rural areas are significantly more likely to migrate (Zhao 1997). Therefore, our specification is likely to miss those best-educated rural children who went beyond a junior-high-school level and were more likely to have left the county by the 1990 census.

III. Effect of SDYs on Rural Education

A. *Main Results*

The By-Cohort Specification.—We first present the results of the by-cohort specification (equation (1)), which effectively shows the conditional correlation between SDYs and educational achievement for all our sample cohorts (1946–1969). Panels A and B of Figure 3 plot the coefficient $\beta_{1,\gamma}$ for each cohort using the 1982 and 1990 census data. We use the 1982 census to check the pretrends because it was closer to the send-down movement and thus subject to less mortality attrition and migration selection. We focus on rural people aged at least 20 in the 1982 census because many younger cohorts had not completed their education when the census was conducted. The dashed line shows the years of primary school ages (7–12) that overlap with the movement (1968–1977) for each cohort. The figure lends strong support to the parallel-trend assumption. The coefficients fluctuate around zero before the 1956 cohort, suggesting that there were no heterogeneous cohort trends in education with regard to the county density of SDYs prior to the rustication movement. Another important takeaway from Figure 3 is that the coefficients gradually increase from the 1956 cohort, as later cohorts spent more primary school years with the SDYs. This suggests that the effect of the SDYs, while

[22] According to the 1 percent sample from the 2000 China's Population Census, 86 percent of the rural people born between 1946 and 1969 lived in the same county as their birthplaces. This number should be even larger in the 1990 census.

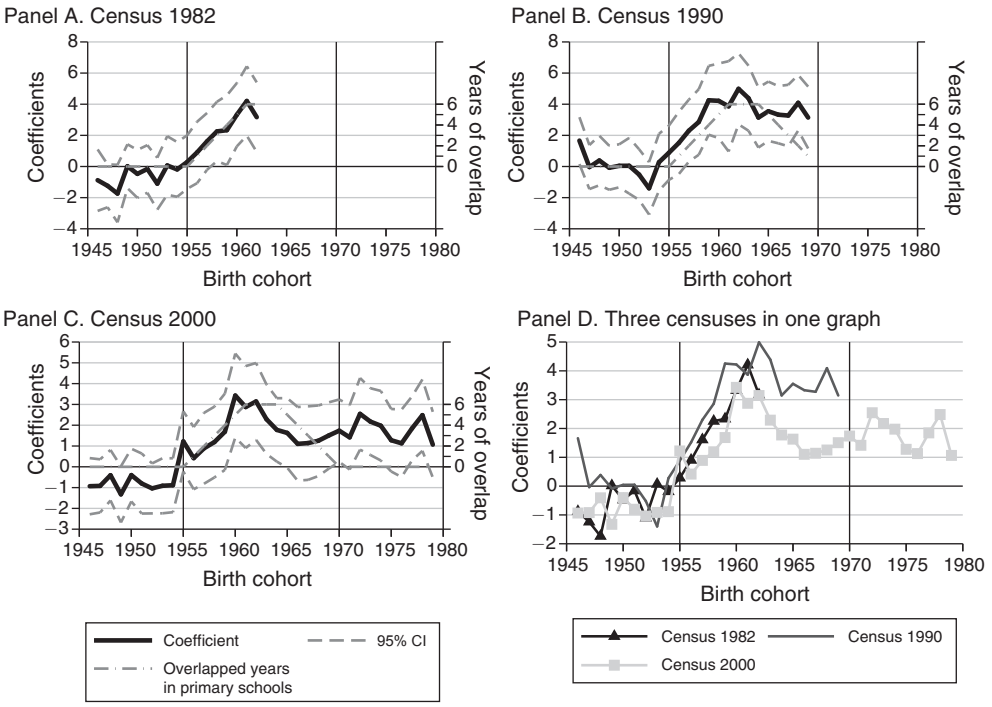

FIGURE 3. EFFECT OF SDYS ON THE EDUCATIONAL ATTAINMENT OF DIFFERENT COHORTS

Note: The left *y*-axis represents the coefficients from equation (1), which captures the effect of SDYs densities on different cohorts.

immediate from their arrival, is accumulative in nature. The effect then declines as the movement came to an end and the SDYs were returning to their urban homes. This dynamic pattern also justifies our choice of the 1956 cohort as the first treated cohort.

The arrival of the SDYs starting in 1968 could have in principle helped the cohorts from 1953–1955, who were junior high age. However, this possibility will not seriously affect our current estimation for two reasons. First, Figure 3 (based on the 1982, 1990, and 2000 censuses) shows that the effects of the SDYs on those older cohorts (1953–1955) are very small in magnitude and statistically insignificant.[23]

[23] We interpret the small effect of the SDYs on these older cohorts as follows. There are two ways in which older kids could be affected by the arrival of the SDYs: they either stayed in junior high or left formal education after finishing primary school due to the insufficient supply of educational facilities (especially teachers) in their villages. If older kids stayed in junior high, the arrival of the SDYs may not have affected their years of schooling because they would very likely have finished their junior high education anyway, although the quality of their education may be somewhat improved after the SDYs became teachers. Alternatively, if they had to stop formal education after primary school, the arrival of the SDYs may have increased the chances of opening a junior high school and calling on these kids to return to school. However, in contrast with younger kids who could rely on the SDYs to attain primary and/or junior high education without interruption (note that our first treated cohort (1956) had just finished primary school and was ready for junior high), these older kids had a 1–3-year gap after primary education, and it was not easy for them to go back to school. The longer the gap, the harder it would have been for them to return. This observation is confirmed by Figure 3, which reveals that among the potentially affected cohorts of 1953–1955, the effects on the older cohorts (1953–1954) are relatively small and statistically insignificant, but the youngest cohort (1955) exhibited some nearly significant and positive effects of SDYs. Including the 1955 cohort in our treatment group does not change our key results.

TABLE 3—THE EFFECT OF SDYS ON THE EDUCATIONAL ATTAINMENT OF RURAL CHILDREN (1990 CENSUS)

Dependent variables:	Years of education		Complete primary		Complete junior high		Placebo I (1990) (1946–1950) versus (1951–1955)	Placebo II (2000) (1970–1974) versus (1975–1979)
Sample:	Rural	Urban	Rural	Urban	Rural	Urban		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local density of received SDYs × affected cohorts (1956–1969)	3.237 (0.701)	0.151 (0.517)	0.441 (0.0873)	−0.0658 (0.0611)	0.767 (0.121)	−0.0517 (0.103)		
Local density of received SDYs × affected cohorts (placebo)							−0.817 (0.576)	−0.432 (0.319)
Male	1.874 (0.0284)	0.668 (0.0256)	0.201 (0.00361)	0.0319 (0.00227)	0.203 (0.00285)	0.0546 (0.00316)	2.286 (0.0300)	0.665 (0.0150)
Han ethnic	0.150 (0.0565)	3.34e-05 (0.0811)	0.0213 (0.00769)	0.00962 (0.00540)	0.00657 (0.00679)	0.0177 (0.00875)	0.0802 (0.0554)	0.477 (0.0401)
Observations	2,775,858	417,883	2,775,858	417,883	2,775,858	417,883	960,123	947,025
R^2	0.293	0.225	0.258	0.106	0.212	0.198	0.267	0.216
$\bar{Y}$ of control group	5.372	8.882	0.616	0.911	0.205	0.670		
County FE	✓	✓	✓	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓	✓	✓	✓
Base education × cohort FE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Standard errors are clustered at the county level. Local density of received SDYs is computed by dividing the number of received SDYs by the county population in 1964. Base education is calculated as the primary and junior high graduation rates of the control group.

