Online Appendix for "Industrial clusters in the long run"—not for publication

This appendix (A) places our experiment within the wider context, (B) provides details about the data sources, (C) sheds additional light on the empirical strategy, (D) provides support for the identification assumption, and (E) presents additional empirical results.

A The Million-Rouble plants in context

In this section, we provide additional information about Million-Rouble Plants (MRPs). First, we summarize the historical context and geopolitical background (A.1). Second, we present the Sino-Soviet cooperation during the First Five-Year Plan—including how the MRP sites were selected—and the characteristics of the plants built under the program (A.2). Third, we review other place-based policies implemented after the end of the First Five-Year Plan and discuss the concurrent evolution of the MRPs (A.3). Finally, we describe the recent developments of MRPs (A.4).

A.1 Historical context

Leaning to one side When the People's Republic was established in 1949, World War II and the civil war had left China a poverty-stricken agrarian country. The new Communist regime was isolated, as the Western world recognized Chiang Kai-shek's Taiwan-based power as the legitimate representative of China. To ensure national security and economic prosperity in such a context, Chinese leaders planned to industrialize the economy rapidly, prioritizing heavy industry as the basis of production.[1] China lacked resources to develop its industry, and turned to the Soviet Union. Despite ideological proximity, economic cooperation with the U.S.S.R. was not obvious. Pre-1949 economic relationships between the two countries were thin, and the Komintern had repeatedly talked the Chinese Communists into supporting the Nationalists, which they then saw as the only political force able to rule China. The Soviet Union was however the only advanced economy China could turn to in the 1950s. First, because it was sympathetic to the new regime's revolutionary agenda. Second, because of that regime's isolation: Washington and its allies imposed an embargo that prevented Communist China from importing the technology and resources needed to develop its industrial base (Zhang, 2001). The subsequent alliance with the U.S.S.R., which Chairman Mao called "leaning to one side" in a famous speech,[2] was further reinforced by the Korean War, which the U.S.S.R. fought vicariously through a Chinese "People's Volunteer Army" of 250,000 men.

Sino-Soviet cooperation On February 14, 1950, the Treaty of Friendship and Alliance was signed between China and the U.S.S.R. A series of agreements ensued, paving the way for a comprehensive economic and scientific cooperation that spanned China's First and half of its Second Five-Year Plans (1953–1957 and 1958–1962).

[1] In the words of future Premier Zhou Enlai, "without heavy industry, there will be no foundation for the national industry" (January 1942).

[2] "On the People's Democratic Dictatorship" (June 30, 1949).

The cooperation between China and the Soviet Union assumed two main aspects: scientific and economic, both embodied in the "156" program. Soviet experts were dispatched to China to advise Chinese planners and supervise investments in the field. At the peak of the Sino-Soviet alliance, 20,000 experts were present in China (Zhang, 2001; Wang, 2003). Although Soviet experts were involved in all aspects of central planning, in particular during the First Five-Year Plan, their presence was crucial for the "156" program. They were responsible for the design and construction of the plants, and they trained Chinese cadres and workers to run the factories and operate and maintain equipment. To ensure the sustainability of the program, 80,000 Chinese students were sent to Soviet universities and technological institutes, with the perspective of a position in one of the plants upon return.

Economic cooperation involved technology and financial transfers. The equipment supplied by the U.S.S.R. was among the most advanced at the time (Lardy, 1987).[3] For instance, blueprints and technical documents for production were shared with Chinese engineers free of charge,[4] allowing China to gradually absorb and adapt Soviet technologies (Xiao, 2014). In the agreements that created the "156" program, the Soviet Union committed to carrying out all the design work, from choosing the sites to implementing the design, providing the required equipment and supervising construction, as well as overseeing new product manufacturing and training ordinary workers, technicians, and all necessary cadres.[5]

The financial resources provided to China by the U.S.S.R. mostly consisted of loans. During his first visit to the U.S.S.R., Chairman Mao negotiated a \$300,000,000 loan (in 1955 prices, corresponding to \$2.9 billion in 2020 prices) at the preferential rate of 1% per annum, which financed part of the "156" program. China was also to reimburse the Soviet Union for the construction of the plants by providing 160,000 tons of tungsten concentrate, 110,000 tons of tin, 35,000 tons of molybdenum concentrate, 30,000 tons of antimony, 90,000 tons of rubber, and other produce including wool, rice, or tea. Some low-skilled workers were also sent to Siberia. Besides loans, Soviet cooperation did however involve an aid component. Technological cooperation implied free transfers of blueprints and documents, the monetary value of which should not be downplayed. The U.S.S.R. also granted China product manufacturing patents that alone represented a value of about 3–3.5 million roubles (Dong, 1999).

[3]The last 15 projects agreed on in 1954 as part of the "156" program benefited from state-of-the-art equipment that few Soviet factories enjoyed (Goncharenko, 2002).

[4]See "Agreement on aid from the U.S.S.R. government to the P.R.C. government to develop the Chinese national economy" (May 15, 1953).

[5]The U.S.S.R. provided between 50% and 70% of the value of the equipment necessary to build the plants (Dong, 1999). The remainder could be produced locally and was not covered by the cooperation.

A.2 The Million-Rouble plants

Chronology The "156" program was decided through three agreements. The first 50 plants were negotiated during Chairman Mao's first visit to the U.S.S.R. (Winter 1949/50). On May 15, 1953, Li Fuchun and Anastas Mikoyan signed the "Agreement on aid from the U.S.S.R. government to the P.R.C. government to develop the Chinese national economy." The parties agreed on building 91 additional industrial projects, and the 141 plants were supposed to be built between 1953 and 1959. In October 1954, Khrushchev visited Beijing and signed with his Chinese counterpart a protocol to build 15 additional industrial plants, completing the Soviet-sponsored "156" program. A total of 149 plants were complete and operational by 1960 (Dong and Wu, 2004). Because 156 projects had initially been touted, speeches and reports continued to refer to the "156" program.

Table A1. The 156 Million-Rouble plants—sector, average construction period, and initial investment.

