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Was China's Send-down Movement Really a Blessing for Rural Education and Economic Development?

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Chen et al. (2020) claim to have found a positive causal effect of the send-down movement on rural education during China's Cultural Revolution. The paper also infers that the movement made the contribution of human capital accumulation in rural areas to China's subsequent economic growth in reform era. We demonstrate that the claimed finding and its inference can be challenged on both factual and methodological grounds. In particular, once the educational attainment is coded by actual schooling-year requirements set during the Cultural Revolution, the estimated effects of send-down youths on rural education become negative and statistically insignificant. We also question the authors' choice to only consider marginal gains in rural schooling without assessing the trade-off of the much larger losses in human capital and social economic costs of the movement. (JEL: I25, O15, P36, R23)

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The send-down movement refers to the rustication program run by the Chinese government to send millions of urban youth to live and work in the countryside in the 1960s and the 1970s. The movement reached its peak during the Cultural Revolution (1966-1976). Between 1968 and 1978, about 16 million of China's

urban youths in their adolescence were sent, mostly against their will, to resettle in rural areas. This movement deprived the whole generation of send-down youths (SDYs) of opportunities to continue adequate education or pursue their careers of choice, leaving many of them with lifelong scars and pains physically and psychologically (Bernstein, 1977; Liu, 2008; Singer, 1971; Xie, Jiang, and Greenman, 2008; Yang and Li, 2011; Zhou, 2013).

A recent paper, "Arrival of Young Talent: The Send-down Movement and Rural Education in China" (Chen et al. 2020), however, claims the finding of empirical evidence that the send-down movement resulted in a large increase of educational attainment (amounting to 17.6 million increase in person-years of schooling) for children in rural area (p. 3410). The paper further infers that the movement made "the contribution of human capital accumulation in rural areas to China's subsequent economic growth" in the reform era (p. 3395). In this research note, we will demonstrate that the paper's empirical work can be challenged on both factual and methodological grounds.

Chen et al. (2020) collected a unique county-level dataset on the number of SDYs each county received (1968-1977) and matched this county-level information to various micro-level survey data, mainly the 1990 and 2000 population censuses and the 2010 wave of the China Family Panel Studies (CFPS). The purpose is to find the impact of presence of SDYs on local rural children's educational attainment, particularly for the treatment cohorts born 1956-1969. A cohort difference-in-differences (DID) identification strategy is applied. Their main estimation equation is as follows:

(1)   Individual educational attainment $= \beta_0 + \beta_1$ SDY density $\times$ treated cohort dummy $+ \beta_2$ individual level controls $+$ county fixed effects $+$ province-cohort fixed effects $+$ county-level base education $\times$ cohort fixed effects $+ \varepsilon$,

where SDY density measures the local intensity of SDYs received, calculated as the ratio of received SDYs to the county population in 1964; county-level base education is calculated as the primary and junior high graduation rates of the control group (1946-1955 cohorts) in each county.

The authors believe that the parallel-trend assumption, which their identification strategy hinges on, is satisfied, i.e., each county's cohort trend in education should not be correlated with SDY density in the absence of the send-down movement. Presenting the conditional correlation between SDYs and educational achievement for all the sample cohorts (1946-1969), the authors point out that the correlation coefficients "fluctuate around zero before the 1956 cohort" but "gradually increase from the 1956 cohort, as later cohorts spent more primary school years with the SDYs." (pp. 3407-3408) These results are shown by the authors to validate the parallel-trend assumption, suggesting that *only* the send-down movement can explain the correlated changes between SDY density and the treated cohorts' educational attainment.

From the estimated coefficient β_1 in equation (1), the authors calculated (based on the assumption that all 245 million rural kids at the period under study could be potential beneficiaries) that the movement led to a 17.6 million increase in person-years of schooling in rural area. Thus, they conclude that the send-down movement made positive contribution to human capital accumulation in rural China.

We demonstrate that there are four major issues that cast some serious doubt on the above conclusions. First, the paper's handling of data leads to inadequate measurement of the key dependent variable of individual educational attainment. In particular, the way schooling years were counted or coded for measuring educational attainment has disregarded important inter-cohort differences in schooling-year requirements and education quality due to the detrimental impact of the Cultural Revolution on the education system, leading to overestimation of the educational attainment by the treatment cohorts. The same measurement problem

3

also begets a presumption of SDYs' capability to supply human capital to rural children.

Second, the parallel-trend assumption for their identification strategy does not hold cleanly. The treatment variable, the number of SDYs received in each county or the county-level density of SDYs, was not exogenous or random. The treated cohorts' educational attainment could have been affected by factors or events other than the send-down movement *per se*, including the way how rural areas for SDY receptions were selected and the inter-region collaboration between the sending cities of the SDYs and the receiving rural counties. Due to neglect and inadequate handling of these factors, the paper's identification strategy does not identify the real causes of the observed correlations between the SDY density and the rural educational attainment.

Third, the authors attribute their observed correlations to the supply of human capital by the SDYs to the rural kids, based on several presumed mechanisms: a) most SDYs had received up-to-standard junior-high or senior-high level of education before send-down; b) many of them were assigned as teachers and taught rural kids; c) many SDYs were ended up in non-agricultural jobs to introduce urban techniques, knowledge, and values to local villagers; d) most SDYs mingled well and frequently with local villagers and their kids. None of these can be supported by concrete evidence.

Finally, without conducting any welfare analysis, the paper concluded with the alleged benefits of the send-down movement disregarding the tremendous losses suffered by SDYs and the huge social and economic costs of this movement.