Second, when we redefine the treatment group to include cohorts from 1953–1955, our key estimates (reported in column 7 of online Appendix Table D1) become somewhat smaller in magnitude but remain significant. Our results are also robust to excluding those older cohorts from the regressions, as shown in column 6 of online Appendix Table D1.

The Cohort DID Specification.—Table 3 presents the main results of our paper. We separately report the rural and urban samples.[24] Column 1 in Table 3 shows that local rural children who were more exposed to SDYs completed more years of education (the coefficient, 3.237, is positively significant). The average density of SDYs is 2.22 percent (22.2 SDYs per 1,000 locals). This implies that exposure to SDYs increased rural children's education by at least 0.072 years, an effect that is comparable in magnitude to that of compulsory education laws in the United States during the first half of the twentieth century.[25] Recall that the rustication movement never sought to improve rural education, and that our results only provide a conservative

[24] It is tempting to use the urban sample as a placebo test. However, 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 later moved to urban areas. On the other hand, we define cohorts born between 1946 and 1955 as the control group. However, urban cohorts could be the direct targets of the movement and could therefore have been affected.

[25] These estimates range from 0.025 to 0.05 years (Angrist and Krueger 1991, Acemoglu and Angrist 2001, Lleras-Muney 2005).

lower-bound estimate. Since 245 million rural kids potentially benefited from the arrival of the SDYs, the movement led to a 17.6 $(= 245 \times 0.072)$ million increase in person-years of schooling in rural areas.

Columns 3 and 5 in Table 3 display the results using the completion of primary/junior high school as alternative educational outcomes. Exposure to SDYs raised the probability of completing primary school by 0.98 $(= 0.441 \times 2.22\%)$ percentage points and that of completing junior high school by 1.70 $(= 0.767 \times 2.22\%)$ percentage points. Thus, for every 100 SDYs a county received during the movement, it would have 20.9 more primary school graduates and 36.2 more junior high graduates.[26] Columns 2, 4, and 6 present the results using the urban sample instead; none shows any sign of significance and the coefficients are much smaller, confirming that the SDYs only affected the rural population in the destination counties. We also conduct two standard placebo tests in columns 7 and 8. Using 1990 census data, we first bisect the pre-treated cohorts (1946–1955) into control cohorts (1946–1950) and placebo-treated cohorts (1951–1955). Then we carry out a similar exercise on the post-treated cohorts (1970–1979) using 2000 census data. Neither test shows signs of statistical significance.[27]

Online Appendix Tables D1 and D2 show that our main results are robust to a wide range of robustness checks, which can be roughly categorized into two sets: alternative empirical specifications and choice of sample. The first set of robustness checks includes (i) different bandwidths of treated cohorts, (ii) using different denominators to calculate the densities of SDYs, (iii) using a continuous measure of treatment, (iv) treating cohorts of junior high ages in 1968 differently, and (v) allowing junior high school education to be affected by the SDYs. The second set of checks includes (i) excluding nine provinces in the "Third Front" Construction region based on Fan and Zou (2019), (ii) excluding five provinces that do not perform well in matching county aggregates and national statistics, (iii) imposing stronger assumptions on migration, (iv) excluding those who are likely to change their *hukou* status, and (v) excluding counties that may have larger measurement errors in the number of received SDYs. Online Appendix Section D provides details of these robustness checks.

Heterogeneity.—Table 4 estimates the heterogeneous effect of SDYs on locals by gender (males received significantly more education on average 6.49 versus 4.22 for females for the control cohorts of 1946–1955) and by level of development (more-educated counties versus less-educated counties).[28] We found the SDY effects were much larger for the less-educated groups and regions: the effect on girls (less-educated counties) is about twice that on boys (more-educated counties).

[26] The total rural population in our defined treatment group is approximately 245 million. During the period 1968–1977, 11.5 million urban youths were sent to rural villages. This produced an increase of 20.9 $(= (0.98 \times 245)/11.5)$ primary school graduates and 36.2 $(= (1.70 \times 245)/11.5)$ junior high graduates.

[27] Strictly speaking, the results from the post-treated cohorts (1970–1979) imply that they were subject to *the same level of persistent effect* after the SDYs left the countryside (instead of no effect), as shown in panel C of Figure 3.

[28] We bisected the sample according to whether the county average years of education of the control group exceeded 5.5 years. The control group in more-educated counties had an average of 6.31 years of education, compared to 4.36 years in less-educated counties.

TABLE 4—HETEROGENEOUS EFFECT OF SDYS (1990 CENSUS)

Dependent variables:	Years of education				Primary	Junior	Primary	Junior
Sample:	Male	Female	Less-educated counties	More-educated counties	Less-educated counties		More-educated counties	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local density of received SDYs × affected cohorts (1956–1969)	2.514	4.092	5.167	2.059	0.838	0.882	0.153	0.579
	(0.624)	(1.007)	(1.594)	(0.668)	(0.184)	(0.217)	(0.0678)	(0.133)
Observations	1,403,169	1,372,686	1,349,489	1,426,369	1,349,489	1,349,489	1,426,369	1,426,369
R^2	0.197	0.316	0.294	0.194	0.253	0.192	0.141	0.188
Mean education years of control group	6.492	4.221	4.361	6.309	4.361	4.361	6.309	6.309
Primary graduate of control group	0.750	0.480	0.466	0.757	0.466	0.466	0.757	0.757
Junior high graduate of control group	0.302	0.105	0.140	0.265	0.140	0.140	0.265	0.265
Individual controls	✓	✓	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓	✓	✓	✓
Base education × cohort FE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Only rural sample is used. Standard errors are clustered at the county level. Individual controls include gender and ethnicity. More-/less-educated counties are defined according to whether the average years of education of the control group exceed 5.5 years. Local density of received SDYs is computed by dividing the number of received SDYs by the county population in 1964. Base education is calculated as the primary and junior high graduation rates of the control group.

Therefore, the send-down movement not only raised the overall level education in rural China but also reduced educational inequality across gender and regions.

The finding that rural girls gained more from the arrival of the SDYs calls for greater attention. In contrast to the huge gender gap in education in rural villages, female SDYs were just as well educated as their male counterparts. They were 7 percentage points more likely to have completed junior high school (77.1 percent versus 70.1 percent) than the male SDYs and only 3.5 percentage points less likely to have completed senior high school (26.4 percent versus 29.9 percent).[29] The well-educated female SDYs might have acted as role models for rural girls, signaling that they too can do as well as boys, collapsing gender stereotypes.