		Construction		Investment	
Sector	Number	Start	End	Planned	Actual
Aviation	11	1953.9	1957.5	7,680	8,002
Chemical	7	1955.3	1958.4	15,292	15,475
Coal	25	1954.3	1958.5	5,323	5,832
Electronic	10	1955.5	1957.9	5,661	4,752
Iron and steel	7	1953.9	1959.0	78,361	80,906
Machinery	23	1954.8	1958.2	9,972	10,336
Nonferrous metals	13	1955.2	1959.0	15,018	15,451
Powerplants	23	1954.0	1958.0	13,040	9,023
Weapons	16	1955.1	1958.4	13,533	12,262
Other	12	1955.3	1959.3	11,752	12,513

Notes: This table reports the number of MRPs by sector, their average construction start and end times, and their average planned and actual investments in 10,000 yuan. The average planned investment by factory was about 130,000,000 yuan, which amounts to 20,000,000 Soviet roubles in 1957 (or $160,000,000 in 2010 U.S. dollars). *Other* industries are shipbuilding, pharmaceutical and paper-making industries.

Characteristics of the plants The industrial cooperation spanned a wide range of sectors (including aircraft, machinery, electronic industry, and weapons), which gave priority to heavy industry. Table A1 summarizes the distribution of the plants by industrial sector. A majority of plants operate in the heavy, extractive, and energy sectors. China had the experience and capacity to build most light-industry factories, so that Soviet cooperation concentrated on sectors and tasks that China lacked the skills and wherewithal to develop (see Giorcelli and Li, 2022). Military-related industries made up a fifth of the plants, reflecting geopolitical concerns.

The MRPs brought about a large technological shift. The sheer size of the investments and their focus on industry was meant to transform China from a subsistence-farming to an industrial economy. The average plant constituted an investment of about 130,000,000

Figure A1. Contemporary view of the Luoyang Truck Factory.

Note: This figure reproduces a contemporary view of the Luoyang Truck Factory, now YTO Group Corporation. In the foreground, we can see the buildings of the Luoyang Truck Factory, constructed as part of the "156" program. Source: YTO Group Corporation website [http://www.yituo.com.cn/; accessed September 11, 2018].

yuan or 20,000,000 Soviet roubles in 1957, which is the equivalent of $160,000,000 in 2010 U.S. dollars. Some plants "produced many new products that China had never produced in history" (Li, 1955a), e.g., the Luoyang Truck Factory, which produced China's first truck (see Figure A1 for a view of what is now YTO Group Corporation).

Location decisions One of the main tasks of the Soviet experts was to help determine the optimal location for the plants (Li, 1955b). Bo Yibo, a prominent leader personally involved in the design of the "156" program, outlines four main criteria guiding the location decision process (Bo, 1991). [C1] Plants had to be built close to natural resources to reduce transportation costs and avoid waste. [C2] Places easily accessible through the road and railway network should be favored, so as to reach down- and upstream firms and end-consumer markets at a lower cost. [C3] Regions with no pre-existing industrial base would be given priority. [C4] Conditional on meeting these first criteria, the MRPs were to be built out of the reach of U.S. and Taiwanese bombers. The first two criteria [C1, C2] were meant to select optimal locations from an economic point of view. Numerous Soviet textbooks on factory location choice were translated and adapted in 1950s China, and the text of the First Five-Year Plan contains a whole section on rational plant location based on geography. A Russian-Chinese thesaurus with a special focus on factory location choice was also published. Soviet plant location textbooks emphasized the importance of pre-selecting several locations, comparing them based on a list of objective criteria, and making field trips to the short-listed sites. Among the main criteria were easy access to natural resources, transportation network, and market access [C1, C2]; the third criterion [C3] does not appear as a goal in its own right in other sources. This third criterion [C3] is however a common feature of place-based policies, as policy makers are often willing to correct perceived inequalities in the spatial distribution of economic activity, and a significant share of the MRPs were indeed built in previously agrarian regions. For this reason, our strategy will exploit: the first three criteria [C1, C2, C3] to select candidate locations; and the fourth one [C4] to extract exogenous variation in the allocation of plants.

The role of vulnerability to aerial attacks Soviet experts recommended that priority be given to expanding existing plants to minimize costs. Stalin expressed this idea himself in a 1952 conversation with Zhou Enlai, although he also advised the Chinese to build *new* plants, in particular defense industry factories, far away from the coast and borders, a lesson the U.S.S.R. had bitterly learnt in World War II. Chairman Mao was apparently responsible for making military security a major tenet of the "156" program (Xia, 2008).[6] An example of the attention paid to military security is the Rehe Vanadium and Titanium Factory, originally located at Nü'erhe, near Jinzhou, Liaoning province. On May 16, 1955, the Heavy Industry Department issued a report arguing that this location, about 10 kilometers from the Gulf of Bohai, did not follow closely enough the "not building, not expanding in coastal areas" principle. They instead recommended that Soviet experts reconsider the site, and the plant was eventually built in Shuangtashan, 100 kilometers away from the sea (Chinese Academy of Social Sciences and State Archives Administration, 1998). Most MRPs were constructed along this "Second Front."

In 1953, Chinese aviation was non-existent, which explains the importance of Soviet military protection.[7] The People's Liberation Army only developed aviation thanks to Soviet support and because of the pressing needs of the Korean War. Han Decai, one of its pioneer pilots and later vice-commander of the Nanjing Air Command, recalled that "when Chairman Mao declared that China would join the Korean War, the Chinese air force did not have one operational unit that could [be] put into the air" (Bergin, 2013). Even after the Korean War, China's air force was recognized as woefully inadequate, and radar technology provided little help. Yang Guoxiang, another of China's first pilots interviewed by Bergin, and later chief pilot of China's first indigenous aircraft, recounts that "many of the aircraft the Soviets had given [to the Chinese after the Korean War] were abandoned because of the short life [remaining on] their engines." The Chinese government would thus shelter the brand new "156" plants close to allied air bases. The

[6]"Minutes of Conversation between I.V. Stalin and Zhou Enlai," September 03, 1952, History and Public Policy Program Digital Archive, APRF, f. 45, op. 1, d. 329, ll. 75-87. Translated by Danny Rozas. Available at `http://digitalarchive.wilsoncenter.org/document/111242` [Accessed May 9, 2025]. The concern with enemy attacks of the new plants can also be seen from the pages of the *Russian–Chinese Technical Thesaurus: with reference to factory location choice* (1954): "Shelter, air-raid dugout" unexpectedly features among the characteristics that a factory must have.

