Communism and Patricide: Collectivization and Domestic Violence in 1960s China

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Abstract: This paper studies the impact of collectivization on patricide in China during the Cultural Revolution. From 1955 to 1957, nearly 96% of farmers were deprived of their private property and organized into communes. Consequently, fathers – heads of the patriarchal family structure – lost control over family wealth. We propose that this shift decreased fathers' bargaining power over their adult sons, which might increase the family conflicts. Based on a novel dataset, we find that the speed of collectivization significantly increased patricide and the result is robust by employing ruggedness to instrumenting for the speed of collectivization. Our study extends the literature on intra-household bargaining from couples to intergenerational relationships.

1. Introduction

China's Cultural Revolution of 1966–1976 generated one of the most disruptive social–political upheavals of the 20th century [MacFarquhar, 1974, Twitchett et al., 1978, MacFarquhar and Schoenhals, 2009]. It is estimated that more than 25 million individuals were prisoned or persecuted during this time, and nearly 1.5 million were killed [Bai and Wu, 2020]. In contrast to the existing politics literature, which states that the two sides involved in conflicts are usually mortal enemies, the Cultural Revolution often pitted co–workers, neighbors and even family members against each other [Su, 2011; Walder, 2014]. Historians and sociologists have attributed this behavior to offenders who were brainwashed by the fanatical political environment of the time. According to this logic, violent behavior – especially targeting family members – was the best way to prove their political loyalty [Spence, 1990; Su, 2011]. We

propose an alternative, economics-based, explanation: the elimination of private property rights during the forced collectivization that took place in the late 1950s laid the foundations for the domestic violence that took place during the Cultural Revolution.

From 1955 to 1957, nearly 96% of rural households were deprived of all their land, draft animals, and all other property. Nearly 600 million farmers were organized into collectives in what became the largest movement from private to communal property rights in human history [Chen and Lan, 2017]. Prior studies have discussed the impact of this movement on economic growth [Kung and Lin, 2003] and social mobility [Chen and Yang, 2019], but little is known about its impact on family life. This paper seeks to fill this gap in the literature and provide empirical evidence on the impact of collectivization on domestic violence – patricide in particular.

Although patricide is an extreme and unacceptable form of violence, especially in a patriarchal Confucian society, it was far from rare during the Cultural Revolution: cases were reported in over 30% of the counties in our dataset. We exploit the fact that fathers were humiliated, abused or even killed in public; such cases were recorded, which helps overcome the usual obstacle of unobservability of domestic violence in prior studies. We use newly released declassified historical documents from Guangxi province to construct a novel county-level dataset of patricide. We link this data to information on the pace and scale of the elimination of private property to identify the effect of collectivization on the occurrence and intensity of patricide.

Our baseline ordinary least squares (OLS) results suggest that patricide is significantly positively correlated with the speed of collectivization. The faster a county established the collectives, the more patricide cases it recorded during the Cultural Revolution in the following decade.[1] To address endogeneity concerns related to the pace and extent of collectivization, we

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[1] We focused only on the patricides in rural areas, since only rural households were deprived of most of their properties from 1955 to 1957. The urban household had kept most of the properties during that time (Walder and Su, 2003). Additionally, we find that no patricide case were reported in urban areas in our dataset.

use land ruggedness as an instrument, since more rugged land complicates the measurement of land plots and the organization of farmers into collectives. Our instrumental variables (IV) results indicate that a one-month less in the speed of collectivization increased the number of patricides by 2.9 percentage points. Our findings remain significant after controlling for extreme weather [Kung and Chen, 2011], national capacity [Adena et al., 2015], and cultural variations [Alesina et al., 2016].

Why is collectivization associated with an increase in domestic violence? We propose that intra-household bargaining theory can provide three main insights into the underlying mechanism. The relationship between fathers and adult sons is the most important in agricultural patriarchal families in China [Yan, 1996]. In this relationship, the father owns the family wealth, mainly land, as well as the right to allocate this wealth among his sons. Meanwhile, sons are obliged to obey their father and take care of their parents in exchange for their inheritance [Lu, 2004, Watson, 2004]. Thus, the amount of wealth owned by the father determines the equilibrium in the classical bargaining model: the father has the power to ask for his sons' filial piety, and the sons are expected to behave strategically [Chan, 2004].[2] This bargaining process is based on well-defined property rights. However, collectivization eliminated the bargaining power of fathers over sons by destroying the long-standing intergenerational inheritance relationship, which eventually increases the likelihood of within-family conflicts.

To further test our hypothesis, we correlate non-inheritance relationship killings within the family with data on the pace of collectivization and find no significant correlation between matricide, killing other older male family members (not fathers) and collectivization. We therefore maintain that domestic violence in the Cultural Revolution can partially be explained by the destruction of private property rights during collectivization. Finally, this study also provides some suggestive evidence that collectivization had long-lasting negative effects on

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[2] A study by Tur-Prats [2019] suggests that stem families (in which parents, sons and daughters-in-law live together) feature less intimate partner violence than nuclear families, implying the importance of family structure on domestic violence. However, in Mao's China, stem families were the most common [Thornton and Fricke, 1987; Feilong, 2011].

father–adult son relationships: contemporary father–adult son relationships are significantly less close in regions that experienced faster collectivization. There is no significant correlation between the pace of collectivization and either mother–adult son relationships or parent–adult daughter relationships.

Most prior studies about domestic violence are limited to the relationship between husbands and wives, in part because many exogenous shocks used to identify the causal impact of bargaining power are gender specific.[3] But China's collectivization movement provides a unique generation-specific quasi-experiment, which exogenously changes the relative bargaining power between fathers and sons. Therefore, our findings extend current intra-household bargaining theory to vertical family relationships.[4]

The second insight is that our study contributes to a small but growing literature on the impact of social–political campaign on family outcomes.[5] In authoritarian regimes, ordinary people do not have the opportunity to participate in the policymaking process, and have a limited ability to avoid policy consequences through migration. Researchers have used such exogeneity to explore family-related outcomes. For example, Almond et al. [2019] studies the impact of land reform in China in the late 1970s on sex ratios and find that land reform boosted incomes, inducing parents to express their preference for sons through sex selection. Li et al. [2010] examine Mao's 'send down youth' policy to isolate the roles of altruism and guilt in affecting parents' behaviors toward twin children. In contrast to these long-standing legacies, we are more likely to focus on the short-run effects within families.[6]

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[3] For example, Aizer [2010] studies the effect of changes in the gender wage gap, Stevenson and Wolfers [2006] looks at divorce laws, Anderberg et al. [2015] investigate the effect of unemployment, and others look at the effect of cash transfers [Angelucci, 2008; Bobonis et al., 2013; Hidrobo et al., 2016]. A broader range of studies uses traffic jams, football losing, etc. as exogenous variations to study domestic violence against women [Card and Dahl, 2011; Beland and Brent, 2018]. Alesina et al. [2016] investigates the longer-term historical determinants of violence against women.