In addition to the population heterogeneity, it is also helpful to understand the heterogeneity of the SDY effects at different educational levels. Table 3 shows that SDYs had a larger effect on junior high education than primary education, mainly because primary school expansion in China took place prior to their arrival. During the 1950s and 1960s, the central government attempted to build a primary school in every village (Hannum 1999). The primary school attendance rate in rural China was as high as 76.7 percent for our control cohorts. By contrast, the junior high attendance rate in rural areas was only 23.2 percent, indicating that there was much more room for junior high education to expand. To support this claim, columns 5–8 in Table 4 report the effect on junior high and primary graduation separately for less-educated and more-educated counties. We find that in less-educated counties

[29] These numbers are based on our calculation using the 2010 CFPS.

where primary education was not universal, the effects on junior high and primary education are close to each other. But in more-educated counties, the effect on junior high education is much larger.

The effect of SDYs on rural children arises from SDYs' educational advantage over local residents. If this is true, we should expect the SDY effect to increase with the education gap between the SDYs and local residents. To explore this expectation, we impute the education gap between rural control cohorts (1946–1955) in the county and corresponding urban counterparts in the same county/prefecture/province to proxy for the education gap. Note that this approach is only an approximation; ideally, we should compute the gap using their *hukou* status during the Cultural Revolution, which is not available. We interact the treatment variable with the imputed education gap in online Appendix Table A1 and find that rural areas with larger education gaps from urban areas experienced greater benefits from the arrival of the SDYs. This evidence is consistent with the hypothesis that the effect of SDYs increases with the education gap between SDYs and local residents.

B. *Mechanisms*

We probe the mechanisms underlying the effects of SDYs on rural education in this subsection. More specifically, how did the arrival of urban youth increase the education of rural children? We provide evidence that better-educated SDYs contributed to the local pool of teachers. Because the rusticated youth were among the best educated in rural villages, many became teachers and instructed rural children. Teaching is the most straightforward way of improving local kids' education. This channel is analogous to Andrabi, Das, and Khwaja (2013), which finds that graduates from girls' secondary schools increased the local supply of teachers, which led to an increase in private schools and improved local access to education.

There is abundant anecdotal evidence that some SDYs worked as teachers in rural villages. Gu (2009) documented that SDYs worked as study counselors and teachers in non-state-funded schools in Jilin and Shaanxi provinces. Gu (2009, p. 230) commented that "Working as teachers in non-state-funded schools was 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 the political background during the Cultural Revolution is considered. China was suffering from a shortage of teachers during this period because intellectuals were attacked and labeled as "bad classes" (Bernstein 1977, Walder 1989).

To formally test the hypothesis that the arrival of the SDYs increased the supply of teachers in rural villages, we collected historical information on the number of teachers from local gazetteers. We found information for 592 of the 1,773 counties in our sample. A smaller set of counties permits us to separate teachers into primary or secondary school teachers and state-funded (*gongban*) or non-state-funded (*minban*) school teachers.[30] We restrict our analysis to the period 1955–1977 and obtained 8,035 county-year observations with the numbers of either primary school

[30] The *minban* schools during our sample period refer to schools that were not run and funded by the county or higher-level governments.

TABLE 5—EFFECTS OF SDYS ON THE SUPPLY OF LOCAL TEACHERS AND EDUCATIONAL FISCAL EXPENSES, 1955–1977 (LOCAL GAZETTEERS)

Dependent variables:	Density of primary school teachers			Density of secondary school teachers			Educational expenses
School types:	All	State-funded	Non-state-funded	All	State-funded	Non-state-funded	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Local density of received SDYs × post 1968	0.034	0.005	0.051	0.017	0.010	0.035	0.072
	(0.012)	(0.011)	(0.028)	(0.005)	(0.004)	(0.007)	(0.668)
Observations	6,521	1,823	1,799	6,336	1,261	1,205	11,677
R^2	0.809	0.754	0.839	0.811	0.776	0.725	0.855
Number of counties	488	152	151	493	107	104	769
County FE	✓	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓	✓

Notes: Standard errors are clustered at the county level. We collect both county-level information on the number of teachers and the number of SDYs from local gazetteers. Local density of received SDYs is computed from dividing the number of received SDYs by the county population in 1964. Local densities of primary and secondary school teachers are computed in a similar fashion.

teachers or secondary teachers available.[31] We estimate how the arrival of the SDYs affected the number of local teachers during the rustication movement using a DID specification:

$$(3) \quad \%Teachers_{t,c,p} = \beta_0 + \beta_1 \%SDY_{c,p} \times I(t \geq 1968) + \lambda_c + \mu_{t,p} + \varepsilon_{t,c,p},$$

where $\%Teachers_{t,c,p}$ 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. We control for county fixed effects λ_c and include provincial heterogeneous time trends $\mu_{t,p}$. Standard errors are clustered at the county level.

Table 5 reports the estimation results of equation (3). Columns 1 and 4 indicate that the arrival of the SDYs significantly increased the supply of local teachers (by 0.75 for primary school teachers and 0.38 secondary school teachers per thousand inhabitants).[32] This represents an impressive increase in the supply of teachers: according to our data, the number of primary (secondary) school teachers per thousand inhabitants was only 4.9 (0.55) in 1965. Since there were initially many more teachers for primary schools than for secondary schools, our result shows a *disproportionate* increase in secondary school teachers, which is in line with our previous findings in Table 3 that SDYs contributed more to junior high graduates than to primary school ones. Columns 2, 3, 5, and 6 reveal another important result: the increase in local teachers mostly occurred in non-state-funded schools. This observation strengthens our claim that the SDYs unintendedly taught the rural kids.

Note that we are not claiming that serving as teachers was the only channel of the SDYs' effects in the send-down movement. In addition to teaching the standard

[31] Note that the number of valid observations varies across counties. For example, in Guangxi Province, the gazetteer of Nandan County only contains such information for 1976, while the gazetteer of Donglan County covers the entire 1955–1977 period.

[32] In the subsample that contains information on teachers, the density of SDYs is 22.0 per 1,000 locals. 0.034 (or 0.017) × 22.0‰ ≈ 0.75‰ (or 0.38‰).

courses, the urban youth also shared their knowledge, ideology, technology, and stories based on their urban experiences. Such communications could happen outside the classroom. Section V provides more evidence of how the SDYs affected the socioeconomic outcomes of rural children in their later lives other than increased years of schooling.

IV. Alternative Interpretations

This section discusses competing stories that may also generate a positive link between SDYs' arrival and rural children's education. Possible confounding factors fall into three categories: missing local characteristics (such as grain production and local government efforts to improve education), contemporaneous historical events (rural education expansion, the Cultural Revolution, the Great Famine), and the mechanical effect that the SDYs (and their offspring) were counted as rural residents.

A. *Grain Production*

The first possibly omitted variable in our main specification is per capita county-level grain production. As introduced in Section I, the central government took into account the local capacity to absorb additional population when reallocating SDYs from urban to rural areas, and local grain productivity certainly affected this capacity. Moreover, nutrition intake is an important determinant of education (see Glewwe and Miguel 2007 for a review), and grain production was the most important indicator of agricultural production in rural China prior to the market-oriented reform. Therefore, it is possible that counties with different levels of grain productivity exhibited heterogeneous trends in education even in the absence of the send-down movement.