[7]Whatever was left from World War II was either taken to Taiwan or sabotaged by the Nationalists before their exile. Chongqing's Baishiyi airfield, for instance, fell victim to such scorched-earth policy and could not be used between 1949 and 1959, when it was eventually rebuilt.

1950 Treaty of Friendship and Alliance indeed assured them that the Soviet Union would defend China in case of foreign aggression. Bo, who was personally involved in plant location decisions, reports that senior military officials took part in the deliberations: "when examining plant locations, [they] would place plant sites on a map", along with all U.S. bases in Taiwan, South Korea and Japan, to determine "which types of American planes could attack which sites" (Bo, 1991).

A.3 Evolution of the plants and later place-based policies

This paper studies the effect of the MRPs over the long run; it is thus critical to understand what they became after the end of the First Five-Year Plan (1953–1957).

End of the First Plan The Sino-Soviet cooperation survived beyond the First Five-Year Plan: 102 of the "156"-program plants became operational during the Second Five-Year Plan, not so much due to delays as to the original agreements between Beijing and Moscow. Two similar agreements were signed on August 8, 1958 and February 7, 1959 to expand Sino-Soviet cooperation and build 125 additional large plants, which were to be built during the Second and Third Five-Year Plans (98 of these projects were sufficiently advanced for site selection). The 1960 split however curtailed this second wave of investments. The MRPs constitute the only large-scale industrialization program carried out in China thanks to Soviet cooperation.

However, some of the Second Five-Year Plan factories could be completed before or shortly after the Sino-Soviet split. The spirit of the "156" program and subsequent Sino-Soviet cooperation was indeed that the U.S.S.R. would provide financial and technical support only where China's capabilities were wanting. As China had built capabilities during the 1950s, the new 125 plants that were planned in the Second Five-Year Plan were logically less intensive in Soviet inputs.

Sino-Soviet split Sino-Soviet relations were strained in the late 1950s by rapid ideological divergence. After Stalin's death, ideological and political tensions started to rise with Khrushchev's condemnation of his predecessor's crimes in 1956 and his policy of "peaceful coexistence with the West." As China kept encouraging a Stalin-like cult of Mao's personality and pursued an aggressive foreign policy, the normalization of the Soviet regime and prospect of *détente* between the two superpowers could only worry Chinese leaders.

The Sino-Soviet split materialized in 1960 when Soviet experts and Chinese students were suddenly repatriated. Incomplete projects that were not viable were abandoned, while future investments were canceled. Six of the MRPs were not operational and could not be completed without Soviet support and were closed. Viable investments were, however, maintained, and our archival research shows that they still benefited from investments of state-of-the-art technologies. Some of the largest MRPs, like Angang, indeed published their own gazetteers, where investments along with monetary values are recorded year after year. Just after the Sino-Soviet split, in the period 1963–1965, Angang invested 248 million yuan in capital construction, followed by 1,383 million in 1966–1975. Such investments were made possible by China's growing industrial capacity, but also by frontier technology imports from Eastern European countries, with some of which China maintained friendly relations throughout the period, and from Western countries after the thaw in diplomatic relations with China in the second half of the 1960s and in the 1970s.

The split did however induce a dramatic shift in China's alliances and conception of national security. The sites that had been carefully selected because they could benefit from Soviet or North Korean protection now appeared vulnerable. Subsequently, Mao launched in 1964 the "Third Front Movement" (*Sanxian jianshe*), a new wave of industrial investments (mostly in heavy industry) directed at remote inland areas.

Third Front Movement The Third Front Movement, which covers the period 1964–1980, is notorious for the costly moving of plants and workers, from sensible locations to places "close to mountains, dispersed, and hidden" (*kaoshan, fensan, yinbi*). Such spectacular moves were however the exception rather than the norm: they were to be restricted to strategic military industries, remain exceptional, and not be carried out on a large scale.[8] "First Front" industries (on the coast and in major cities) would be affected, as they were deemed the most vulnerable to foreign attacks. The motto for the recently built "Second Front" industries, to which the MRPs belonged, was however to continue developing them as previously planned. Only three plants built under the "156" program were entirely or partly moved. A first check of the robustness of the rise and fall pattern observed in the paper is to exclude these displaced investments (see Appendix Table D4, Panel B). In this exercise, we also exclude 15 MRPs that closed down during the reform era; almost all of them operated in the extractive sector and went into liquidation because of the depletion of the natural resource they exploited.

A concern with the Third Front Movement is that, although Second Front industries, and the "156" plants in particular, were largely unaffected, massive investments were directed toward other provinces, which may have hurt the economic environment of the MRPs. To check whether Third Front investments diverted resources away from the treated counties and explain their decline in the second period, we use the list of

[8] *Comrade Fuchun's summary report to the National Planning Meeting*, October 20, 1964.

Third Front provinces from Fan and Zou (2021). Table D4, Panel A, controls for concurrent policies and includes an indicator variable equal to 1 if a county belongs to such a province and 0 otherwise. We find that this control does not alter the results.

The Third Front Movement and "156" program both incorporated military imperatives in plant location decisions, but they were designed in different geopolitical situations. We show the induced variation in vulnerability in Figure 2, and we condition for the later vulnerability in our baseline specification.[9]

Cultural Revolution A few years after the MRPs construction, Mao launched the "Great Proletarian Cultural Revolution." This movement, which officially lasted between 1966 and 1976, triggered a period of political turmoil that mostly affected urban areas and large enterprises. Industry valued added dropped from 44.6 to 12.6 million Chinese yuan (in constant 1990 prices) between 1966 and 1967, and it would not recover until 1980 (Dong and Wu, 2004). Because they were more industrialized, the counties treated under the "156" program may have suffered disproportionately from the Cultural Revolution, and the disorganization of production may have affected their trajectory beyond 1976, leading to the rise-and-fall pattern that we observe.