The organization of this research note is as follows. Section I discusses the bias in measuring educational attainment, the key dependent variable in the study. In Section II, we replicate the main econometric exercise in the study to show that, once educational attainment of the treatment group is coded with the actual schooling-year requirements, all the estimated positive effects of SDYs on rural

education will no longer hold. We then discuss issues that may have caused failure of the identification strategy in Section III. Factual base for the presumed mechanism to supply human capital is to be scrutinized in Section IV, followed by Section V to discuss the welfare costs of the send-down movement. The last section concludes our deliberation.

I. Inadequate Measurement of the Key Dependent Variable

Chen et al. (2020) take the 1946-1955 cohorts as the control group and compare the educational attainment of the treatment group (1956-1969 cohorts) to the control group. They use schooling years to measure educational attainment for both groups, disregarding the change of school system and, more critically, the downgraded education quality during the Cultural Revolution. The resulting measurement inflates the educational attainment for the treatment group.

Chen et al. "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 higher-level schooling years in a similar fashion" (p. 3404). This way of coding schooling years results in a measurement problem for the cohorts in the treatment group whose school-age years overlapped the Cultural Revolution decade (1966-1976) and its subsequent years before the basic schooling-year requirements were fully restored to the pre-1966 system. As acknowledged by the authors (Footnote 21 in Chen et al. 2020, p. 3405), from 1969 through the end of the Cultural Revolution, the primary-junior-senior schooling years required were compressed from the traditional 6-3-3 years down to 5-2-2 years. After the Cultural Revolution ended, the restoration to the system of 6-3-3 years took years to complete.[1] Therefore, the way educational attainment is measured in the paper has

[1] The 6-3-3 schooling-year system was not immediately restored after the ending of the Cultural Revolution. The duration of junior high school started to resume to 3 years in 1978 in most regions while the length of senior high school was increased to 3 years over the period 1981-1985 (Chen, Jiang, and Zhou, 2020). The duration of primary school was officially set to 6

5

inflated schooling years for the affected cohorts by one year for primary-school graduates, by two for junior-high graduates, and by three for senior-high graduates.

This mismeasurement of educational attainment is more inimical if we consider the severe deterioration of education quality during the Cultural Revolution, when hostility and rejection to intellectuals and knowledge were openly promoted and advocated by the Maoists (Mao, 1969). At the onset of the Cultural Revolution, all schools were shut down from 1966-1968 to wreak havoc to the educational system perceived by the Maoists to have been dominated by the so-called "bourgeoisie intellectuals". Many experienced teachers and educators were publicly criticized, denounced, and humiliated by Red Guards. Some were even beaten to death or forced to commit suicides.[2] After reopening of schools in 1968, students were back to classroom under the call of "resuming classes for the Revolution". However, the pre-Cultural-Revolution education was officially denounced to be a 17-year regime of "bourgeoisie dictatorship" (Ministry of Education, 2015) and a nationwide Education Revolution was launched to rebuild the education system towards fulfillment of Mao's "thirty-year-old exhortation to unite theory with practice in education" (Wong, 1976, p. 29). The pre-Cultural-Revolution curriculum was swept away and all subjects were "revolutionized" beyond recognition with their contents substantially watered down.[3] Teachers were not encouraged (or even allowed) to teach well or discipline students. Manual labor in factories and farm fields substituted many hours of classroom teaching. Exams or quizzes were banned or conducted without any invigilation. All schools were placed under the

years in 1985 when the government announced the goal of achieving universally mandatory 9-year basic education (i.e., 6-3 for primary and junior high education) by year 2000.

[2] In August-September 1966, a total of 1,772 persons were beaten to death in Beijing by Red Guards. Numerous were forced to commit suicide. Many of the victims were teachers and educators (Wang, 2009).

[3] For example, Mao's quotations and poems dominated the language classes, all pre-Cultural-Revolution literature or narratives of history were discarded and replaced by Mao's ideological indoctrination, foreign language lessons only resumed in a few central cities and were limited to teaching propaganda slogans, and science courses were reduced to courses for "practical knowledge for industry/agriculture".

supervision of "representatives of revolutionary workers or peasants", who deployed intellectual educators of any meaningful control of education quality.

To measure the impacts of these events, Meng and Gregory (2002) count the number of schooling years interrupted by the shut-down of all schools in 1966-1968 and the severe disruption to education in 1968-1971 when school activities were almost exclusively focused on political indoctrination and manual labor. Their tally suggests that these interruptions affected 17 birth cohorts (1947-1963), who suffered loss of schooling years varying between 1 and 8 years and delay of years to apply for university/college entry varying from 1 to 12 years.[4]

Meanwhile, China's basic education experienced a "great leap forward" in quantity expansion, especially in rural areas. Between 1965 and 1976, while the primary-school enrollment increased 29.1 percent, the number of secondary school students rose 6.25 times. Much of this quantity expansion occurred in rural areas: Rural students' share of junior high enrolment rose from 33.7 percent to 75.2 percent while their share of senior high enrolment grew from 9.0 percent to 62.3 percent (Zhang, 1984, pp. 1001-1021). This great leap forward alone would result in an increase in educational attainment of rural children even without SDYs, if attainment was simply measured by schooling years.

In fact, the great quantity expansion in rural education during the Cultural Revolution was achieved largely by quality downgrading. This was evident in the subsequent years to the ending of the Cultural Revolution, when the government reemphasized on quality of education and phased out large numbers of low-quality schools, mainly in rural areas.

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[4] These numbers, however, do not take into account of the lost schooling years due to the shortened 5-2-2 school-year system from 1969 onwards. Nor do they measure the loss of education quality due to the watered-down curricula in years after 1971 through the end of the Cultural Revolution.

As shown in Table 1, between 1978 and 1984, all categories of schools in rural areas were substantially scaled back in both number of schools and student enrolment, while in urban areas only senior high schools were scaled down to a much less extent. In terms of percentage changes, the rural senior schools experienced the largest fall (-81.4 percent and -79.0 percent respectively in school numbers and enrolment), followed by rural junior high schools (-39.3 percent and -30.9 percent), urban senior high schools (-19.6 percent and -18.7 percent), and finally rural primary schools (-12.9 percent and -11.1 percent).