To evaluate the potential influence of grain production, we collected county-level grain production data in 1965 from local gazetteers. This year is suitable for our analysis because (i) agricultural production had recovered from the Great Famine of 1959–1961; (ii) the Cultural Revolution and the massive send-down movement had not started; and (iii) these data were available for 1,252 of the 1,773 counties in our sample. Dividing the total output by the county population in 1964 yields the grain production per capita. Column 1 in panel A of Table 6 adds to our main specification (equation (2)) the interaction between per capita grain production in 1965 and the treatment cohort dummy. The results show that the SDY effect remains highly similar after considering the impacts of grain productivity.

B. *Local Government Efforts to Improve Education*

One may argue that it is not that the SDYs improved local education, but that local governments that were more focused on education actively accepted more urban youth. In this scenario, local education would have improved even without the arrival of the SDYs. If this argument is true, we should observe that local governments that received more SDYs spent more money on education. To formally test this possibility, we collected county-year-level information on fiscal education

TABLE 6—ADDRESSING VARIOUS CONFOUNDING FACTORS (1990 CENSUS)

Dependent variables:	Years of education					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Local density of received SDYs	3.779	4.424	4.513	3.196	3.244	4.447
× affected cohorts (1956–1969)	(0.876)	(1.096)	(1.182)	(0.725)	(0.701)	(1.342)
Grain production p.c. in 1965	−0.0401					0.0996
× affected cohorts (1956–1969)	(0.0534)					(0.123)
Local primary school construction		−0.157	−0.133			−0.235
rate[a] × affected cohorts		(0.217)	(0.216)			(0.242)
(1956–1969)						
Local secondary school construction		2.101	2.230			2.232
rate[a] × affected cohorts		(1.069)	(1.069)			(1.198)
(1956–1969)						
Local primary school construction			18.34			
rate × SDY density × affected			(9.470)			
cohorts (1956–1969)[b]						
Local secondary school construction			−77.74			
rate × SDY density × affected			(28.78)			
cohorts (1956–1969)[b]						
Local severity of Cultural Revolution				−0.462		−0.500
× Cultural Revolution cohorts I				(0.241)		(0.617)
(1954–1961)[c]						
Local severity of Cultural Revolution				0.236		−0.169
× Cultural Revolution cohorts II				(0.632)		(0.755)
(1962–1968)[c]						
Local severity of Great Famine[d]					−0.229	−0.344
× Famine cohorts I (1955–1958)					(0.0572)	(0.0979)
Local severity of Great Famine[d]					−0.0553	0.0635
× Famine cohorts II (1959–1961)					(0.0663)	(0.111)
Observations	1,964,222	1,243,049	1,243,049	2,759,926	2,775,804	978,074
R^2	0.297	0.301	0.301	0.294	0.293	0.304
Panel B						
Local density of received SDYs	3.710	4.617	4.617	3.216	3.237	4.887
× affected cohorts (1956–1969)	(0.880)	(1.108)	(1.108)	(0.718)	(0.701)	(1.340)
Observations	1,964,222	1,243,049	1,243,049	2,759,926	2,775,804	978,074
R^2	0.297	0.301	0.301	0.294	0.293	0.304
Information on grain production	✓					✓
Information on number of schools		✓	✓			✓
Information on Cultural Revolution				✓		✓
Individual controls	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓	✓
Base education × cohort FE	✓	✓	✓	✓	✓	✓

Notes: Only rural sample is used. Standard errors are clustered at the county level. Individual controls include gender and ethnicity. Local density of received SDYs is computed by dividing the number of received SDYs by the county population in 1964. Base education is calculated as the primary and junior high graduation rates of the control group.

[a] See Section IVC for the detailed construction of this variable.

[b] To keep the double-interaction terms having a standard interpretation, the school construction rate and SDY density in the triple-interaction term use the deviation from the sample mean.

[c] Local severity of the Cultural Revolution is proxied by dividing the number of victims by the county population in 1964. The data source is Walder (2017).

[d] Local severity of the Great Famine is proxied by 1 minus the ratio of 1959–1961 cohort size over 1955–1957 cohort size.

expenditures from local gazetteers for 776 counties. Online Appendix Figure A1 shows that the trend of educational expenditures from local gazetteers closely tracks

that reported by the National Bureau of Statistics in China (NBS). Using the same method we employed to estimate the contribution of SDYs to the supply of local teachers (equation (3)), we examine in column 7 of Table 5 whether more SDYs contributed to more public education expenditures and find no such evidence.

However, fiscal expenditures on education were not the only way for a county-level government to improve local education. It could have demanded that villages set up and finance local schools. The education costs would not show up in the county government's budget in this scenario. In the following subsection, we will examine this possibility together with the rural education expansion program by directly controlling for the construction of primary and secondary schools at the county level.

C. *Rural Education Expansion Program*

The education system in urban China was severely disrupted during the Cultural Revolution, while secondary education in rural areas experienced a tremendous expansion from the mid-1960s to the late-1970s (Han 2001, Andreas 2004).[33] The goal of the expansion was to achieve universal junior high education in the countryside by 1985 (Pepper 1990). According to the NBS, the number of secondary schools increased tenfold from 19,367 in 1965 to 198,963 in 1977. Most of those new schools were not financially supported by the state but by people's communes or production brigades. Typically, several villages pooled their resources to build a joint secondary school (*lianban zhongxue*) that educated children from neighboring villages. After Mao's death, the expansion was partially reversed between 1978 and 1983. Many schools attached to production brigades were shut down, and at most one junior high school was retained in each commune (Pepper 1990). The decline was also related to the collapse of the commune system in the early 1980s, which provided institutional and financial support for those non-state-funded rural schools.

The rural education expansion program was an important confounding event with the send-down movement because the two events closely overlapped and potentially benefited the same group of rural people (school-age children). To formally differentiate the effects of SDYs and rural education expansion, we collected county-year-level information on the number of primary and secondary schools from local gazetteers. Our empirical strategy to control for the influence of the rural education expansion follows that of Duflo (2001), which studied the impact of a primary school construction program in Indonesia. We approximate the intensity of the rural education expansion program with the annual increase in schools from the mid-1960s (1964–1966) to the mid- to late-1970s (1975–1977) scaled by the county population in 1964. Of the 1,773 counties in our main sample, we have data for 806 on the construction rate of both primary and secondary schools. Panel A of online Appendix Figure A2 displays the rapid process of school expansion. The average number of secondary schools per county increased from 10.8 in 1965 to 77.3 in

[33] The expansion at the primary level started earlier. During the 1950s and 1960s, the central government attempted to build a primary school in every village (Hannum 1999). Nevertheless, in the following empirical analysis, we also take into account the possibility that primary education also expanded in rural areas from the mid-1960s to the late-1970s.