To control for the effect of the Cultural Revolution, we use data collected from 2,213 local annals (*difang zhi*)—see Walder (2014). Information about the number of "casualties" from the Cultural Revolution was culled from the historical narratives included in the annals. "Casualties" can be divided into two categories: the number of "unnatural deaths" and number of "victims," which may refer to any type of political persecution from expulsion to public beatings. Because the county annals were encouraged but not required to publish any figures about Cultural Revolution violence, assumptions need to be made to deal with missing information. We follow Walder (2014) and code missing values as 0 even if the narrative does refer to casualties but without stating a figure.[10] Appendix Table D4, Panel A, uses the casualties data to condition for Cultural Revolution violence. Including these controls does not alter the results; the disruption created by the Cultural Revolution does not explain the decline of treated counties.

Economic reforms The transition from central planning to a more market-oriented economy may have dealt a severe blow to the state-owned "156" plants.

[9]In panel B of Figure 2, we measure vulnerability in 1964, at the onset of the Third Front Movement. The effects are similar if we control for a milder version of 1964 vulnerability, considering U.S.S.R. and North Korean air bases as neutral rather than as threats. We also find the same rise-and-pattern if we control for vulnerability to U.S. or Taiwanese bombings in 1990, i.e., following the collapse of the Soviet Union and using the locations of air bases in that year [results available upon request].

[10]Alternatively, we can (i) restrict the sample to counties with non-missing data, or replace missing values by (ii) the provincial average, (iii) the maximum in the province, or (iv) the minimum in the province. Results are not affected by these various imputation rules.

The MRPs weathered the economic regime change quite well. Only 15 plants closed down, and the decline of treated counties between 1982 and 2010 is not due to Million-Rouble plants going bust (see Appendix Table D4, Panel B). About a third of the "156" plants evolved into large, diversified industrial groups (*jituan*). Examples of such *jituan* include Ansteel, which evolved from the Anshan Iron and Steel Company and is now listed on the Shenzhen and Hong Kong Stock Exchanges. Figure A2 displays a picture of the main plant in 2016.

Figure A2. Entrance of the main Ansteel group plant in 2016.

Source: Ansteel Group Corporation (2016). Anshan Iron and Steel Company is an example of *jituan*, i.e., large, diversified industrial groups having evolved from the initial, more focused investment.

We further rely on the NBS above-scale survey (1998–2007) to shed light on the evolution of the MRPs—see Appendix A.4 for a description of the procedure followed to match plants with firms and a comparison of the MRPs with other firms in the same county. We find that (i) most plants are still active today (94 of the 125 MRPs that operated in the manufacturing sector could be identified) and (ii) they are much more productive than other above-scale firms (controlling for size; see Table A2 and the detailed discussion in Appendix A.4).

Another major feature of China's development since the 1980s is the creation of Special Economic Zones and various types of industrial parks. These may have attracted production factors because of the promise of superior returns despite treated counties being productive and still growing. To test for this factor, we use industrial parks data from Zheng et al. (2017). The data are at the prefecture level and provide us with the number of industrial parks extant in a prefecture at some point in five-year intervals, covering the period 1980–2005. Appendix Table D4, Panel A controls for the total number of industrial parks in the prefecture and shows that the results are robust to this place-based policy.

A.4 The Million-Rouble plants today

The rise-and-fall pattern experienced by treated counties might partly reflect the rise and the fall of MRPs themselves. Local economies may have thrived following the physical capital investments of the "156" program and then declined as this capital depreciated. Such a co-evolution of the MRPs and local economies could occur because of (i) the sheer size of MRPs in local economies and (ii) spillover effects.

In this appendix, we first present how we identify MRP descendants in firm-level data. Next, we investigate the size of MRP descendants in the local economy, and we compare their performance with other firms. Finally, we provide evidence on their relative dynamics to assess whether the MRPs might have dragged other firms down.

Definition of MRP descendants The Million-Rouble plants founded in the 1950s have evolved into large business groups (*jituan*) that span multiple establishments. In the paper, we *exclude* from all our baseline regressions the establishments that belong to the MRPs or their daughter firms. This allows us to abstract from firm boundaries and the division of labor between establishments within business groups, and thus to focus on the spillovers that the MRPs exert on their local economies.

We identify the "legal units" (*faren danwei*) descended from the "156"-program plants in the annual firm survey data described in Section 2. We combine manually collected information on the histories of the MRPs (relying on historians' works, our own archival research, and information from the Chinese search engine Baidu) with a fuzzy matching algorithm based on firm names, locations, industries, and other characteristics. More precisely, we first convert MRP names (both current and older names) into keywords, which allow us to identify potential descendants in the establishment-level data. We then manually identify *direct* descendants of the MRPs among that set of observations based on available historical information. We next use the fuzzy matching algorithm to categorize the remainder of establishments into *indirect* descendants and non-descendants. We finally check manually the quality of the matches.

This process allows us to match 117 of the 125 Million-Rouble plants operating in the manufacturing sector to at least one observation in the establishment-level data. The MRPs have on average 2.75 direct descendants and 34 indirect descendants. Despite the expansion of the MRPs into large business groups, MRP descendants remain geographically clustered: 100% (64%), 96% (58%), and 66% (27%) of (in)direct MRP descendants operate in the same province, prefecture, or county, respectively, as the original "156"-program investment.

Table A2. Share of the Million-Rouble plants in local economies.