TABLE 1— CHANGES OF PRIMARY AND SECONDARY SCHOOLS 1978-1984

		1978	1984	percentage change
Primary				
number of schools	Rural	916,000	798,000	-12.9
	Urban	33,323	55,740	67.3
enrolment (10,000)	Rural	12,879	11,451	-11.1
	Urban	1,745	2,106	20.6
Junior High				
number of schools	Rural	107,103	65,003	-39.3
	Urban	6,027	10,900	80.9
enrolment (10,000)	Rural	3,872	2,674	-30.9
	Urban	1,124	1,190	5.9
Senior High				
number of schools	Rural	36,003	6,691	-81.4
	Urban	13,212	10,627	-19.6
enrolment (10,000)	Rural	949	199	-79.0
	Urban	604	491	-18.7

Source: compiled from National Bureau of Statistics of China (1985) and National Bureau of Statistics of China (2010).

With higher standards for diploma and admission, percentages of graduates entering next level of schools fell sharply: In 1975 (a year before ending of the Cultural Revolution), 60.4 percent of junior high graduates and 90.6 percent of primary school graduates entered the next level of schools. After the return of emphasis on education quality, these ratios immediately fell to 40.9 percent and 87.7 percent in 1978, and 32.3 percent and 66.2 percent in 1982, and then recovered somewhat to 41.7 percent and 68.4 percent in 1985 (National Bureau of Statistics of China, 2010, Table 1-71). In comparison, in rural areas, the percentage of junior high graduates entering senior high schools was 90.8 percent in 1977 and fell to

65.0 percent in 1985 (Yang, 2005), which was a change more drastic than the nationwide trend, indicating a greater extent of quality tightening after shutdown of many low-quality schools.

The poor education quality of the cohorts schooled in the Cultural Revolution was best summarized by the former leader Deng Xiaoping, who pointed out in 1977 that "… nowadays the graduates of the best high schools in Beijing only attained education the same level as the previous first-year students in junior high" (before the Cultural Revolution) (Qian, 2018). The undisputable evidence for Deng's testament is the nationwide campaign of remedial education launched in January 1982, by the five departments of the central government with a "Joint Notice on Effectively Carrying Out Remedial Education in Culture and Technology for Young and Middle-Aged Employees" (Editorial Commission, 1997). The objects of the remediation were junior high graduates of Class 1968 and all (junior and senior high) of Classes 1969 through 1980. The majority of SDYs fell right in this group. They had to take a whole set of junior high courses and pass the exams before they could obtain a (recertified) junior high diploma. The nation mobilized all resources to help the youth, including technicians, accountants, managers and government officials. Cities like Shanghai even offered televised middle school classes for adults. The campaign lasted for four years until 1985. This nationwide remedial education was necessary only because the Cultural Revolution deprived the graduates from 1968 through 1979 of proper secondary education.

Thus measurement of educational attainment for the 1956-1969 cohorts schooled in the Cultural Revolution is inflated in Chen et al. (2020) due to two problems in handling this crucial data for the key dependent variable. One is over-counting the schooling years for these cohorts and the other is failing to make adjustment of the schooling-year counts to quality deterioration for the same cohorts.

Since the send-down movement was concurrent with these shifts in the education system, it follows that the estimated value of β_1 in equation (1) reflects no more

than the inter-cohort differences in attaining the same number of schooling years in the historical context of shifting schooling-year requirements and education quality. As acknowledged by Chen et al., "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" (Footnote 21 in Chen et al. 2020, p. 3405). From the facts presented in this section, it is evident that either of these interpreted results can be most plausibly attributed to the compressed schooling years and lowered standards during the Cultural Revolution.

Later in Section IV, we will see that the inflated measurement of educational attainment also engenders an unfounded presumption made by Chen et al. of SDYs' capability to supply human capital to rural children. Now let us discuss how this problematic measurement leads to the central findings in Chen et al.

II. Main Findings Made on Weak Ground

From (1) it is easy to derive the following equation for the estimated β_1:

$$(2) \quad \widehat{\beta_1} = \frac{\overline{Edu}_{1956-1969} - \overline{Edu}_{1946-1955}}{SDY\ density} + \frac{\widehat{effects\ of\ other\ factors}}{SDY\ density},$$

where *Edu* refers to educational attainment and upper bar indicates (weighted) average values.

Table 3 in Chen et al. (2020, p. 3409) presents the central finding of the study, i.e., the estimated value of β_1 is a statistically significant 3.237 for rural samples but an insignificant 0.151 for urban samples. According to (2), these results are highly sensitive to the gap, $\overline{Edu}_{1956-1969} - \overline{Edu}_{1946-1955}$. Since average SDY density is 2.22 percent (22.2 SDYs per 1,000 locals), a one-year increase of the gap in average years of schooling between the treatment group and the control group will raise the first term in (2) by 1/0.0222 =45.045. Based on information from Table 2 in Chen et al. (2020, p. 3406), it is easy to see that the first term in (2) is (7.190 – 5.372)/0.0222 = 81.89 for the rural samples and (10.536 – 8.881)/0.0222

= 74.55 for the urban samples. Apparently, it could just take a slightly smaller gap in years of schooling between the two groups (especially by tuning down the treatment group's average years of education) to cause the estimated value of β_1 to fall towards zero or even below it.

To verify how seriously the authors' inflated coding of schooling years has affected the paper's estimated effects of SDYs on rural education, we use the Replication Data for Chen et al (2020) to replicate their exercise with modified coding of schooling years to reflect the 5-2-2 schooling-year requirements for primary-junior-senior education during the Cultural Revolution. The modified coding results are compared to those in Chen et al. in Table 2.