1977. However, rural primary schools did not experience such a rapid change during this period. Panel B shows that the trend of our data from local gazetteers matches the national-level statistics from the NBS quite well.[34]

Column 2 of Table 6 reports the results after controlling for the construction rate of schools. The estimated coefficient on primary schools is small in magnitude and statistically insignificant, which is not surprising because the school expansion during this period mostly targeted secondary education. The effect of the secondary school expansion is relatively large: each additional secondary school per 1,000 inhabitants generated an increase of 0.191 $(= 2.101/11)$ years of education. Our estimate can be translated into an increase of 0.735 years of education per 1,000 children aged 5–14,[35] an effect larger than Duflo's (2001) estimation, which found that each primary school constructed per 1,000 children aged 5–14 led to an increase of 0.12–0.19 years of education. Our estimated effect is larger probably because secondary education in rural China was not prevalent at the time: only 20.5 percent of our control group received a junior high education (Table 2). As a comparison, in Duflo's (2001) study, 69 percent of children were enrolled in primary school prior to the school construction program.

After controlling for the intensity of the rural education expansion program, the estimated coefficient of SDYs drops slightly from 4.62 to 4.42 (Column 2 in Table 6, panel A versus panel B). Our estimation also highlights that in terms of improving rural education, the educated urban youth contributed at least as much as the school expansion program. Column 2 in Table 6 suggests that receiving 43.2 $(= (1{,}000 \times 2.101/11)/4.424)$ SDYs has the same effect as building one new secondary school. During the period 1968–1977, rural villages received 11.5 million SDYs, which was equivalent to building 266,000 schools. According to the NBS, about 180,000 secondary schools were built from 1965 to 1977.

To explore the potential connection between the two programs (education expansion and send-down movement), Column 3 in Table 6 additionally includes the interaction term between the density of SDYs and the school construction rate. We find that the two events substitute for each other: the SDYs' effect is larger in places with fewer secondary schools. This is reasonable, because in counties with better access to middle schools, children could probably receive a junior high education regardless of how many SDYs had arrived. This result suggests that the positive effects of SDYs are unlikely to be driven purely by a coincidence with the school expansion program.

D. *Cultural Revolution*

As previously mentioned, the main purposes of the mass send-down movement, i.e., to settle students who could not go to school, to alleviate urban unemployment, and to discharge Red Guards, were the direct consequences of the Cultural

[34] In panel B of online Appendix Figure A2, we instead present the number of students per 10,000 inhabitants because national-level statistics on the number of schools were missing during the early period of the Cultural Revolution (1966–1971).

[35] According to China's 1964 population census, children aged 5–14 accounted for 26 percent of the total population.

Revolution. The local severity of the Cultural Revolution[36] may thus be correlated with the number of received SDYs.

Since most violent events and negative shocks to educational institutions took place in the first few years of the Cultural Revolution,[37] we first define the 1954–1961 cohorts as the more intensively treated group because their primary school education overlapped with the first three years of the Cultural Revolution. The 1962–1968 cohorts were only exposed to the less violent period of the Cultural Revolution during their primary school years. Column 4 in Table 6 shows the expected result: the Cultural Revolution had negative consequences on the education of the more severely affected cohorts. Despite the significant negative shocks of the Cultural Revolution, the estimated effects of the SDYs are almost identical to our baseline specification, as shown in Column 4 of Table 6, suggesting that our results are robust to the inclusion of the impacts of the Cultural Revolution.

E. *Great Famine*

Another possible confounding historical event is China's Great Famine (1959–1961), which caused an estimated 16.5–45 million deaths nationwide (Meng, Qian, and Yared 2015). Since our study covers cohorts born between 1946 and 1969, some were exposed to this catastrophic event. A large literature discusses the negative long-term impact of the Great Famine on various socioeconomic outcomes (Chen and Zhou 2007, Meng and Qian 2009). Moreover, local food production may have created a linkage between the local severity of the Great Famine and the number of accepted SDYs. Meng, Qian, and Yared (2015) documented the institutional setting that resulted in a surprising positive correlation between mortality rates during the famine and food productivity. Local food productivity was also among the factors related to how many SDYs a locality could accept, as discussed in the background section.

To control for the influence of the Great Famine, we calculated the county-level severity of the famine following Meng, Qian, and Yared (2015), which used the birth cohort sizes of survivors observed in 1990 to proxy for county-level famine severity. We defined local famine severity as 1 minus the ratio of the cohort size of the famine cohorts (1959–1961) over that of the non-famine cohorts (1955–1957). How the local severity of the famine affects the outcome of the survivors is not straightforward. Bozzoli, Deaton, and Quintana-Domeque (2009) decomposed the effect of the mortality rate on survivors' outcomes into two components: (i) a scarring effect, which is the direct long-term effect of a negative shock and (ii) a selection effect, which can improve the overall outcome of survivors by removing the least healthy population. They used China's Great Famine as an example that "at sufficiently high mortality levels, selection can dominate scarring" (Bozzoli,

[36] We measure severity using the number of victims in each county as the share of the county's population in 1964 using data from the "China Political Events Dataset, 1966–1971" (Walder 2017), which was constructed based on information from local gazetteers.

[37] Walder and Su (2003) collected information on violent events during the Cultural Revolution for 1,530 counties. While 836 armed battles were recorded in 1967 and 215 battles in 1968, there were only 26 in 1969 and 0 afterward. At the beginning of the Cultural Revolution, all schools in urban China were closed for approximately 2–3 years. They were reopened in 1968–1969, and the standard school curriculum was gradually resumed in 1972 (Deng and Treiman 1997).

Deaton, and Quintana-Domeque 2009, p. 647). Therefore, we define two treatment groups of the Great Famine, those born between 1955 and 1958 and those born between 1959 and 1961.[38] We anticipate that both groups suffer from the scarring effect, but that the positive selection effect is stronger for the second group. Therefore, the negative impact of the famine should be smaller for the second group. Column 5 in Table 6 confirms this conjecture: while the severity of the Great Famine had a strong negative impact on the first group's education, the effect on the second group is much smaller, suggesting an offset between selection and scarring. Moreover, the estimated impact of SDYs' arrival remains almost unchanged, suggesting that our results are robust to the inclusion of the effect of the Great Famine. The last column of Table 6 simultaneously controlled for all the confounding factors considered above, and the SDY effect remains highly robust.

In the regressions above, when we introduce each variable of the confounding factors into the main specification (equation (2)), the sample size of the regressions changes accordingly due to the missing values. To capture the influence of this change in sample size and to facilitate comparisons, each column of panel B in Table 6 runs the main specification using the same sample as that of panel A but without controlling for the corresponding confounding factor. Comparing the estimates on the SDY effect between panels A and B clearly shows that if we keep the sample size the same across regressions, the inclusion of the confounding factors exerts very small impacts on our baseline estimates.