[4] Miguel [2005] examines the impact of poverty on killings of relatives, specifically elderly witches, in Tanzania.

[5] Most existing studies look at the long-term impact of such historical movements on social capital and economic development outcomes [Roland and Yang, 2017; Bai and Wu, 2020].

[6] Ideally, we would like to observe any change in family conflicts following or during collectivization. Yet there is no data available on fights, quarrels or even abuse. Patricide data was recorded during the Cultural Revolution only because the extreme fanatical political environment provided a unique opportunity for family conflicts to be revealed publicly. Chen and Lan [2017] also study the short-term impact of collectivization, and find that farmers killed or hid draft animals to avoid the loss of private property between 1955 and 1956.

Third, this paper seeks to better understand the role of family in participation in political violence. In contrast to previous studies that discuss the roles of income shocks [Dube and Vargas, 2013; Bazzi and Blattman, 2014], government policy [Nunn and Qian, 2014; Yanagizawa-Drott, 2014], and culture and religion [Caselli and Coleman, 2013, Glaeser, 2005], our findings highlight the importance of private property rights on the relationships between family members.[7] Although we focus on an extreme behavior, we believe our explanation supports Becker's framework of investigating families.

This paper is organized as follows. Section 2 provides a brief historical overview and presents a simple conceptual framework to explain how collectivization increased domestic violence. Section 3 introduces our data source and explains how we created our database. Section 4 presents our empirical strategies and results, while Section 5 explores the potential long-term effects. Section 6 concludes.

2. Background and Conceptual Framework

2.1 Cultural Revolution

The Cultural Revolution is one of the most important events of the 20th century. Its original purpose was to remove "people in authority taking the capitalist road" [MacFarquhar, 1974; Walder, 2015]. It was intended to be a massive purge, mainly targeting urban officials. However, collective conflicts and various political campaigns quickly swept the whole country and almost everyone eventually became involved. Victims were killed not for committing a crime, but for being labelled possible "class enemies"; the most commonly cited murder weapons were ordinary farming tools. The armed battles killed an estimated 750,000 to 1.5 million people and caused permanent injuries to a similar number. Over 30 million people were targeted as political enemies [Walder and Su, 2003].

Perhaps most astonishingly, the victims and killers during the Cultural Revolution were

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[7] Friedman [2013] also provides a thorough literature review of the theories of participation in political conflicts.

previously co–workers, neighbors or even family members, in contrast to the existing literature in politics which states that the two sides involved in conflicts are usually mortal enemies [Su, 2011, Walder, 2014]. Conventional wisdom ascribes the murders to the fanatical political environment at the time; the famous propaganda called on citizens "to place righteousness above family loyalty". Violent behavior was the most effective way for individuals to demonstrate their political loyalty [Lu, 2004, Spence, 1990]. We propose an alternative, economics-based explanation, which tracks the fundamental reasons back to the collectivization that took place several years earlier.

2.2 Collectivization

From 1956 to 1957, farmers were forced to turn over all their land, animals, and other assets and received no (or very little) compensation. The purpose of the movement was to extract more agricultural resources to subsidize heavy industries in the city and accelerate industrialization [Lin, 1990]. As a result, all productive assets were pooled together in a single organization – called an "advanced cooperative". The production activity of each member of the cooperative was strictly controlled under unified management, and people were paid in the form of "work points". By the end of 1957, 96% of rural households across the country had been organized into such cooperatives [Chen and Lan, 2017].

Although an extensive literature has discussed the social and economic impacts of collectivization [Lin, 1990; Li and Yang, 2005; Kung and Chen, 2011; Meng et al., 2015], very little attention has been paid to its impact on families. We argue that well-defined private property rights that used to be controlled by the head (father) of the family were deprived, which fundamentally destroyed the economic relationship between fathers and adult sons.

2.3 Conceptual Framework

As discussed above, the traditional Chinese family is a typical stem family: parents, sons and daughters-in-law live together. The family structure centers on the father–adult son relationship, which is superior to all other family relationships [Yan, 1996; Cohen, 1992]. This relationship is defined by filial piety from Confucianism and supported by patrilineal descent,

patriarchal authority, and patrilocal residence. This family structure was solid and stable for over 2,000 years. The father is the head, and in charge of all crucial family decisions; how to allocate his inheritance (e.g., land rights, animals) among his sons is one of the most important [Yan, 1996; Cohen, 1992].[8]

Conceptually, fathers and adult sons bargain over the allocation of family resources and responsibility for the housework. On the one hand, fathers use two forces: Confucian filial piety values and threats of dividing the wealth unequally, to incentivize sons to obey their willing unconditionally. On the other hand, sons use the promise of taking care of parents to bargain for more inheritance. Well-defined property rights are required for such a bargaining process to work well.

Collectivization signaled fathers' loss of private property – and a corresponding loss of economic bargaining power over their sons. Sons lost the economic incentive to obey their father and take care of their parents; Fathers' attempts to use cultural values to force sons to obey them increased intergenerational tensions. The Cultural Revolution provided a rare opportunity for such private conflicts to be made public and gave sons more incentives to show their dissatisfaction, resentment, and anger toward their fathers.[9]

3. Data

We created a novel database by manually collecting data from a large number of historical documents from 1955 to 1976 in Guangxi province.[10] In this section, we first explain why we chose this province to study and then describe how we construct our key variables: family violence and the speed of the collectivization movement.

3.1 Guangxi Autonomous Region

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[8] Although the 1950 Marriage Law legalized females' freedom of marriage, girls' inheritance rights were not recognized until the late 1980s [Zhang, 2009].

[9] Studies have found that household divisions started to appear before the Cultural Revolution, but very seldom [Yan, 1994, Sheng, 2005].