TABLE 2—MEAN YEARS OF EDUCATION BY DIFFERENT CODING METHODS

Cohort:	Control group (1946-1955)		Treatment group (1956-1969)		Gap in educational attainment between groups	
Location:	Rural	Urban	Rural	Urban	Rural	Urban
Coding method by Chen et al. (2020)	5.372 (3.365)	8.881 (3.178)	7.190 (3.100)	10.536 (2.511)	1.818	1.655
Coding method in this paper	5.372 (3.365)	8.881 (3.178)	5.773 (2.045)	8.108 (1.887)	0.401	-0.773
Observations	960,127	148,244	1,815,752	271,603		

Notes: Standard deviations are in parentheses. The coding method in this paper is based on the pattern of 5-2-2 during the Cultural Revolution: 5 years of primary school, 2 years of junior high school, and 2 years of senior high school. For people who dropped out of primary school, junior high school, or senior high school, their years of education are coded as 2.5, 6, or 8, respectively.
Source: compiled from Replication Data for Chen et al (2020): https:// doi.org/10.3886/E119690V1.

As shown in Table 2, when the actual schooling-year requirements are coded, the average educational attainment of the treatment group in rural area is only 0.4 year more than that of the control group. The coding method used by Chen et al. has inflated the inter-group gap in educational attainment by 1.4 years for the rural samples. In urban area, the average educational attainment of the treatment group is now 0.77 year less than that attained by the control group, in contrast to the 1.66 years more counted in Chen et al. (2020).

When we apply the modified coding results to replicate their exercise, we find that β_1, the estimated effect of SDYs on the educational attainment of treated cohorts, becomes negative and statistically insignificant (Table 3). This result suggests nil treatment benefit, rendering the main findings of Chen et al. invalid.

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

Dependent variable	Chen et al. (2020) Years of education (coded by 6-3-3)		Our replication Years of education (coded by 5-2-2)	
	Rural	Urban	Rural	Urban
Local density of received SDYs	3.237	0.151	-0.421	-0.215
×affected cohorts (1956-1969)	(0.701)	(0.517)	(0.657)	(0.644)
Male	1.874	0.668	1.475	0.617
	(0.028)	(0.026)	(0.020)	(0.022)
Han ethnic	0.150	3.34e-05	0.0791	-0.026
	(0.057)	(0.081)	(0.042)	(0.066)
Observations	2,775,858	417,883	2,775,858	417,883
R^2	0.293	0.225	0.232	0.175
Mean years of education of control group	5.372	8.882	5.372	8.882
County FE	√	√	√	√
Province-cohort FE	√	√	√	√
Base education × cohort FE	√	√	√	√

Notes: Standard errors are in parentheses.
Source: Replication calculated from Replication Data for Chen et al (2020): https:// doi.org/10.3886/E119690V1.

TABLE 4—THE EFFECT OF SDYS ON THE EDUCATIONAL ATTAINMENT – ROBUSTNESS CHECK (1990 CENSUS)

	Control group		Treatment group					
	1946-1955		1956-1960		1956-1963		1956-1966	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
<u>Chen et al.</u>								
Local density of received SDYs ×affected cohorts			2.654 (0.519)	0.680 (0.661)	3.351 (0.726)	0.594 (0.525)	3.260 (0.711)	0.297 (0.515)
R^2			0.288	0.200	0.305	0.223	0.302	0.223
Mean years of education	5.372	8.882	6.764	10.297	7.148	10.546	7.216	10.566
<u>Replication</u>								
Local density of received SDYs ×affected cohorts			-1.399 (0.667)	0.201 (0.659)	-0.644 (0.688)	0.150 (0.641)	-0.496 (0.665)	-0.069 (0.631)
R^2			0.255	0.181	0.251	0.174	0.241	0.170
Mean years of education	5.372	8.882	5.512	7.910	5.771	8.102	5.807	8.128
Observations	960,127	148,244	1,437,195	226,630	1,814,427	287,480	2,285,274	354,271

Notes: Standard errors are in parentheses.
Source: Replication calculated from Replication Data for Chen et al (2020): https:// doi.org/10.3886/E119690V1.

We also replicate the robustness check in online Appendix Table D1 of Chen et al. by breaking up the treatment group into three treated-cohort groups: 1956-1960, 1956-1963, and 1956-1966. Again no more positive and statistically significant effects of SDYs on rural educational attainment can be found for any of these cohort groups (Table 4). As for the urban group, the estimated coefficients for all the cohort groups remain small (<0.3) and statistically insignificant, similarly as in Chen et al (<0.7).

It is worth pointing out that our modified coding of educational attainment does not even take into account the loss of school-years due to schooling interruption counted by Meng and Gregory (2002), which varies from 1 to 8 years for the affected cohorts. Nor does our coding make any adjustment to downgraded education quality during the Cultural Revolution.

III. Failed Identification

Chen et al. (2020) follow the identification strategy of the cohort DID model developed by Duflo (2001) that relies on the parallel-trend assumption to identify the effect of the treatment. The paper displays (Figure 3 in Chen et al. 2020, p. 3408) estimated coefficient $\beta_{1,\gamma}$ from their equation (1) (p. 3405) for various cohorts to show that *only* educational attainment of the treated cohorts (1956-1969) is significantly correlated with SDY intensity, lending support to the parallel-trend assumption: "in the absence of the (send-down) movement, the cohort trends in education should not be related to the intensity of the treatment (here, the local intensity of SDYs)" (pp. 3394-3395). That is, any omitted variable should not change that correlation between the treatment and the treatment group's performance.

The county-level density of SDYs is the key independent variable in the model to represent the primary treatment – exposure of rural children to SDYs. However,

this treatment variable bears features of endogeneity, accompanied by factors that invalidate the parallel-trend assumption, on which the paper's identification strategy hinges.