F. *Can the Remaining SDYs Mechanically Explain Our Results?*

As previously mentioned, approximately 5 percent of SDYs stayed in the countryside permanently (Liu et al. 1995). This fact may raise the concern that the SDYs who stayed in rural villages after the movement could mechanically increase the average rural educational attainment and contaminate our estimation. We argue that this is unlikely for two reasons. First, because most SDYs were middle school graduates from urban cities, they were generally older than our treatment groups. The 2010 wave of the CFPS, which includes information on whether the subject was an SDY, reveals that 44.8 percent of the SDYs in the sample were born in 1946–1955 and 38 percent were born in 1956–1969. This implies that a larger share of SDYs would be put in our control group than in the treatment group, which causes us to underestimate the SDY effects. Second, according to the 1982 population census and our definition of treated cohorts, approximately 245 million rural children were affected by the arrival of the SDYs. The 5 percent of 11.5 million SDYs only account for 0.23 percent of the rural children who were potentially exposed to SDYs even if we put all the remaining SDYs into the treatment group.

Marriage between rural residents and SDYs may also create a mechanical channel. A large proportion of SDYs were fresh graduates from urban schools and were soon of marriageable age. If SDYs married local residents, their offspring were naturally better educated because one of their parents had a higher-level education. However, this is unlikely to explain our empirical findings for two reasons. First, the marriage rate of

[38] Meng, Qian, and Yared (2015) shows that the deviation in birth cohort sizes started as early as 1954, suggesting that newborns were more severely threatened by the famine.

SDYs was rather low (around 8 percent at the end of the movement, 1975–1977: see Liu et al. 1995). On the one hand, the government encouraged the SDYs to get married late.[39] On the other hand, they were afraid that marrying local people could hinder their prospect of returning to their urban homes (Liu et al. 1995). The second reason is that the overlap between SDYs' offspring and our defined treatment group is very limited, since it would have had to involve an urban youth being sent to the countryside in 1968, getting married immediately, and having their first child in 1969, the last cohort of our defined treatment group.

V. Lasting Impacts of SDYs

This section explores two related issues regarding the long-term impacts of SDYs on rural residents. First, starting in 1978, the vast majority of SDYs started to leave the rural villages and return to their urban homes. Were there any lasting impacts in the countryside after they left? Second, we have so far focused on the increased years of education due to the arrival of the SDYs, which only captures the "quantity" of education. One may be concerned whether the increased quantity really translated into any stock of human capital. This is a valid concern, because the education content during the Cultural Revolution was different from that before and after: for instance, factory and farm work were introduced into the curriculum (Meng and Gregory 2002). To address this concern, we examine the lasting impacts of the SDYs on socioeconomic outcomes other than years of education. We show that the increased educational attainment induced by SDYs *does* translate into increases in human capital stock, as reflected in more positive attitudes toward education, the higher likelihood of attaining higher-level education and pursuing high-skilled occupations, later marriages, and smaller families.

A. *Persistent Effect of SDYs*

We first present evidence of the persistence of the SDYs' effect. Many of the cohorts born after 1970 had not completed their education by 1990. Therefore, we use 2000 census data to estimate the effects of SDYs on those younger cohorts. Panel C in Figure 3 suggests that the positive effect of SDYs gradually declined as they started returning to their urban homes in 1978. However, the effect never dropped to zero, revealing the persistence of human capital accumulation due to the arrival of the SDYs. The magnitude of persistent effects after the 1970 cohort is approximately one-third to one-half of the peak. As explained above, this persistence is too large to be explained by the 5 percent of SDYs who permanently stayed in rural areas.

B. *Effect on Values*

Section IIIB noted that SDYs working as teachers was one possible way in which they improved local education. In addition to teaching standard courses, the

[39] In the early 1970s, the Chinese government started to implement more stringent family planning policies. An important part of the policy package was to encourage late marriage. Urban educated youth were designated as role models of late marriage to the rural people (Liu et al. 1995).

urban youth also shared their knowledge, values, and stories based on their urban experiences inside and/or outside the classrooms. For example, people living in urban areas generally placed a greater emphasis on education, and this value might have passed from the SDYs to rural residents. Exposure to new information can alter people's attitudes and behaviors (Jensen and Oster 2009). Because media coverage was extremely limited in rural China during this period,[40] the SDYs became important carriers of new information and may have induced changes in local norms, values, and attitudes.

We use data from the 2010 CFPS to formally test the hypothesis that the SDYs' effects could take the form of values and cultural diffusion. After excluding three municipalities (Beijing, Tianjin, and Shanghai) and city-governed districts (during the period of the Cultural Revolution), we matched 91 CFPS counties with our county-level dataset compiled from local gazetteers. Because CFPS covers a much smaller range of counties than the population census, our results in this subsection are more suggestive than conclusive. In the 2010 wave, the CFPS asked a wide range of questions about people's beliefs and values, for example the extent to which they agree with the statement "the higher level of education one receives, the higher the probability of his/her future success" (1 = strongly disagree; 5 = strongly agree). Following Chen, Lu, and Xie (2018), we took ten statements (see online Appendix Table A2 for a complete description) to construct a measure of locus of control (LOC), first proposed by Rotter (1966). The LOC measures the extent to which people believe the outcome is under their control (internal) versus under the control of outside factors (external). The five internal statements are education, talent, effort, hard work, and intellect, and the five external statements are family socioeconomic status, family wealth, family connection, luck, and connection. The LOC has been widely adopted as an important measure of noncognitive skills (Heckman, Stixrud, and Urzua 2006; Gong, Lu, and Xie 2015; Chen, Lu, and Xie 2018). We use it to gauge people's values and attitudes toward factors such as education, effort, luck, and family background.

We adopt the same empirical strategy as our analysis of educational outcomes. We restrict the rural sample to those born during the period 1946–1969 and define cohorts 1956–1969 as the treatment group. This approach assumes that school age is an important period for children to form their values and LOC. It follows that of Cobb-Clark and Schurer (2013), which found that changes in LOC are concentrated among the young or the very old, and changes during adolescence are quite modest. We use the following equation to evaluate how exposure to the better-educated SDYs affected local residents' values and LOC:

$$(4)\quad LOC_{i,g,c,p} = \beta_0 + \beta_1 \%SDY_{c,p} \times I\big(1956 \le g \le 1969\big) + \beta_2 \mathbf{X}_{i,g,c,p} + \lambda_c + \mu_{g,p} + \mathbf{\Lambda}_c \times \mu_g + \varepsilon_{i,g,c,p}.$$

Table 7 presents the results. Rural residents who were more affected by the movement had a more internal LOC (column 1). They held more positive attitudes

[40] The average TV ownership rate in China was only 19 televisions per 1,000 people in 1977 (Thomas 2003). The rate should be much lower in rural China during the send-down movement.