MRP descendants share (p.p)	Labor	Capital	Compensation	VA	Patents
Direct	0.779	0.991	1.019	0.425	2.276
Indirect	1.552	1.146	1.681	1.270	0.804
All	2.331	2.137	2.701	1.695	3.080
Observations	937	937	937	937	501

Notes: The sample consists of treated counties and covers the years in the period 1998–2007. For each variable, the table displays the shares of MRP descendants in the local economy. *Labor* is the total number of employees. *Capital* is the total amount of real capital. *Compensation* combines wages, housing subsidies, pension and medical insurance, and welfare payable. *VA* is total value added. *Patents* is the total number of patents registered by firms in a given year. Note that some county × year observations do not exhibit any patent registration or do not have firms with no missing values for the variables needed to compute markups; we exclude such observations from the calculation of shares.

Size and performance in the local economy We first assess the quantitative importance of the MRPs in their local economies. Table A2 relies on the identification of the MRPs in the "above-scale" firm data to compute the share of the MRPs in the economies of treated counties. Over the period 1998–2007, MRPs accounted for a moderate share of the economic activity in treated counties: They represented 2.33% of manufacturing employment, 2.14% of capital, 2.70% of the total wage bill, 1.70% of total value added, and 3.16% of patents (in that county × year). Table A2 shows that the MRPs do not account for a large share of the local economies; their effects must therefore come from the spillovers that they exert. Note that MRP descendants contribute *more* in terms of patents compared to their share of employment.

We next provide evidence of the size and performance of the MRPs relative to other firms in treated counties. In Table A3, we regress various outcomes on an indicator variable equal to 1 if the establishment is a descendant of a 156-program plant, and 0 otherwise. We distinguish between direct and indirect descendants in Panel A and B, respectively, and consider all descendants in Panel C. Table A3, Panel A shows that the direct descendants of MRPs are an order of magnitude larger than other establishments in the same county. They are also an order of magnitude above other firms in other respects—capital, return to labor, and innovation. Despite being 13 times as big, which expectedly lowers their TFP and innovation per capita, we see that they register 5-6 times as many patents as the average other establishment and that their lower TFP is partly due to higher competition.[11] This shows that Million-Rouble plants are unique firms in the industrial landscape of treated counties. To this day, they act as major innovation powerhouses and would be expected to exert large (positive) spillovers on their local

[11]Our outcomes of interest may be systematically correlated with firm size. Controlling for size, however, MRP descendants still exhibit significantly higher innovation than other establishments [results not reported].

economies.

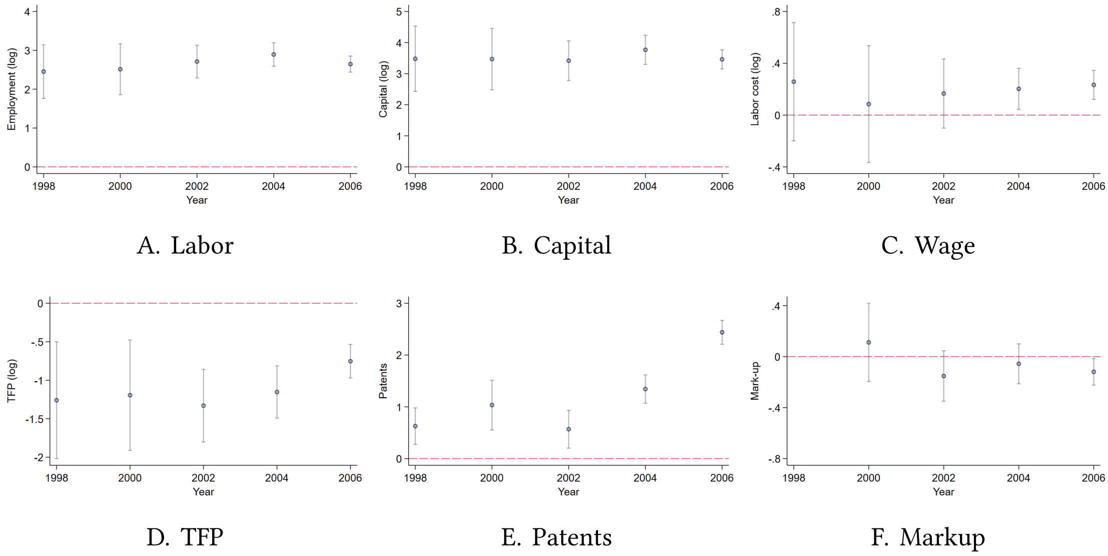
Table A3. MRP size and performance relative to other firms in treated counties.

	Labor (1)	Capital (2)	Wage (3)	TFP (4)	Patents (5)	Markup (6)
Panel A: Direct descendants						
MRP	2.633	3.400	0.402	-0.798	1.816	-0.163
	(0.157)	(0.175)	(0.090)	(0.098)	(0.332)	(0.061)
Obs.	139,307	139,307	139,307	139,307	139,307	87,533
Panel B: Indirect descendants						
MRP	0.473	0.266	0.149	-0.233	-0.050	-0.105
	(0.090)	(0.158)	(0.035)	(0.087)	(0.019)	(0.018)
Obs.	139,307	139,307	139,307	139,307	139,307	87,533
Panel C: All descendants						
MRP	0.701	0.594	0.176	-0.294	0.144	-0.112
	(0.097)	(0.177)	(0.034)	(0.091)	(0.049)	(0.015)
Obs.	139,307	139,307	139,307	139,307	139,307	87,533

Notes: Each cell is the outcome of a separate regression. Standard errors are clustered at the 2-digit industry level (reported between parentheses). The unit of observation is an establishment × year. The sample covers the period 1998–2007 and contains only treated counties. All specifications include county fixed effects and year fixed effects. In each Panel, the main independent variable is an indicator variable equal 1 if an establishment belongs to or is descended from a Million-Rouble plant (MRP); Panel A considers only direct descendants, Panel B considers only indirect descendants, and Panel C considers both. See the text for a detailed description of the identification of descendants. *Labor* is the logarithm of the number of workers; *Capital* is the logarithm of real capital; *Labor cost* is the logarithm of total compensation per employee; *TFP* is the logarithm of firm-specific total factor productivity as computed in Imbert et al. (2022); *Patents* is the number of patent applications registered by the firm; *Markup* is a dummy equal to one if the markup is above the median within a 4-digit industry × year cell, computed following De Loecker and Warzynski (2012)—see Appendix B. Note that some firms lack the information necessary to compute markups.