[10] Although the Cultural Revolution officially started in 1966 and ended in 1976, most studies in history, politics and sociology find that the bulk of the mass killings took place from 1967 to 1971. Our data set shows that all domestic killings occurred from November 1967 to September 1968 [Walder, 2014, Su, 2011].

Guangxi is located in southern China (Figure 1), covering an area of 236,700 square kilometers. It governs 99 counties, and had a population of approximately 24 million and roughly 30% ethnic minority groups in the 1960s [Su, 2011]. It was one of the poorest areas before the 1980s, with over 80% of people living in rural mountainous areas.
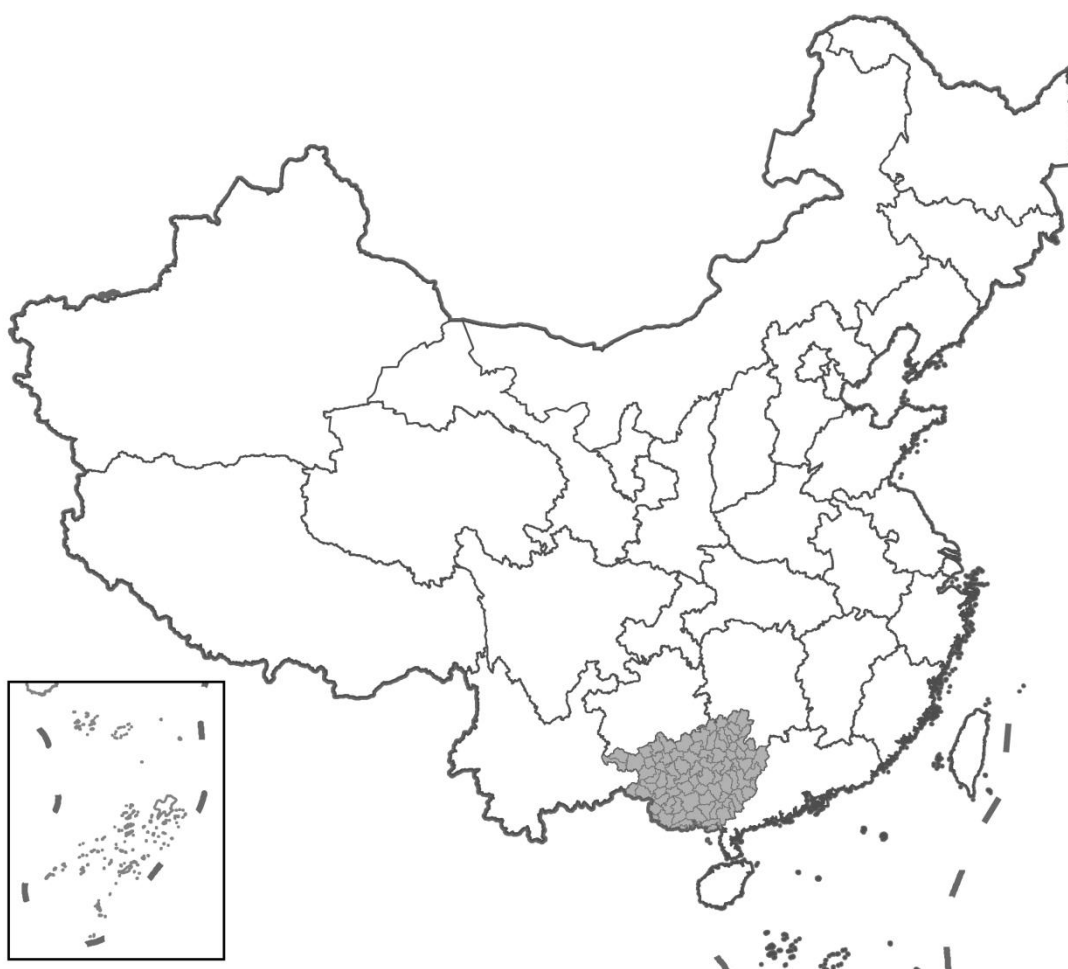

Figure 1: Location of Guangxi Province

The most important reason that we study Guangxi is that, to our best knowledge, it is the only province that recorded almost every killing tragedy (including the date, location, name of offenders and victims) in rural areas during the Cultural Revolution. In the late 1970s and early 1980s, local government officials investigated and published the details of all killings that happened in the past ten years in a book called "Major events in Cultural Revolution" ("Wenge Dashijian"). The provincial government later complemented this book with other documents, such as "Dealing with the issues in the Cultural Revolution" ("Chuli Wenge Yiliu Wenti") and

"Recordings of Major Events in the Cultural Revolution in Guangxi" ("Guangxi Wenge DaShiji"), to produce 36 volumes with over 100,000 words of encrypted official recordings – "The Chronology of Mass Killings during the Chinese Cultural Revolution in Guangxi" (Guangxi Wengge Jimi Dangan Ziliao) [Song et al., 2011]. This is the most detailed record of this period to date, and Guangxi is the only province that has a reputation for frankness in recording these events [Su, 2011].

Guangxi is also one of the two provinces that were most severely socially damaged by political chaos in the Cultural Revolution.[11] Guangxi reported higher-than-average numbers of injuries (251 vs. 212 national average), persecutions (12,234 vs. 11,390 nationally) and killings (581, vs. 80) [Walder and Su, 2003]. Yangshuo county experienced continual political conflict after July 1966. In a single month in 1968, 2,513 people were subjected to violent struggle sessions, and 639 people were beaten to death [Walder and Su, 2003].[12] Finally, there was considerable cross-regional variation in the killings in Guangxi: 15 out of 99 counties in the province reported more than 1,000 deaths, which accounts for 62.5% of the total killings in the province [Walder and Su, 2003].

3.2 Family Violence
In the original documents, investigators recorded the date, location, and persons involved in every violent activity. Patricide usually happened in public (e.g., in the office of the village head or on the street). The government's account describes the following example:

In the morning of August 1st, 1968, (Binyang county), the secretary lured Zhengfu Liu to fight against his father Riheng Liu, who was assigned as 'class enemies' and was being investigated. Zhengfu Liu held a wooden stick and hit his father's head, Riheng Liu died (The Chronology of Mass Killings during the Chinese Cultural Revolution in

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[11] Guangdong, which neighbors Guangxi, also experienced many mass killings during this time [Su, 2011].
[12] Researchers have tried different ways to check the data quality and found consistent under-reporting issues, but the data from Guangxi has been criticized the least. For instance, researchers use the length of the account in the county annals to measure data quality. Although the average length in Guangxi ranks fourth or fifth, lower than Shanghai or Shaanxi., the reported deaths per county is the highest, at 581. Shangdong reported only 18 deaths per county, Zhejiang 17, Hubei 11, and Qinghai only 4, which are hard to believe [Walder and Su, 2003].