TABLE 7—THE EFFECT OF SDYS ON LOCAL PEOPLE'S LOCUS OF CONTROL (CFPS 2010)

Dependent variables:	Do you agree with following statements? 1 = strongly disagree, 5 = strongly agree										
		Internal locus of control					External locus of control				
	LOC index[a]	Education	Talent	Effort	Hard work	Intellect	Family SES	Family wealth	Family connection	Luck	Connection
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A											
Local density of received SDYs × affected cohorts (1956–1969)	13.186	2.817	0.728	0.716	0.791	−0.772	−2.092	−0.707	−1.438	−2.735	−0.845
	(6.311)	(0.948)	(1.514)	(0.812)	(0.593)	(0.688)	(1.064)	(2.021)	(1.016)	(1.166)	(0.797)
Observations	6,026	6,026	6,026	6,026	6,026	6,026	6,026	6,026	6,026	6,026	6,026
R^2	0.175	0.139	0.133	0.147	0.157	0.151	0.143	0.154	0.143	0.145	0.125
Panel B											
Local density of received SDYs × affected cohorts (1956–1969)	13.549	2.816	0.633	0.740	0.815	−0.767	−2.185	−0.851	−1.475	−2.818	−0.885
	(6.188)	(0.946)	(1.481)	(0.809)	(0.602)	(0.685)	(1.028)	(1.918)	(0.998)	(1.177)	(0.793)
Years of education	0.117	−0.000	−0.031	0.008	0.008	0.002	−0.030	−0.046	−0.012	−0.027	−0.013
	(0.013)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
Observations	6,026	6,026	6,026	6,026	6,026	6,026	6,026	6,026	6,026	6,026	6,026
R^2	0.185	0.139	0.143	0.149	0.158	0.151	0.152	0.173	0.144	0.152	0.127
Individual controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Base education × cohort FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Only rural sample is used. Standard errors are clustered at the county level. Individual controls include gender and ethnicity. Local density of received SDYs is computed from dividing the number of received SDYs by the county population in 1964. Base education is calculated as the primary and junior high graduation rates of the control group.

[a]Following Chen, Lu, and Xie (2018), we define the LOC index as the summation of ten z-scores (external locus-of-control statements take negative values). The higher the score, the more internal the individual. Online Appendix Table A2 presents the ten questions for generating this index.

toward education (column 2) and were less likely to believe their fates were predetermined by their family's socioeconomic status (column 7) or luck (column 10). Panel B additionally controls for education. Although education seems to be a strong predictor of values and LOC, most estimates remain almost unchanged after controlling for this factor. Therefore, interacting with SDYs may have directly influenced local residents' values and LOC.

C. *Seeking Higher-Level Education*

After rural children completed junior high school, would they continue to senior high? The effect of the SDYs on senior high and even higher education is very different from the effect on basic education. On the one hand, local senior high education should not be directly affected by the arrival of the SDYs. Most SDYs were junior high or senior high graduates themselves, and were therefore not qualified

TABLE 8—THE LASTING EFFECT OF SDYS ON OUTCOMES OTHER THAN EDUCATION

Dependent variables:	>Junior high (conditional on junior high)	Labor force participation		High-skilled occupation	
Census:	1990	1990		1990	
	(1)	(2)	(3)	(4)	(5)
Local density of received SDYs × affected cohorts (1956–1969)	0.481	0.0409	0.0365	0.0622	0.0355
	(0.0830)	(0.0390)	(0.0391)	(0.0167)	(0.0168)
Years of education			0.00137		0.00816
			(0.000180)		(0.000153)
Observations	1,147,340	2,775,858	2,775,858	2,633,659	2,633,659
R^2	0.071	0.182	0.182	0.012	0.040
$\bar{Y}$ of control group	0.174	0.951	0.951	0.0185	0.0185
Individual controls	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓
Base education × cohort FE	✓	✓	✓	✓	✓

Dependent variables:	Teacher as occupation		Age at first marriage	Number of children[a]	Second genderation's education[b]
Census:	1990		2000		2010
	(6)	(7)	(8)	(9)	(10)
Local density of received SDYs × affected cohorts (1956–1969)	0.0398	0.0250	3.027	-0.957	4.186
	(0.00993)	(0.0103)	(0.698)	(0.275)	(0.849)
Years of education		0.00456			
		(8.35e-05)			
Observations	2,775,858	2,775,858	2,219,527	1,007,793	108,164
R^2	0.005	0.024	0.172	0.186	0.547
$\bar{Y}$ of control group	0.00760	0.00760	22.73	2.770	9.012
Individual controls	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓
Province-cohort FE	✓	✓	✓	✓	✓
Base education × cohort FE	✓	✓	✓	✓	✓

Notes: Only rural sample is used. Standard errors are clustered at the county level. Individual controls include gender and ethnicity. Local density of received SDYs is computed by dividing the number of received SDYs by the county population in 1964. Base education is calculated as the primary and junior high graduation rates of the control group.

[a] Fertility history information is only available to women aged 15–50.

[b] See Section VF for the detailed construction of data that combine two generations.

to teach senior high. On the other hand, we defined treatment groups according to whether a person attended primary school during 1968–1977. Therefore, many of our treatment cohorts received their senior high education after the SDYs had left the countryside. In this sense, the success of rural children in attending senior high school conditional on the completion of junior high education reflects the potential long-term impacts of the SDYs and the quality of junior high education affected by SDYs.

Column 1 in Table 8 confirms that local junior high graduates were more likely to seek higher-level education if they were more exposed to SDYs. The coefficient

estimate of 0.481 can be interpreted as follows: if a county received 100 more SDYs during the movement, 11.6 more students would graduate from senior high school.[41] The increase in senior high graduates is smaller than that for primary graduates (20.9) and junior high graduates (36.2), as presented in Section III. This result confirms our conjecture that the movement had a larger impact on lower-level education (primary and junior high), and that its effect on higher-level education is mostly indirect.

D. *Occupational Choice*

How did exposure to the SDYs affect the occupational choices of rural children when they grew up? We first use the 1990 census to check whether exposure to the SDYs changed the labor force participation of the affected cohorts. Columns 2–3 in Table 8 suggest that there was no significant effect on labor force participation. This is not surprising because China's labor participation in 1990 was almost universal (95.1 percent). Note that we count agricultural work as a form of active labor because we focus on the rural sample, and a vast majority of them were farmers (about 90 percent). Then we look at how SDY exposure affected occupational choice. Columns 4 and 5 show that local children exposed to the SDYs were more likely to choose high-skilled occupations, which we define following the International Standard Classification of Occupations 1988 (ISCO-88),[42] which classifies all occupations (except the armed forces) into nine major groups. ISCO-88 assigned a skill level to each major group. We treat "professionals" and "technicians and associate professionals" (the two highest levels) as "high-skilled" occupations. We report the SDYs' effect on each major group of occupations in online Appendix Table A3.

One particularly relevant occupation is teacher. If the SDYs' students were more likely to become teachers, the temporary increase in local teachers (i.e., the SDYs) would translate into a persistent increase (SDYs' students). Column 6 in Table 8 looks at whether the arrival of SDYs encouraged local children to choose teaching as their future occupation. The regression result suggests a statistically significant and positive effect. Columns 5 and 7 additionally control for schooling, and the estimated SDY effect for high-skilled occupation and teacher occupation falls by almost one-half, which is hardly surprising because people must be sufficiently educated to take a high-skilled occupation or teach in schools. However, an important part of the effect remains after controlling for education, which suggests that the positive effect does not merely stem from more years of schooling but also from some "quality" dimension of the education conveyed by the SDYs.