As acknowledged by the authors, "Three 'pulling' factors determined the number of SDYs a county would receive: the rural area's distance from the place, its capacity to absorb incoming urban youth, and its need for more laborers" (p. 3399). It is understandable that a place's distance to central cities (where most SDYs originated) is strongly associated with many favorable local conditions for development, including better infrastructure, more local public goods, and higher density of local human capital. These conditions also tend to be positively correlated with local capacity to receive and absorb immigrants like SDYs.

Therefore, county-level SDY density is highly correlated with these favorable conditions. Of all SDYs, only 8.0 percent were sent outside their home provinces (Table 1 in Chen et al., 2020, p. 3400). More than half of those sent outside home provinces became workers of state farms or collective farms (Liu 2009, p. 184), who had little interaction with local villagers. A main pulling factor for the inter-province send-down was strategic need for young laborers mostly in semi-military farms in the border regions. The remaining (less than half of) the inter-province SDYs (or less than 4 percent of all SDYs) were sent to settled down in rural villages. For their settlement, the local capacity to absorb urban youth appeared to be the main pulling factor but that had to be weighed against the competing needs to resettle the intra-province SDYs.

About 92 percent of all SDYs were resettled within their home provinces. For these intra-province SDYs, local absorption capacity was more surely the main pulling factor since home-province SDYs were generally treated more favorably than the SDYs from other provinces in terms of settlement locations. The send-down movement was carried out mandatorily. Local governments had an annual quota of send-downs to fulfill and they determined the send-down selection process

14

based on the quota and the number of urban high school graduates in the year (Zhou, 2013). In order to mitigate resistance to and resentment against the send-down movement, administrators in charge had to send the youths to places they were less reluctant to go, more likely to survive, and as close to their home cities as possible. Therefore, they tended to reserve the country sites of better economic conditions and more convenient locations for home-province urban youths (Liu 2009, pp. 186-87). On top of that, a policy at that time allowed some SDYs to settle down in villages of their rural relatives who agreed to accept them (Bonnin, 2013). This option made SDY flow more in line with local absorption capacity and proximity to the home cities.

Given the above facts, for the counties that receive over 90 percent of SDYs, SDY density was determined by the local conditions for absorbing the urban youths. These local conditions not only affected SDY density, but also influenced rural human capital accumulation and other dimensions of social-economic development.[5] It is certainly plausible that these conditions might affect the correlation between the treatment (SDY density) and the treated cohorts' educational attainment, invalidating the parallel-trend assumption. They also pose a fundamental challenge to the authors' interpretation of their finding that identifies SDY density to be the effective channel of human capital supply from urban youths to rural kids – we will leave this challenge to IV.

A crucial confounding factor or contemporaneous event neglected in the paper is the inter-regional collaboration. During the send-down movement, to persuade rural counties to willingly take in SDYs, major cities (especially provincial capital cities) where SDY originated had a policy to establish a long-term collaboration between city districts and the rural prefectures/counties, the so-called *qu-qu-dui-*

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[5] Table 5 in Chen et al. (2020, p. 3413) presents a significantly positive correlation between SDY density and secondary school teacher density. This evidence supports the point that conditions to absorb SDYs also had favored expansion of education.

kou arrangements (Liu, 2009, p. 184). Under the arrangement, the governments of sending cities provided resource assistance to the rural prefecture/county administrations receiving their SDYs, hence reinforcing the local conditions for development, including human capital accumulation. The assistance inevitably affected the trend impacts of the model's treatment so as to invalidate the parallel-trend assumption.

Finally, to show that SDYs had made long-term impacts on the treated cohorts after they left the settled countryside, Chen et al. applied the similar identification strategy – with various dependent variables to be placed on the left-hand side of equation (1) – to gauge a robust correlation between SDY density and the treated rural residents' (and their children's) values related to education and life, represented by the latter's locus of controls revealed in CFPS survey in 2010 (Table 7 in Chen et al. 2020, p. 3422) as well as their human-capital related outcomes other than education revealed in 1990 census (Table 8 in Chen et al. 2020, p. 3423). From these results, the authors conclude that the movement produced a long-term spillover of SDY human capital that had persistently positive impacts on rural residents' human capital accumulation and economic welfare. Here again the identification strategy may have failed due to the neglect to account for important confounding events.

In the 1980s to the 1990s, market-oriented economic reforms and the subsequent massive rural-urban migration were emerging just as the treatment cohorts (1956-1969) entered and experienced their prime years for employment. The household responsibility system initiated in 1978 greatly increased agricultural productivity and eventually led to the disbanding of the People's Communes. Township and village enterprises (TVEs) mushroomed in two waves, 1984-88 and 1992-96 (Chen, 2016). Between 1984 and 1988, 95.45 million left farming to work at TVEs. In 1989, the first wave of rural-urban migration massed to 30 million (Xiao, 2013). The young people at that time, the treatment cohorts included, were active

participants of the industrialization and urbanization process. Participation in, and even mere observation of, such great transition would inevitably change these cohorts' attitude toward education and marriage, and their lifestyle. Meanwhile, the control cohorts (1946-1955) were more mature and settled, and less likely to change their attitude toward education, career opportunities and lifestyle by developments around them. The impacts of these events must have been more powerful and significant in the counties that received more SDYs during the send-down movement, thanks to their location advantages and collaborative links to the cities. The different impacts of these contemporaneous events render the parallel trend assumption invalid.

IV. Presumed Mechanisms

Due to the identification problems, all that Chen et al. (2020) can testify is the observed correlations between county-level SDY density and the treated cohorts' much inflated educational attainment or their later-life human-capital related outcomes. To argue the point that the send-down movement made contribution to rural human capital development, the authors attribute that observed correlations to the supply of human capital by the SDYs to the rural kids, based on several presumed mechanisms.