Panel B shows that indirect descendants of MRPs are markedly different both from direct descendants and from other establishments. Although they are significantly larger than other firms, they are much smaller than direct descendants. More importantly, indirect descendants are *less* likely to innovate than other, non-descendant establishments. This last result motivates our exclusion of both direct and indirect descendants from our baseline regressions: If MRPs restructured their production to concentrate innovation and high-value activities in core, flagship establishments, and devolved low-innovation, low-value activities to peripheral daughter firms, as the coefficient in Panel B, column 5 might suggest, including indirect descendants among non-MRP firms would bias our results toward finding the negative spillovers that we present in Section 3.

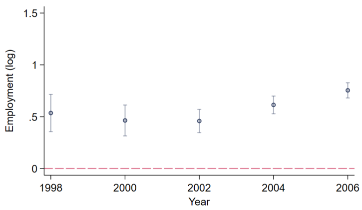
Figure A3. Dynamics of Million-Rouble plants—direct descendants.



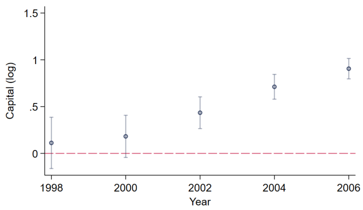
Notes: The sample consists of both treated and control counties and covers the years in the period 1998–2007. The unit of observation is an establishment × year. *Labor* is the logarithm of the number of workers; *Capital* is the logarithm of real capital; *Labor cost* is the logarithm of total compensation per employee; *TFP* is the logarithm of firm-specific total factor productivity as computed in Imbert et al. (2022); *Patents* is the number of patent applications registered by the firm; *Markup* is a dummy equal to one if the markup is above-median within a 4-digit industry × year cell, computed following De Loecker and Warzynski (2012)—see Appendix B; this variable is not available for 1998. The independent variable is an indicator variable equal 1 if an establishment belongs to or is directly descended from a Million-Rouble plant (MRP)—see the text for details. All regressions include 2-digit industry fixed effects.

The dynamics of MRPs We finally investigate the dynamics of MRP descendants. We first compare direct MRP descendants with other establishments to assess their relative size and performance over time (Figure A3). More precisely, we restrict the sample to consecutive years (e.g., 1998 and 1999), regress outcomes of interest on an indicator variable equal to 1 for direct MRP descendants and 0 otherwise, and report the coefficients and 95% confidence intervals associated with the MRP dummy against time. All regressions include 2-digit industry fixed effects, and we include establishments from both treated and control counties to avoid mechanically inflating MRP performance by comparing them to the weaker firms in their own counties—see Section 3. We observe again that MRPs are an order of magnitude larger than other firms, both in terms of employment and capital. Employment and capital remain relatively stable over time (Panels A and B). The average compensation per worker appears to be higher within direct MRP descendants than in other establishments and exhibits a slight upward trajectory (Panel C). TFP is significantly lower in direct descendants throughout the period but experiences, if anything, an increasing trend (Panel D). The dynamics in terms of the number of patents registered is the most striking (Panel E): in the late 1990s, when patent registration was still in its infancy in China, MRPs were already ahead of other firms in terms of patent registration, and they have kept diverging from the rest over the period 1998–2007. Conversely, they do not differ from other firms in terms of markup (Panel F).

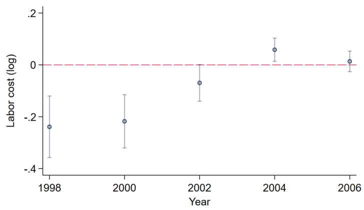
Figure A4. Dynamics of Million-Rouble plants—all descendants.



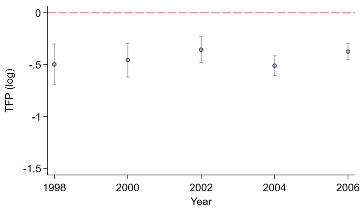
A. Labor



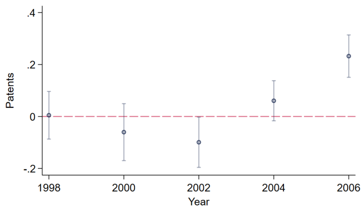
B. Capital



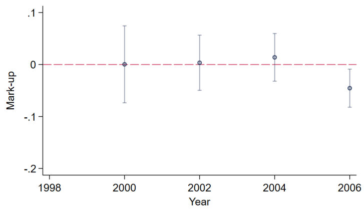
C. Wage



D. TFP



E. Patents



F. Markup

Notes: The sample consists of both treated and control counties and covers the years in the period 1998–2007. The unit of observation is an establishment × year. *Labor* is the logarithm of the number of workers; *Capital* is the logarithm of real capital; *Labor cost* is the logarithm of total compensation per employee; *TFP* is the logarithm of firm-specific total factor productivity as computed in Imbert et al. (2022); *Patents* is the number of patent applications registered by the firm; *Markup* is a dummy equal to one if the markup is above-median within a 4-digit industry × year cell, computed following De Loecker and Warzynski (2012)—see Appendix B; this variable is not available for 1998. The independent variable is an indicator variable equal 1 if an establishment belongs to or is (directly or indirectly) descended from a Million-Rouble plant (MRP)—see the text for details. All regressions include 2-digit industry fixed effects.

We then compare all MRP descendants with other establishments in Figure A4. The ascending pattern visible for direct descendants is even more obvious when all MRP descendants (both direct and indirect) are considered. The establishments descended from "156"-program plants are growing in terms of employment, capital, wages, and patent registrations. TFP is still lower, although it exhibits a rising trend in later years. There is no clear pattern as far as markups are concerned.