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In this account, the local officer encouraged Zhengfu Liu to attack his father, Riheng Liu. The father died instantly after being brutally hit with the wooden stick. Based on such information, we construct two variables to measure patricide: (1) a dummy variable coded 1 to indicate the occurrence in a specific county, and 0 otherwise and (2) a continuous measure of the number of patricide cases. We use these two variables to study the occurrence of this tragedy as well as its intensity. In our dataset, 31.5% of the country's 92 counties reported the occurrence of patricide. For every 10,000 people, the average number of patricides is approximately 57. Panel (a) of Figure 2 illustrates the large regional variation in intensity. Darker areas indicate that more homicides occurred in a county.

We also collect data on matricides and killings of elderly relatives other than fathers and mothers. We have hypothesized that the inheritance relationship between fathers and adult sons explains the cross-regional variation in patricides. Hence, matricides and killings of non-parent elder relatives can serve as falsification tests: we predict they will be insignificant.

3.3 Speed of Collectivization

Data on the speed of collectivization comes from more than 90 county annals, which clearly record the beginning and end dates of establishing advanced cooperatives after 1955. It is calculated as the number of months the county took to finish collectivization. We observe a substantial variation in speed: the fastest county took 1 month and the slowest one spent 15 months. Prior studies have suggested that the quicker a county finished collectivizing, the stronger the state power to deprive individuals of their private property rights [Lin, 1990]. Panel (b) in Figure 2 describes the regional variation in speed of finishing the construction of communes. The darker the color, the less time the county took to establish its advanced cooperatives. Comparing Panels (a) and (b) of this figure shows that areas that established advanced cooperatives more quickly tended to have more patricides during the Cultural Revolution. We therefore hypothesize that the faster the advanced cooperatives were established, the more damage the process caused to the previously traditional family

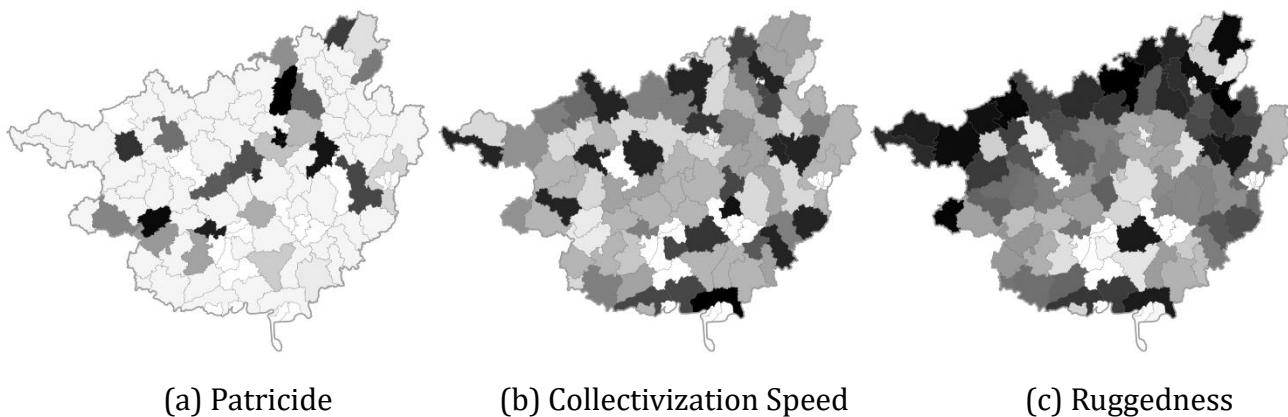inheritance relationships. As a result, it is more likely to observe family violence in those areas.

(a) Patricide   (b) Collectivization Speed   (c) Ruggedness

Figure 2: Patricide, Collectivization Speed and Ruggedness in Guangxi

Note：(a) darker areas indicate more patricides; (b) darker areas indicate slower collectivization; (c) darker areas indicate more rugged areas. In all panels, the white areas indicate no data available.

Figure 3 presents a clearly negative relationship between the time the county took to finish collectivization and the number of patricides during the Cultural Revolution. As is suggested, a place with less time to finish establishing advanced cooperatives tended to have more patricides. For more rigorous analysis please see the following empirical part.
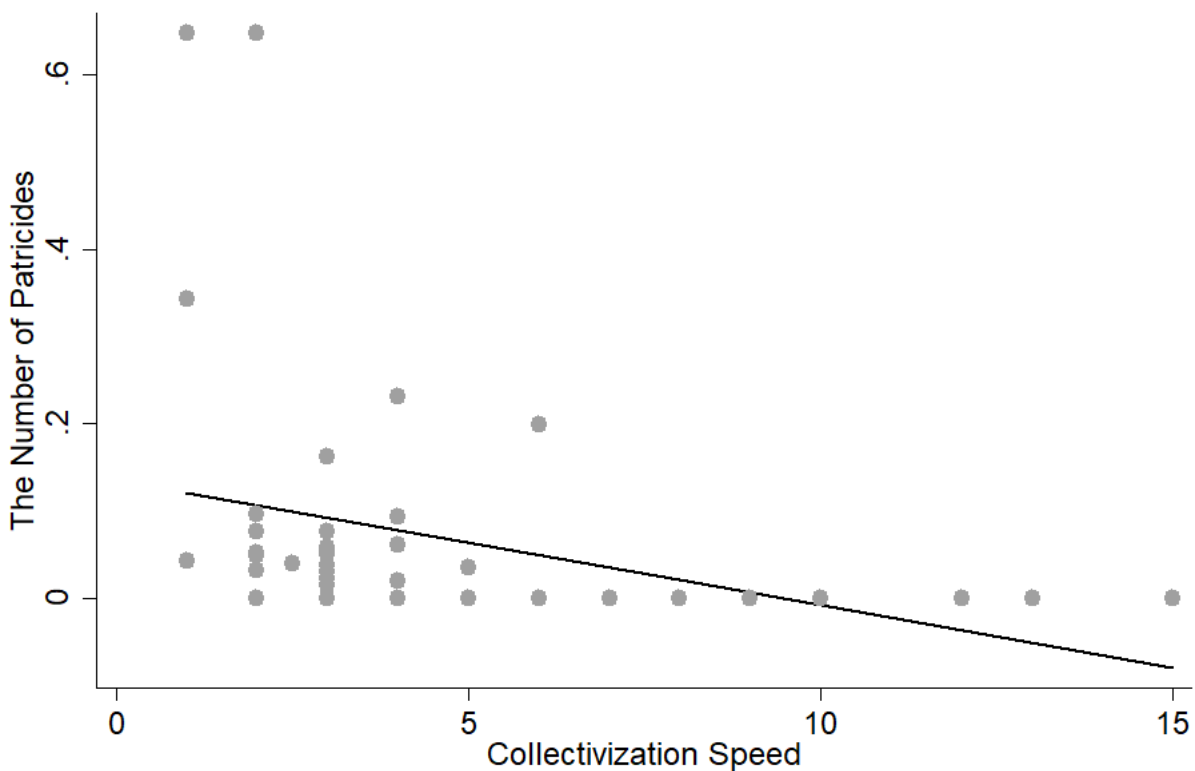
Figure 3: Relationship between Collectivization Speed and Patricide