First, to enable the SDYs to channel human capital to rural kids, Chen et al. believe that "most SDYs were junior high or senior high graduates themselves" (p. 3422) and "many of them were assigned to teach rural kids because of their education advantages" (pp. 3393-3394). They, however, did not provide any data or solid evidence on the extent the SDYs were assigned as teachers, since such happenings were few and far between.

The fact is: a) most SDYs had received education equivalent to *no better than* six-year primary schooling before being sent down due to the impacts of Cultural

17

Revolution discussed in Section I; b) rarely did SDYs get chances to become teachers, although there were isolated cases, for the reasons below.

Teachers in villages were coveted positions then, mostly awarded to sons and daughters of local cadres. (Qualifications were not a main consideration for that matter.) This phenomenon was largely due to the dominant role of production team cadres in decision making at the village level. During years of the send-down movement, all rural villages were organized in the People's Commune, which typically had three layers of organization: production teams at the bottom, production brigades at the middle, and the commune headquarters at the top, corresponding to natural villages, administrative villages (usually covering about ten natural villages), and townships (usually covering about ten administrative villages) respectively. Learning from lessons of the rampant free-riding problem in the early years of the People's Commune movement, the central government regulated in 1962 that the basic accounting units must be the same as the basic production units at the level of production teams (i.e., natural villages) (CCCPC, 1962).[6] The practice continued till the early 1980s when People's Communes dissolved.

This institutional setting is important. Most elementary schools during the period under study were run and funded by villages, i.e., the production teams. It is true that a typical junior high school was run by a production brigade and shared by all the production teams within the brigade. However, financially, it was still funded by production teams. The production brigade only negotiated with the subordinate production teams and then channeled the resources to the junior high school from these production teams. Teachers in those non-state funded rural schools were nominated and recommended by the production team cadres. Most rural teachers

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[6] Chen et al. (2020) mistakenly believe that the agricultural production during the period under study took the form of production brigades, and thus the rural elementary schools and high schools were funded by these brigades (p. 3401 and p. 3416).

made a living by earning work points from the village-level production teams where they resided, just like a typical peasant. At the end of the year, they had to use the accumulated work points to claim back their grain rations and other necessities or in-kind incomes from the production teams. Under this arrangement, these rural schools could not afford to have too many teachers who were actually supported by their production teams. In addition, these teacher positions were highly competitive. They were viewed as clean and less manual jobs and reserved mostly for local youths who had gone to school locally or returned to villages after receiving education elsewhere. Disadvantaged in local connections, SDYs as outsiders had very little chance to be rural school teachers.

On the other hand, SDYs' foremost desire was to leave the countryside to return to their cities (Chen and Cheng, 1999; Gold, 1985; Singer, 1971). They were aiming for opportunities in factories, the military and technical/nursing schools, and the better educated and well connected got these opportunities earlier and left. As for those SDYs whose parents were labeled "enemies of the people" (most of whom endowed with better-than-average human capital), their chance to serve as teachers was nil – They were supposed to be "re-educated" rather than educate others.

To argue that arrival of SDYs significantly increased the supply of local teachers, especially secondary-school teachers, Chen et al. present a positively significant correlation observed at county level between secondary-school teachers' density and SDYs density after 1968 (Table 5 in Chen et al. 2020, p. 3413). As we show in Section III, since rural school expansion concurrently happened with the send-down movement, this correlation is widely open to alternative interpretation by the locational advantages of counties to receive SDYs, to receive resource supports from cities, and to recruit teachers.

It is also notable that, contrary to the authors' belief, few SDYs had attained enough education before send-down to qualify them to be teachers of secondary schools and strong evidence shows that the locale in the countryside did not regard

19

SDYs as an important source of teachers.[7] During the nationwide rural school expansion that concurred with the send-down movement, many schools were built, but there was severe shortage of teachers to staff the newly-built schools. However, there was no evidence that governments, central, provincial or at the county level, had made concerted efforts to mobilize SDYs to be teachers. Had SDYs been qualified as teachers, local governments would have recruited them, as was indeed the case in Shanghai only for the better educated graduates of Classes 1966-67.[8] Even there, only some of the better educated graduates from these classes obtained this opportunity.

Apart from Classes of 1966-67, almost all 14 million SDYs, who were junior high graduates of Classes 1968-69 or graduates of the four-year high schools of later years through the end of the Cultural Revolution, received education equivalent to *no better than* six-year primary schooling. The authors' calculation from the 2010 census that "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" (Footnote 1 in Chen et al. 2020, p. 3393) did not take into account the substantially watered-down quality of education received by those who graduated from secondary schools during the Cultural Revolution. Nor did these education records of the SDYs reflect the loss of school-years caused by schooling interruption counted by Meng and Gregory (2002).[9] Very few of the SDYs were

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[7] Chen et al. acknowledge that "Most SDYs were … not qualified to teach senior high" (pp. 3422-3423), somewhat contradicting what they attempt to suggest by Table 5.

[8] In 1971 and 1972, the Shanghai municipal government recruited graduates of Classes 1966-67 senior high and some Class 1966 junior high from the state farms as teachers to meet the demand of middle schools in Shanghai. One of the authors of this research note was among the recruited.

[9] Meng and Zhao (2016) use the 1955 birth cohort to illustrate the consequences of schooling interruption: "If this cohort started primary school on time, they had completed four years of primary education when the Cultural Revolution began. Because all schools were closed between 1966 and 1968, their primary education was cut short by two years. In 1969 these students went directly into junior high school even though their primary education was not finished. In junior high school, from 1969 to 1971, the students mainly took excursions to factories and countryside to work rather than learning in classrooms, and hence they 'missed' another three years of junior high school education. In 1971, although they graduated from junior high schools, the senior high schools were not opened for admission" (p.8). So when those of this cohort were sent down to the countryside, they only had completed four years of formal primary education.

more qualified than their rural educated youth competitors to serve as secondary school teachers (see Section I).