Million-Rouble plants are thus highly innovative and dynamic firms. Set against the findings of Section 3, the results presented in this appendix offer a stark contrast to other firms in their counties, which are less productive, less innovative, and less competitive than firms in ex-ante comparable control counties.

B Data description

This section first provides information about the construction of the MRP data from archives and secondary sources (B.1). We next present data sources used to create the vulnerability measure that serves as instrument (B.2). We then move on to county-level variables (B.3). We finally describe our firm data, the construction of productivity measures, patents, and mark-ups (B.4, B.5, B.6).

B.1 Construction of the MRP data from archives and secondary sources

The MRP data consist of archival and secondary sources and allow us to fulfill two objectives: (i) determine the treatment status of each county, and (ii) define MRP characteristics used in heterogeneity analyses. Primary sources also provide us with important contextual information, e.g., on the siting decision process, which we confirm with Bo Yibo's memoirs (Bo, 1991)—see Section A.2.

Objective (i) crucially relies on the location of the plants and their listing under the 156 program. We obtain this information from archival documents that list the MRPs' names, locations, planned investments, and original sectors of activity. These documents include the original texts of the First Five-Year Plan (FYP) and of the various agreements signed by Beijing and Moscow that led to the 156 program (see Section A.2) and to the subsequent 2nd-FYP projects that we use in a robustness check (see Section D); these agreements can be found in the Chinese Academy of Social Sciences and State Archives Administration (1998, 2011). As some actual locations may deviate slightly from the initial plan, we confirm the information from the archives with sector- or MRP-specific gazetteers, the websites of MRPs' descendant firms, articles found on Zhiwang (the Chinese Google Scholar), or Baidu Baike (Chinese equivalent of Wikipedia), as well as with Dong (1999) and Dong and Wu (2004). Importantly, we found few disagreements between primary and secondary sources; differences mostly come from imprecisions at the planning stage. Out of the 150 factories that were agreed on as part of the 156 program, only one could not be located, so that we use 149 MRPs in our analysis.

Objective (ii) requires us to obtain information on how the 156 program was carried out, beyond what was initially planned, to capture for instance the duration of the construction period or whether the plant was later closed. Such information is best found outside of archives, in sector- or MRP-specific gazetteers and MRPs' websites, as well as in secondary sources like Dong (1999) and Dong and Wu (2004). Objective (ii) also covers the task of tracking MRP descendants in the firm survey data; this task, which involved a combination of hand-collected data with a fuzzy matching algorithm is described in Appendix A.3.

B.2 Flying cost and vulnerability instrument

The instrumental variable in our baseline TSLS specification is based on the construction of flying costs for American and Taiwanese bombers to each mainland Chinese county in 1953 (we proceed similarly for 1964 and 1972), and relies on the following data sources.[12]

First, we established lists of U.S. (including in Taiwan), North Korean, and Soviet airbases that contained geocoordinates as well as opening and closing dates, allowing us to geolocate airbases that were active at the time. To establish the lists, we relied on information from Wikipedia, the official websites of the U.S. Air Force and Republic of China Air Force, and GlobalSecurity.org.

Second, we extracted information from declassified CIA files to parameterize the cost surface for Soviet (or North Korean) and U.S. (or Taiwanese) interceptor aircrafts based on their combat ranges (CIA, 1952). We complement this information with technical data on the different makes of fighter jets used at the time, from Aviation-History.com and the website of the Boeing company.

B.3 County-level outcomes and control variables

This section provides details about the county-level data. We first describe the data sources of outcome variables, then move on to matching variables and controls used in our baseline specification, and finally list additional data sources used only in robustness checks or Appendix exhibits.

Outcomes Our main outcomes of interest in the county-level analysis are population and GDP per capita, both measured in 1982 and 2010. Population is obtained from the 1982 and 2010 Population Censuses. The GDP data are extracted from the census shapefiles for 1982 and from the University of Michigan's China Data Center for 2010; both sources rely on County Gazetteers. Additional outcomes of interest are computed from the censuses: *Urban reg.* is the share of the population that has a non-agricultural household registration (*hukou*), and *Share industry* is the industrial employment share, both aggregated up to the county level from individual-level data.

In Section 4.2, we further study the effect of the treatment on entrepreneurs and emigrants, from the 2015 1% Population Survey, and on various outcomes (unemployed, entrepreneur, manager, emigrant, emigrant manager) for college-educated individuals of working age, from the 2005 1% Population Survey.

Appendix exhibits study additional outcomes, such as: labor force participation, the illiteracy rate, and the male-to-female ratio from the 1982 Population Census; employ-

[12] A more detailed description of the construction of the instrument can be found in Appendix C.2.

ment shares in agriculture, industry, and services from the 1982 and 2010 Population Censuses; county-level government expenditures, revenues, and savings in 2010 from the China Data Center; the unemployment rate, share of emigrants among managers, share of college-educated, share of public employees (i.e., working in a government, health, or education job), share working in the hospitality sector, and share working as professionals in engineering, accounting, or finance, from the 2005 1% Population Survey, which contains information on both place of residence and place of household registration crucial to study migration; and variables on values and aspirations extracted from the China Family Panel Studies (CFPS) 2010 survey.

Please note that each observation is identified by a county code in these data, and the code corresponds to the administrative borders of the corresponding year. As county (and prefecture) borders were redefined at various stages in China, our analysis nests all outcomes at the level of 2010 counties. This procedure requires area-based inference, described in the text, and relies on yearly county maps between 1949 and 2015 from the China Data Center.

Matching variables and baseline controls We rely on various GIS data sources to create (i) the variables used in the propensity score matching procedure and (ii) additional controls. These variables are: (i) travel cost to the provincial capital (i.e., to the centroids of the prefectures where the provincial capitals were located in 1953),[13] population in 1953 (from the 1953 Population Census), county area (from the 2010 county map obtained from the China Data Center), travel costs to coal mines, coke mines, and ore deposits (all from USGS shapefiles), and (ii) travel cost to major ports (through the river network, also from USGS shapefiles), and penalized flying cost to enemy airfields in 1964 (see Appendix B.2). All these variables are in logarithm and recast to match county boundaries in 2010, as for outcome variables. The travel cost variables are created by a least-cost path algorithm that uses a parametrization of the cost surface based on Fogel (1964) and Glaeser and Kohlhase (2004). Further details about the construction of the matching variables and controls are available in Appendix C.1 and Table C1.