Notes: Data collected by authors from county gazettes and The Chronology of Mass Killings during the Chinese Cultural Revolution in Guangxi. It should be noticed that collectivization speed is measured by the time it took to finish collectivization, the less time, the faster collectivization. So collectivization speed and the number of patricide is negatively correlated.

In addition to these baseline variables, we also consider additional controls, such as political radicalism, economic factors, culture and extreme weather in robustness checks. Table 1 reports the county-level summary statistics for the variables used in our empirical analysis.

Table 1: Summary Statistics

	N	Mean	Std
Panel A: Main Variables			
Collectivization Speed	92	5.397	3.755
Occurrence of Patricide	92	0.315	0.467
Occurrence of Matricide	94	0.032	0.177
Occurrence of Family Killing Older Males Other Than Fathers	89	0.775	0.420
Number of Patricide (per 10,000)	90	0.057	0.154
Number of Matricide (per 10,000)	94	0.006	0.051
Number of Family Killing Older Males Other Than Fathers (per 10,000)	89	0.408	0.503
Ruggedness	94	2.321	1.167
Panel B: Control Variables			
Total Deaths and Injuries in Armed Battles (per 10,000)	94	39.606	161.155
Number of Communist Party Members (per 10,000)	90	0.020	0.014
Years of Having Radio by 1966	90	9.322	2.617
Distance to The Capital City (km)	78	171.335	87.403
Number of Confucian Temples	81	0.877	1.511
Ethnic Minority Ratio	78	0.513	0.374
Grain Output (1,000 tons)	78	69.048	42.248
Extreme Weather	94	0.457	0.501

Note: Data come from database created by the authors. Main data sources include declassified local government files, county gazettes, SRTM 90m Digital Elevation Database and Yearly Charts of Dryness/Wetness in China for the Last 500-Year Period (1981).

4. Empirical Strategies and Results

This section estimates the impact of the speed of collectivization on the patricide. Section 4.1

presents the OLS estimates and Section 4.2 reports the two-stage least-squares (2SLS) estimates. Section 4.3 discusses the robustness of the results.

4.1 OLS

The econometric specification is as follows:

$$Y_{i1960s} = \alpha + \beta_1 CollectivizationSpeed_{i1950s} + X'_{i1960s} + \varepsilon_{it} \quad (1)$$

Where i indexes county, and t indexes time. The outcome variable of interest, Y_{i1960s}, represents either (1) the occurrence of patricide in county i in the 1960s, coded 1, or 0 otherwise (OLS and *probit* regressions are used for this outcome variable) or (2) the number of patricides. For this outcome, two transformation methods are used. One is $ln(number\ of\ patricides + 1)$ and the other is $ln(number\ of\ patricides + (number\ of\ patricides^2 + 1)^{0.5}$, which is called inverse hyperbolic sine (IHS) transformation. This approach has been widely used in the literature to deal with data that is right skewed (Pence, 2006).[13] Our main explanatory variable is $CollectivizationSpeed$; larger values indicate slower collectivization speeds. To deal with the heteroskedastic disturbances that are possible in a small sample size [Finch and Finch, 2017; Angrist and Pischke, 2008], we employ the wild bootstrap technique proposed by Cameron et al. [2008] in all our analysis and present the p-values.

We report the baseline regression results in Table 2. Columns (1) and (2) show the results on the occurrence of patricide, while Columns (3) and (4) use the number of patricides as dependent variables. Overall, we find that counties that engaged in faster collectivization have a higher likelihood of patricide occurrence and more patricide tragedies. The point estimate in Column (1) indicates that collectivizations that took one month longer are associated with a 6-percentage-point increase in the likelihood of the occurrence of patricide, which corresponds to a 18.75% increase (0.06/0.32 = 0.1875). The point estimator slightly increases to 8.6

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[13] One obvious advantage of this approach is that the IHS function is defined even when the original value is zero and the interpretation of the regression coefficient is similar to standard log transformation.

percentage points if we employ the *probit* regression approach. As for intensity, the results in Column (3) suggest that collectivizations that took one month longer are associated with a 1.2-percentage-point increase in the number of patricides. IHS transformation produces similar results – a 1.4-percentage-point increase.

Table 2: Baseline Results

	Occurrence of Patricides		Number of Patricides	
	OLS	*Probit*	Log Transformation	IHS Transformation
	(1)	(2)	(3)	(4)
Collectivization Speed	-0.060***	-0.086***	-0.012***	-0.014***
P-value from Wild Bootstrap	[0.002]	[0.000]	[0.004]	[0.004]
Observation	91	91	89	89
R-squared	0.234	0.263	0.135	0.128

Notes: Wild bootstrap p-values are in brackets. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$ based on wild bootstrap p-values. Column (2) reports the marginal effects and pseudo R-squared from the *probit* regression.