[41] The calculation proceeds as follows. The average density of SDYs is 2.22 percent. The movement increased the probability of senior high graduation conditional on junior high graduation by 1.07 percentage points. The size of the affected rural cohort is 245 million, 50.9 percent of whom completed junior high school. Lastly, 11.5 million urban youths were sent to rural villages between 1968 and 1977. Therefore, $(1.07 \times 245 \times 0.509)/11.5 = 11.6$.

[42] China uses its own occupational classification system (the Chinese Standard Classification of Occupation, or CSCO). We adopt the transformation used by IPUMS International (https://international.ipums.org/) that translates the Chinese standard to the international one.

E. *Marriage Age and Family Size*

Columns 8 and 9 in Table 8 examine two family-related outcomes: age at first marriage and number of children. We use the 2000 census here because the 1990 census does not contain data on age at first marriage. We find evidence from column 8 that the arrival of SDYs contributed to later marriages for the treated cohorts. We also find that SDY exposure led to fewer childbirths, as shown in column 9. Cultural diffusion from the SDYs is a possible channel for these results. In the early 1970s, the Chinese government started to implement more stringent family planning policies and encouraged later marriages and fewer childbirths. Urban educated youth were designated as the role models for rural people (Liu et al. 1995). Later marriages make parents more prepared for child rearing, and smaller families enable rural residents to invest more in the education of their offspring. Both family-related outcomes benefit the affected cohorts and help transmit the positive effect of the SDYs to the second generation. We explore this theme in the next subsection.

F. *Effect on the Second Generation*

We have shown that the first generation of the SDY-affected cohorts received more years of schooling, together with more positive attitudes toward education, later marriages, and smaller families. It would be interesting to examine the intergenerational impacts of SDYs in the countryside. Several studies have investigated the intergenerational transmission of human capital (see Black and Devereux 2011 for a review). Two China-related studies, Meng and Zhao (2016) and Chen et al. (2019), found evidence that the negative consequences of the Cultural Revolution passed onto their offspring.

To estimate the SDYs' effect on the second generation, we used the 1‰ sample from China's 2010 population census. First, we constructed parent–children pairs by matching the rural household head with other family members of the same household who reported their relationship to the head as son/daughter. Second, we restricted the sample to children whose parents were born between 1946 and 1969. The children whose parents were born between 1956 and 1969 become the treatment group. Finally, we estimate the following equation:

$$(5)\quad Y\_Edu_{i,g,c,p} = \beta_0 + \beta_1 \%SDY_{c,p} \times I\big(1956 \le P_{i,g,c,p} \le 1969\big) + \beta_2 \mathbf{X}_{i,g,c,p} + \lambda_c + \mu_{g,p} + \mathbf{\Lambda}_c \times \mu_g + \varepsilon_{i,g,c,p},$$

where $P_{i,g,c,p}$ represents the parents' year of birth. The key difference from our main specification (equation (2)) is that now we are interested in understanding how parents' exposure to the arrival of the SDYs affected their children's education.

Column 10 in Table 8 reports the estimation results.[43] We find evidence that the arrival of the SDYs in the 1960s and 1970s has had persistent effects on the second

[43] There is one concern using the 2010 census: some children might still be attending school. For example, if a parent was born in 1969 and had his/her child at the age of 25, the child would be 16 in 2010. However, our

generation 40 years later. We also note that the estimated coefficients in Table 8 using the 2010 census exceed those in Table 3 using the 1990 census. Previous studies estimated a coefficient of intergenerational transition in education of about 0.6 (Meng and Zhao 2016, Chen et al. 2019), which means that if parents received one more year of education, children's school years would increase by 0.6. At first glance, our results seem to suggest an increase of more than 1.0. However, we need to realize that parents' exposure to the arrival of the SDYs affected their children's educational outcome not only through the parents' number of schooling years but also through their values on education (Table 7), the increased supply of teachers (columns 6 and 7 in Table 8), and later marriages and smaller families (columns 8 and 9 in Table 8).

To summarize, there are at least three possible sources of persistent effects after SDYs left the countryside. The first source is infrastructure. Many SDYs were among the founders of village schools. Even if SDYs left the village, the schools stayed, and other people including their students probably assumed their teaching positions. This is in line with Duflo (2001), which studied a school construction program in Indonesia and highlighted the importance of infrastructure in education. The second source is the diffusion of knowledge, ideas, and values generated with the arrival of SDYs, which would persist after the SDYs left the villages. The persistent positive attitudes toward education in the locality decades later serves as supportive evidence for this channel. A third source is indirect spillovers. For rural residents who had no direct interaction with SDYs, they could still benefit from those who directly communicated with SDYs. For example, the directly affected cohorts may serve as teachers (columns 6 and 7 in Table 8) and become the parents more supportive of education (column 10 in Table 8).

VI. Conclusions

The sent-down movement during the Cultural Revolution mandated approximately 16 million educated urban youth to move to rural areas. The mandatory nature of the movement provides a unique opportunity to examine how such an unprecedented scale of resettlement affected hundreds of millions of less-educated rural children. To conduct this analysis, we digitized a unique county-level dataset on the flow of SDYs from over 3,000 book-length local gazetteers and matched it with individual-level population censuses and family surveys.

Using a cohort DID method, we find that rural children who were more exposed to urban SDYs when they were of schooling age obtained more years of education. Contact with SDYs resulted in 17.6 million more person-years of schooling in rural areas. Socioeconomically disadvantaged groups, namely girls and children in less-developed areas, reaped larger benefits, suggesting that the SDYs not only raised the overall level of rural education, but also reduced social inequality. Our analysis of the heterogeneous impacts of the SDYs also indicates that the effects on rural education increase with the knowledge gap between the SDYs and local

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 graduating from junior high school. As a robustness check, we excluded the current student sample and obtained similar results.

residents. Neither local government efforts to improve education nor other contemporaneous events (e.g., the rural education expansion, the Cultural Revolution, or the Great Famine) drive the SDYs' effect.

In addition to teaching rural kids, the SDYs could have also generated spillovers of values related to education and life. We find that rural residents with more SDY exposure have more internal LOC: they have more positive attitudes toward education and are less likely to believe their achievements are determined by their family's background. Another important finding relates to the persistence of the SDYs' effect. Most SDYs left rural villages when the rustication movement ended. Their local impacts diminished after this time but never disappeared. SDY exposure also contributed to more skilled occupational choices, later marriages, and smaller families. We also find evidence of positive effects of SDYs on the second generation of the affected cohorts. Given that the massive migration of rural labor with medium skills laid the foundation for China's comparative advantage in manufacturing, our study sheds new light on the potential link between human capital accumulation in rural areas due to the arrival of the SDYs and the country's rapid economic growth over the past 40 years.

To the best of our knowledge, this paper is among the first to assess the benefits of the send-down movement on rural children. Since it was a mandatory and uncompensated migration from the SDYs' perspective, this movement also caused many negative consequences for the SDYs (such as deprivation of further educational opportunities). How to evaluate the cost side of the movement is an important topic and we would leave it for future research.

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