To validate the exposure-to-SDY treatment, Chen et al. claim that "many SDYs were … ended up in nonagricultural jobs" and thus "served as a bridge between urban and rural areas" so as to "benefit local residents by introducing new urban techniques, knowledge, and values" (p. 3401). By the numbers cited by the authors, however, very few SDYs took nonagricultural jobs and mingled with rural kids in villages. In 1975, 32,421 SDYs in Jilin province "worked in jobs such as study counselors, agricultural technicians, barefoot doctors, *minban* (non-state-funded) teachers" (p.3401). These actually accounted for only 5.2 percent of the (county aggregate) SDYs received in Jilin during 1968-1977 or just 3.1 percent of officially reported SDYs received in the province during 1962-1979 (online Appendix Table C1 for Chen et al. 2020). If *minban* teachers made up, say, a fourth of the four categories of jobs mentioned here, they would account for a mere 0.8 percent of the SDYs.

Even of this small proportion of SDYs who took these nonagricultural jobs, not all could have frequent contact with local villagers and their kids. It is also true for most SDYs who toiled in farm fields that mingling with rural residents was rare and hard. This is because of all SDYs sent down during 1967-1979, about 27.4 percent were "*nong chang zhi qing* (farm-worker youth)" (Table 3B in Liu, 2009), working as farm workers in state or collective farms, living a semi-military life physically isolated from rural villagers.

The other SDYs (72.6 percent of the total) were "*cha dui zhi qing* (settled-down youth)", who settled down in rural villages and became members of the local agricultural production teams. They, however, typically lived by themselves in their own compound (so-called "*jiti hu* (collective households)" or "*zhiqing dian* (SDY residence)" in a group of 3-10 persons (Bonnin, 2013, p. 242). In some regions, they even formed their own production teams. After a long day of hard work in the

fields to earn their "work points" that recorded work done for the collectives, those SDYs generally returned to their compound to prepare their own meals, cultivate vegetables on their assigned "private plot" (i.e., a small piece of land reserved for a rural household), deal with all kinds of household chores with little modern facility convenience (such as running water or electricity), and write letters to their parents. Most SDYs simply did not have time, energy, mood, or motivation to interact with local children. On the other hand, most villagers did not welcome those "immigrants" forced upon them. Most SDYs found it difficult to be accepted by the local community even they made efforts to (Bonnin, 2013; Liu, 2009).

V. Ignored Social Costs

It is an overwhelming consensus in the literature about the send-down movement that the state-mandated movement was a wasteful migration program forced on most SDYs and their parents against their will with profoundly negative social and economic consequences (Li, Rosenzweig, and Zhang, 2010; Xie, Jiang, and Greenman, 2008; Zhou, 2013; Yang and Li, 2011; Zhou and Hou, 1999). Without attempting any welfare analysis, Chen et al. (2020), however, conclude from their questionable findings that "the SDYs benefited the approximately 245 million school-age children in rural China". Even if the alleged benefits ever existed, they should only be meaningfully discussed in comparison with the enormous costs brought by this movement to the SDYs, their families, and the society.

Using published data of yearly student enrollment, graduates, and percentage of graduates entering next level of schooling in the 1960s and the 1970s, we retrospectively project the counterfactual case what the 16.47 million SDYs sent down from1967 through 1979 would have attained in education. Table 5 presents our results. Total loss of schooling among the 16.47 million SDYs amounts to 70.27 million person-years. This number is four times of the "17.6 million increase in

person-years of schooling in rural areas" alleged by Chen et al (2020, p. 3410). If the total population of their defined treatment is 200.9 million rather than 245 million,[10] the authors' approach would only be able to claim 14.44 million increase in person-years of schooling in rural population. That will raise loss-to-"gain" ratio to 4.9 : 1. It is also important to note that our estimate of education loss has yet to take into account the losses from severe deterioration of education quality or the interruption to schooling during the Cultural Revolution, as discussed in Section I.

TABLE 5— ESTIMATED LOSS OF SDYs' EDUCATIONAL ATTAINMENT (1967-1979)

	Education attained before send-down			Lost education opportunities			
	Senior secondary education	Junior secondary education	Primary education	Junior secondary education	Senior secondary education	Tertiary education	Total
Persons (million)	0.18	3.47	12.82	10.58	8.12	3.78	22.48
Million person-years				31.73	24.36	14.18	70.27

Notes:

1) Estimations for education obtained before send-down are made on these fact-based assumptions: (a) SDYs account for one third of urban graduates from classes of 1966-67; (b) SDYs sent in 1968-69 account almost all urban graduates of classes 1968-69; (c) All classes from 1970 onwards attained equivalence to completed primary education before send-down.
2) Education opportunities are estimated based on percentage of graduates entering next level of schools in 1965, which are 82.3 percent, 70.0 percent, and 45.6 percent respectively for graduates of primary school, junior secondary school, and senior secondary school.
3) SDY flows in 1977-79 are excluded from the pool of SDYs missing senior high education.
4) Years of schooling are 3-3-4 for junior secondary, senior secondary, and tertiary education.
5) 50 percent of the Worker-Peasant-Soldier students during 1970-76 are counted as SDYs and their attainments are added by 2 years per person to offset lost person-years in college education.[11]

Sources: National Bureau of Statistics of China (2010), Tables 1-69, 1-71 and Liu (2009), Table 3B.