4.2 IV Estimation

A critical concern when implementing OLS analysis is the endogeneity of the speed of collectivization. We might worry about unobserved time-varying variables across regions that correlate with both speed and the subsequent occurrence of patricide. To address this concern, we utilize an IV approach, instrumenting for the speed of collectivization using the county-level ruggedness index. Prior studies suggest that terrain ruggedness has important direct influences on the lack of state capacity [Adena et al., 2015]. In our context, we expect that local government officials had to expend more time and effort to travel and finish the socialist land reform in more rugged areas, which to some extent helped families resist the damage caused by the state-sponsored elimination of private property rights.

We follow Nunn and Puga [2012] to create our ruggedness index using altitude data from the SRTM 90m Digital Elevation Database (details available in the Appendix). Panel (c) of Figure 2 shows the regional variation in the index; darker colors indicate rougher areas. The mean of the

ruggedness index is 2.32, with a standard deviation of 1.17. Combining Panels (a), (b), and (c) in Figure 2, we observe that areas with fewer recorded patricides have more rugged land, and thus it took longer to establish advanced cooperatives there. Figure 4 presents a clearly positive relationship between the ruggedness index and the speed of collectivization, which suggests that a place with more rocky areas took longer to establish the advanced cooperatives.
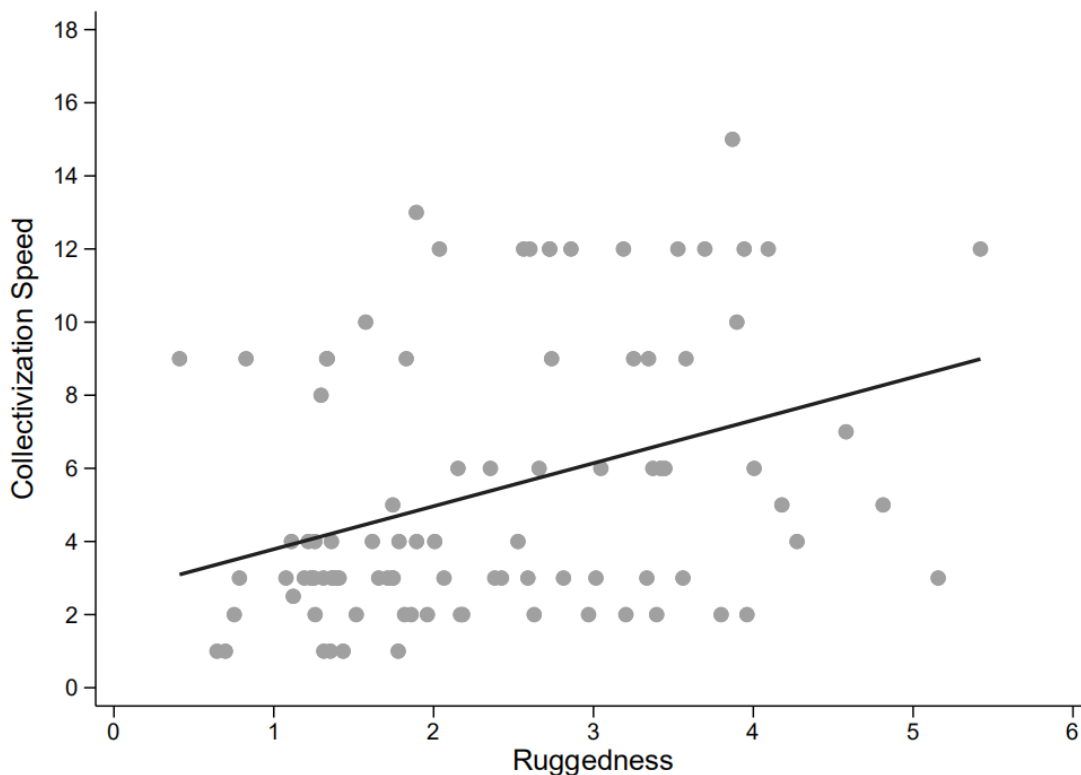

Figure 4: Relationship between Ruggedness and Collectivization Speed

Notes: Data collected by authors from county gazettes and SRTM 90m Digital Elevation Database.

The IV equation takes the form of the OLS equation as represented in equation (1) above, but the independent variable of interest is replaced by the predicted speed of collectivization, as shown in the following specification:

$$Y_{i1960s} = \alpha + \beta_1 \widehat{CollectivizationSpeed}_{i1950s} + X'_{i1960s} + \varepsilon_{it} \quad (2)$$

Where $\widehat{CollectivizationSpeed}$ is generated by the first-stage regression in the IV framework:

$$CollectivizationSpeed_{i1950s} = \alpha + \alpha_1 Ruggedness_i + \varepsilon_{it} \qquad (3)$$

The IV results are presented in Table 3, where Column (1) shows the first-stage regression results on the correlation between ruggedness and months taken to finish collectivization. The correlation coefficient is 1.177 and the F-statistic is 13.066. Column (2) extends the analysis to nearly 1,600 counties across the country.

The first-stage results, using either counties in Guangxi or across the whole country, suggest that a higher value on the ruggedness index strongly predicts more time to finish collectivization. Columns (3)–(5) show the 2SLS results using occurrence, log and IHS transformation of the number of patricides, respectively, which are consistent with the baseline results. The results suggest that counties in which collectives took one month less to complete were 12.5-percentage-points more likely to experience patricide. The number of patricides increased by 2.9 percentage points in these areas. P-values from the wild bootstrap method suggest that these impacts are significant at the 1% level.[14]

Table 3: IV Estimates Results

	First Stage		IV		
	Collectivization Speed		Occurrence of Patricides	Log Transformation	IHS Transformation
	(1)	(2)	(3)	(4)	(5)
Ruggedness	1.177***	0.845***			
Collectivization Speed			-0.125***	-0.029***	-0.034***
P-value from Wild Bootstrap	[0.000]	[0.000]	[0.002]	[0.002]	[0.002]
F-statistics	13.066	23.788			
Observation	92	1,594	91	89	89
R-squared	0.127	0.015	-0.038	-0.157	-0.145

Notes: Wild bootstrap p-values are in brackets. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$ based on wild bootstrap p-values.

4.3 Robustness to More Controls

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[14] We also present the reduced-form results in Table A.1 to show the relationship between the exogenous ruggedness index and patricide. Not surprisingly, we find that areas with less rocky arable land are associated with a higher likelihood of patricide and an increase in the number of patricide cases.

Many studies have suggested that violent behavior during periods of political chaos is significantly correlated with political radicalism, culture, economic factors, extreme weather, etc. In this section, we check whether our main results are robust after considering these factors.

Political Radicalism. Individuals' behavior might be affected by political radicalism during the Cultural Revolution. We use three variables to capture political radicalism. First, Walder [2014] and Su [2011] find that patricide often happened in armed battles between two factions or in the political campaigns. It is possible that the more deaths or injuries that occurred in such collective conflicts, the more likely patricide was to be recorded. Thus, we control for the total number of deaths and injuries in all collective conflicts from 1966 to 1968, collected from the county gazettes. Second, Yang [1996] and Kung and Lin [2003] suggest that the density of political party members may be positively correlated with collective violent behaviors in the Cultural Revolution. We therefore collect data on the number of Communist Party members for each county from the county gazettes and add it as another control. Third, to address the literature that discusses the importance of national capacity in political violence, we control for the number of years of radio that each county had access to before 1966 [Adena et al., 2015] and the distance from the county to the capital city of the province [Su, 2011].

Confucian Culture. We use two variables to measure Confucian culture, as some studies have found that levels of violence were significantly lower in counties characterized by stronger Confucian norms [Kung and Ma, 2014]. First, we collected data on the number of Confucian temples in each county from the local records of the Qing Dynasty ("Da Qing Yi Tong Zhi"). Second, we collected data on the ethnic composition from the 1980 census and expect that areas with more ethnic groups are less impacted by Confucian norms, because only Han Chinese follow Confucian teachings.

Economic Factors and Extreme Weather. Several studies have explored the importance of income or poverty in determining killing behaviors [Miguel et al., 2004; Miguel, 2005]. We collected 1966 county-level grain output data from the county gazettes. Since grain output in

rural China was largely dependent on the weather in the 1960s [Lin, 1990], we also gathered weather data from the China drought and flood records ("*Zhongguo Jin Wu Bai Nian Han Lao Fen Bu Tu Ji*") and calculated the average weather index for each county from 1956 to 1966. Then, we created a dummy variable to indicate whether a county experienced any extreme droughts or floods in these years based on a specific cutoff.

Table 4 presents the 2SLS estimates. The dependent variable is the number of patricides. The baseline results of the effect of collectivization speed on patricide are as expected. Column (1) presents the estimates with only the prefecture fixed effects, while Columns (2), (3) and (4) present the estimates with the controls as well as the prefecture fixed effects. The estimates change little after controlling for political radicalism, Confucian culture, economic factors, and extreme weather. We also find that political radicalism weakly affects patricide: a greater number of Communist Party members significantly increase the incidence of patricide. This finding is consistent with the prediction in the literature that political radicalism and state capacity are correlated with politically motivated violent behaviors (Yang, 1996; Adena et al., 2015).

Table 4: 2SLS Estimates Results, with More Controls

	Number of Patricides			
	(1)	(2)	(3)	(4)
Collectivization Speed	-0.021**	-0.021**	-0.022**	-0.021*
	(0.008)	(0.010)	(0.011)	(0.011)
Total Deaths and Injuries in The Armed Battles		-0.011*	-0.012	-0.011
		(0.007)	(0.008)	(0.010)
Number of CPM		3.937*	4.544	4.812
		(3.327)	(4.019)	(4.617)
Years of Having Radio by 1966		0.011	0.012	0.012
		(0.009)	(0.009)	(0.010)
Distance to The Capital City		0.004	0.017	0.020
		(0.028)	(0.029)	(0.032)
Number of Confucian Temples			-0.008	-0.009
			(0.006)	(0.006)
Ethnic Minority Ratio			-0.080	-0.075

				(0.062)	(0.072)
Grain Output					0.007
					(0.029)
Extreme Weather					-0.002
					(0.036)
Constant		0.128***	-0.043	0.018	-0.067
		(0.039)	(0.176)	(0.178)	(0.272)
Prefecture Fixed Effect		y	y	y	y
Observations		89	75	66	66
R-squared		0.236	0.411	0.493	0.499

Notes: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Dependent variable is $ln(number\ of\ patricides + 1)$.

4.4 Placebo Test: Impact on Matricide and Other Killings

According to our conceptual framework, the damage to the inheritance relationship between the head of the family/father and the adult son is the fundamental motive for the violent behavior. In other words, we should not expect collectivization to have any significant impact on other types of killings, because there is no such inheritance relationship among other family members.

Table 5 shows the 2SLS regression results of the effect of collectivization on other types of killings. The dependent variables in Columns (1) and (2) are the occurrence and intensity of matricide, those in Columns (3) and (4) are the occurrence and the intensity of killing of older male relatives other than the father, while the dependent variable in Column (5) is the number of total killing per ten thousand people during the Cultural Revolution. Our results, with and without controls, suggest that collectivization had no significant effects on other types of killings.[15]

Table 5: 2SLS Regression Results of the Effect of Collectivization Movement on Other Killings

	Occurrence	Number of	Occurrence	Number of Older Male	Number of Total

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[15] Given the small number of matricides reported, we might worry that the lack of significance is due to the lack of power. We therefore perform a power calculation to back out the sample size needed to detect significance at the 10% level with 80% power using the estimated coefficients. For the incidence of matricide, the sample size needed is 500; for the intensity of matricide, the sample size is 3,000. We conclude that there is little or no association between the speed of collectivization and matricide.

	of Matricide	Matricides	of Older Male Homicides other than Father	Homicides other than Father	Killings
	(1)	(2)	(3)	(4)	(5)
Collectivization Speed	-0.031	-0.007	-0.083	-0.118	0.000
	(0.019)	(0.006)	(0.068)	(0.080)	(0.000)
Total Deaths and Injuries in Armed Battles	-0.024	-0.004	-0.024	-0.063	0.000
	(0.015)	(0.004)	(0.038)	(0.043)	(0.000)
Number of CPM	-1.167	3.598	-3.268	-27.045	0.034
	(9.932)	(3.063)	(15.937)	(21.656)	(0.099)
Years of Having Radio by 1966	-0.017	-0.006	-0.007	-0.027	-0.000
	(0.013)	(0.004)	(0.014)	(0.022)	(0.000)
Distance to the Capital City	-0.079	-0.041	-0.258	-0.076	-0.001
	(0.079)	(0.028)	(0.134)	(0.148)	(0.001)
Number of Confucian Temples	0.011	0.004	0.008	-0.046	-0.000
	(0.015)	(0.005)	(0.045)	(0.034)	(0.000)
Ethnic Minority Ratio	-0.117	-0.035	-0.432	-0.227	0.001
	(0.112)	(0.038)	(0.383)	(0.667)	(0.003)
Grain Output	-0.112	-0.056	-0.125	-0.292	-0.001
	(0.086)	(0.036)	(0.121)	(0.164)	(0.001)
Extreme Weather	0.126	0.003	-0.262	-0.113	0.001

	(0.104)	(0.013)	(0.207)	(0.234)	(0.001)
Constant	1.174*	0.440	3.174**	3.433**	0.012*
	(0.696)	(0.281)	(1.375)	(1.555)	(0.007)
Observations	68	68	64	64	56
R-squared	0.086	0.256	0.411	0.488	0.189

Notes: ***p < 0.01, **p < 0.05, *p < 0.1. Robust standard errors are presented in brackets.