Losses of SDYs' education opportunities are just part of the enormous social-economic costs of this movement. Even from a central planner's perspective, the send-down movement was a total failure. One of the economic motivations of the

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[10] Chen et al. (2020) overstate total population in their defined treatment group. Derived from Table 2 in their paper (p. 3406), the total population of this treatment group should be 181.58 million in all the 1,843 counties with SDY information, which account for 90.4 percent of the counties targeted for this study. Even if counties without SDY information are added and assumed to have the same population density of treated cohorts as in counties with SDY information, it is clear that the total population of treatment group cannot be more than 200.9 million (=181.58/0.904), much lower than the 245 million claimed.

[11] From 1969 through the end of the Cultural Revolution, tertiary education was limited mainly to science & technology disciplines and open only to the so-called "worker-peasant-soldier students" recruited not by their academic merits but by their ideological loyalty recommended by the local Party cadres.

movement was to reduce employment pressures in urban areas. It turned out that during 1966-1976, while sending 16 million urban youths to the countryside, the government recruited about 13-14 million people from rural areas into city enterprises. Of those hired from rural areas, approximately 4.5 to 6 million were SDYs (Pan, 2010).

Meanwhile, the send-down movement failed to provide means of survival for many SDYs. A national conference on the send-down movement in 1973 acknowledged that one third of the SDYs could not make ends meet by themselves and 40 percent of SDYs lived in indecent shelters (Bonnin 2013, p. 95). By the end of the Cultural Revolution, more than 50 percent of SDYs in 13 of the 27 provinces could not make enough to feed themselves. In 5 provinces, this ratio reached 70-80 percent. Meanwhile, 0.96 million SYDs, more than one tenth of the SDYs still in the rural area at that time, did not have proper housing (Liu 2009, pp. 668-69).

All this happened despite that the send-down movement had become an unbearable fiscal burden to the government: from 1970 to 1976, the central government's annual expenditure on SDYs increased yearly from less than 300 million yuan to over one billion yuan. In 1962-1972, the expenditure on SDYs was already equivalent to 12.3 percent of government's annual fiscal expenditure for supporting agricultural production. Over years, this ratio rose remarkably to 22.1 percent, 21.2 percent and 23.3 percent respectively in year 1974, 1975, and 1976.[12] That amount of money not even included the expenditures on the send-down movement by local governments and rural collectives. By 1978, senior leaders in the government had to conclude that the send-down movement was no longer sustainable. They acknowledged that fiscal money amounting to almost seven billion yuan had been spent on the movement over a decade only in exchange for

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[12] Calculated from Liu (2009) Table 11 and State Statistics Bureau (2010) Table 1-17.

24

the so-called "four discontents" – those of SDYs, their parents, the peasants, and the government itself (Liu, 2009, p. 851; Bonnin, 2013, p.135).

The movement was also a humanitarian tragedy. Tens of millions of urban youths, most of them 16-20 years of age, were sent down to settle in countryside against their will and choice, away from their loved ones and families, suffered from hard manual labor, poor living conditions, indigenous diseases, malnutrition, and mental trauma (Liu, 2008; Singer, 1971; Bernstein, 1977). They paid huge prices for the send-down movement and some of them even lost their lives. According to official statistics, just in six years from 1974 to 1979, 25,690 SDYs died in their prime years, of whom 62 percent died of "abnormal causes", which include suicides, political persecution, criminal acts, work-related and other accidents. These deaths did not include those who went missing in the countryside (Liu 2009, Table 5). Numerous cases of abuses, rapes and suicides were reported, some of which provoked mass protests and even hunger strikes. In 1975-1976, it was officially reported of nearly 10,000 "cases of ill treatment" (mostly rapes) occurred annually to SDYs (Liu 2009, p. 864). The traumatic send-down experience had long-term negative effects on many SDYs' health, careers, and personal life (Wang and Zhou, 2016; Zhou, 2013; Yang and Li, 2011; Li, Rosenzweig, and Zhang, 2010; Xie, Jiang, and Greenman, 2008; Gong, Lu, and Xie, 2020).

VI. Conclusion

In this research note, we provide a critique to Chen et al. (2020), which asserts that the send-down movement brought long-lasting benefits to rural children's educational attainment. The paper further infers that the movement facilitated the subsequent economic growth in reform era with its contribution to human capital accumulation for the rural children. We demonstrate that the paper's empirical results and inference are derived from inappropriate handling of data, non-

negligible measurement problems with the key dependent variable, failure in accounting for factors that invalidate the parallel-trend assumption for the identification strategy, and a number of unfounded presumptions that lead to misunderstanding of the role of SDYs in rustication. In particular, once the educational attainment is coded by actual schooling-year requirements set in the Cultural Revolution, the estimated effects of SDYs on rural education are found to be negative and statistically insignificant.

Empirical studies provide powerful tools (including the cohort DID model applied in this paper) for analyzing causal links and thus have the important opportunity to reveal factual causality and guide policy making. When the method is used improperly or with mishandled data, however, the results can be meaningless or misleading to policy making.

Based on our scrutiny of their paper, we find little substance in the claim by Chen et al. (2020) that their study made contributions "to three strands of literature" (p. 3395). Other than producing the results shown to be problematic by our analysis, their study did not improve "understanding the channels of supplying human capital and their consequences in developing countries", nor did it add to "the literature on the persistence of human capital spillovers" or "investigate the social and economic consequences of China's send-down movement on the SDYs".

Last but not the least, we challenge the authors' choice to only consider marginal gains in rural schooling without assessing the trade-off of losses in human capital caused by the send-down movement. Just by narrowly focusing on tradeoff of school-years, we find that 16 million SDYs have lost a total of over 70 million person-years of schooling, or more than four times the rural schooling "gains" reported in the paper. Furthermore, their trade-offs equation failed to consider the severe quality deterioration in rural education during the Cultural Revolution. After all, when we take into account the enormous social economic costs and life-long sufferings borne by the SDYs, their families, and the society, the send-down

movement was no doubt one of the greatest disasters of social engineering in China's modern history.

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