5. Long–term Impact on Intergenerational Relationships

Our work suggests that collectivization fundamentally destroyed the intergenerational inheritance relationship between fathers and adult sons in traditional Chinese families, suggesting that the intimate relationships among family members may have been damaged. To determine whether such damage has had long-term effects on contemporary family relationships, we study the relationship between the speed of collectivization and intergenerational (parent–child) relationships using the 2003 to 2013 waves of the Chinese General Social Survey.[16] We use two indicators – (1) whether they celebrate Fathers' Day and (2) whether they celebrate Mothers' Day – to proxy for the intimacy of relationships between adult sons/daughters and their fathers/mothers.

Table 6 reports the results broken down by gender. Columns (1) and (2) show the correlation between the speed of collectivization and whether adult males celebrate Fathers' Day and Mothers' Day with their parents. We find that males in counties that collectivized more rapidly are less likely to celebrate Fathers' Day with their fathers. However, we do not find that adult males' celebration behavior with their mothers is associated with collectivization. By contrast, we find that adult females' behavior is not associated with collectivization, as shown in Columns (3) and (4). These findings indicate that the long-term negative effects of

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[16] This is a yearly or biannual nationwide household survey, covering both rural and urban areas. Nevertheless, most of the sampling sites for intergenerational relations are cities, while the collectivization movement we focus on came from rural areas, which makes it impossible for us to match the collectivization data for these outcomes. The only two outcomes that can be observed in all specifications are about Father's Day and Mother's Day, which is why we only discuss the effect of collectivization on these celebrations.

collectivization are only found in father–adult son relationships.

Table 6: OLS Regression Results on Long–term Outcomes

	Males		Females	
	Fathers' Day (1)	Mothers' Day (2)	Fathers' Day (3)	Mothers' Day (4)
Collectivization Speed	0.002	0.002	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	8.969***	9.850***	5.056***	5.226***
	(0.816)	(0.811)	(0.935)	(0.963)
Observations	3,107	3,100	2,945	2,947
R-squared	0.203	0.218	0.194	0.191

Notes: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors are presented in brackets. Fathers' Day equals 1 if it ever happened at home, and 0 otherwise. All regressions include individual-level characteristics, including year of birth, education attainment, personal annual income and family annual income as controls. Province fixed effects are also included in all regressions.

Some previous studies have found that the quality of previous intergenerational relationships affects new intergenerational relationships (Lin, 2008; Szydlik, 2008; Aquilino 2005; Kaufman and Uhlenberg, 1998). Thus people might be more inclined to respond violently to family disputes if their family members treated their fathers cruelly in the 1960s. If such a view holds, perhaps we should expect no difference in poor intergenerational relationships between males and females, as presented in Table 6. Another explanation that is more in line with our hypothesis is that sons who lost their inherited wealth due to collectivization in the 1960s, after becoming fathers, still have weaker bargaining power over their sons due to the less disposable wealth, and hence tense intergenerational relationship, which followed.[17]

6. Conclusion

During the Cultural Revolution, the victims were often the killers' neighbors, friends, and even family members. Why would extreme and unacceptable violence such as patricide occur? This

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[17] This argument is supported, as the significant correlation between collectivization and contemporary intergenerational relationship disappears after we control for the father's income. This finding indicates that collectivization works through the channel of reducing the father's disposable income.

paper proposes that the elimination of private property rights during the forced collectivization was a necessary (although not sufficient) condition for the tragedy of patricide in China in the 1960s, as the elimination of their fathers' property incentivized sons to disobey their fathers, and eventually changed the bargaining power between family members. Our results suggest that the quicker a county finished establishing the collectives, the more patricide cases that county experienced during the Cultural Revolution. The results remain robust to a series of controls and to employing terrain ruggedness to instrument for the speed of collectivization.

Although the context of our study has many specific institutional features, the most essential ingredient for our mechanism – the elimination of private property rights changed the bargaining power between family members – is consistent with the theory. The evidence presented here represents a first step towards better understanding the importance of property rights in intra-household resource allocation beyond the husband and wife relationship and sheds light on the impact of social–political movements on domestic violence.

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Appendix: Ruggedness Calculation

We follow Nunn and Puga (2012) to calculate a county's ruggedness index, originally devised by Riley, DeGloria, and Elliot (1999) to quantify small-scale terrain irregularities, which has been widely utilized in economic analysis (Burchfield et al., 2006). Specifically, our starting point is China's altitude data from SRTM 90m Digital Elevation Database (Jarvis et al., 2008). It is a global elevation data set that the entire surface of the earth are regularly spaced at 3 × 3 arc seconds on a map using a geographic projection (see in the following figure). The terrain ruggedness index of any point on the earth's surface is calculated by the square root of the sum of the squared differences in elevation between that point and the eight adjacent points (the eight major directions of the compass north, northeast, east, southeast, south, southwest, west, and northwest). More formally, let $e_{i,j}$ denote elevation at the point located in row i and column j of a grid of elevation points. Then the terrain ruggedness index of Riley et al. (1999) at that point is calculated as $\sum_{m=i-1}^{i+1} \sum_{m=j-1}^{j+1} \sqrt{\left(e_{i,j} - e_{m,n}\right)^2}$. We then average across all grid cells in a country to obtain the average terrain ruggedness of the county.

	$i-1, j-1$	$i, j-1$	$i+1, j-1$	
	$i-1, j$	i, j	$i+1, j$	
	$i-1, j+1$	$i, j+1$	$i+1, j+1$	

Figure A1: Ruggedness Calculation

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