Additional data In this Appendix, we introduce different controls to check the robustness of the results to potential correlations between vulnerability to enemy airstrikes and: (i) first- or second-nature characteristics affecting their economic development at later stages, and (ii) later policies that influenced their growth in the later period. Further variables are needed to: (iii) investigate alternative mechanisms, and (iv) devise alternative matching strategies.

[13] We extracted the locations of provincial capitals in 1953 from Wikipedia.

Controls for (i) consist of: elevation (minimum, mean, and maximum), ruggedness (or average slope in the county), potential—GAEZ model-based—crop yield, actual grain output in 2010 from county gazetteers, land supply constraints measured as the share of non-developable land as induced by local geography around city borders (following Imbert et al., 2023), (log) distance to railways and distance to highways in 2010 (Baum-Snow et al., 2017), and land-form characteristics from the SOTER database, reduction in trade uncertainty following China's accession to the World Trade Organization in 2002 (following Pierce and Schott, 2016), distances to Chinese cities in 1900 (from China Historical GIS, CHGIS), to the coast, to military airfields (information on People's Liberation Army Air Force airbases was obtained from Wikipedia), and to Ming-dynasty courier stations (Berman and Zhang, 2017). The travel cost variables are created by a least-cost path algorithm that uses a parametrization of the cost surface based on Fogel (1964) and Glaeser and Kohlhase (2004). The distance variables use as-the-crow-flies planar distance. Further details about a subset of these controls are available in Appendix C.1 and Table C1.

Controls for (ii) consist of: exposure to the Great Famine (measured by the standardized cohort loss estimated from a 1% sample of the 1990 Population Census, following the procedure of Meng et al., 2015, and using the 1953 Census population as the denominator); exposure to the Cultural Revolution (the share of the population who fell victim to the Cultural Revolution, extracted from County Gazetteers by Walder and Su, 2003, see Appendix A.3 for further details about the data and variable construction); exposure to the Third Front Movement (an indicator variable equal to 1 if the county is located in a Third-Front province and 0 otherwise, see Fan and Zou, 2021); exposure to the 2nd Five-Year-Plan plants, which we hand-collected and geolocated based on archival documents (see Appendix B.1); and Special Economic Zones, measured by the number of industrial parks created in the county between 1980–2005 (see Zheng et al., 2017) per 10,000 inhabitants (using population from the 1953 Census).

Controls (iii) consist of: the share of SOEs in the number of "above-scale" industrial firms in 1994 (from the *City Statistical Yearbooks*), land prices (residential, industrial, commercial) from the registry of auctioned land (1998–2018); housing characteristics (share of homeless people, share of residents in dorms, share of the population living in dwellings constructed before 1990, share of subsidized housing, i.e., the share of the population renting at a lower than market rate or who purchased affordable housing or former public housing) from the 2015 1% Population Survey; pollution (average NO2, PM10, PM2.5 concentration in 2014, the earliest year available) from the China National Environmental Monitoring Center (CNEMC); average commute time from the 2015 1% Population Survey; shares of workers covered by social insurance and medical insurance from the 2015 1% Population Survey; share of public establishment and average ratio of entertainment costs to revenue from the NBS survey (1998–2007); shares of residents with a high-school degree and with a college degree from the 2015 1% Population Survey; and values (coded from 1 to 5: "Hard work is critical for success," "Connection is critical for success," "Network is more important than ability," "Important to become rich," "Inequality is desirable," and "Fair competition is necessary for harmony") and pre- and post-Revolution elites (the percentage of Communist Party members, the percentage of pre-Revolution elites, i.e., individuals whose households were labeled as "landlords," "rich peasants", "capitalists," or "enterprise owners" at the time of the Communist Revolution, and the percentage of post-Revolution elites, i.e., individuals from households with at least one Communist Party member in the 1940–1965 birth cohorts—see Alesina et al., 2021) from the China Family Panel Survey (CFPS).

Variables (iv) consist of: industrial output in 1949 and in 1952, measured by gross value of industrial output at the provincial level (apportioned between counties according to land area, from Field et al., 1975),[14] and total industrial capital over the period 1840–1937 (Du, 2014, 2019).

Finally, Appendix C.1 mobilizes a Railroad Map of China (1948, Joint Intelligence Committee), and Appendix C.2 uses declassified CIA files to map the paths of the surveillance flights carried out by Taiwanese pilots between 1963 and 1965.

B.4 Firm data description, product codes, and measures of concentration

This section provides a quick description of the firm survey, describes how we associate a product code to each firm in every year, and details how we produce measures of concentration.

Firm data description Our main analysis in Sections 3 and 4 relies on a survey of manufacturing firms conducted by the National Bureau of Statistics (NBS), which collects basic accounting information for state-owned manufacturing enterprises (SOEs) and for private manufacturing establishments. Reporting is mandatory for the former, and is conditional for the latter on annual sales: above RMB 5 million, private manufacturing establishments are expected to fill the survey (compliance is fairly high, as shown in Imbert et al., 2022). The available information includes: (i) all accounting variables—capital is reported at face value without accounting for depreciation, so that it requires adjustments, but the other variables are standard; (ii) size of the workforce; (iii) names and addresses of the establishment, which allows us to geo-locate it at the postcode level

[14]Data are missing for 8 out of 29 provinces in 1949 and for 2 out of 29 provinces in 1952. We impute missing values using data from other provinces in the same region.

and to link establishments over time (see Imbert et al., 2022, for a description of the linking procedure). The output is a standard survey of establishments, which covers the vast majority of the manufacturing production in China from 1998 to 2007.

One major issue with the survey—given the purpose of our analysis—is that every establishment reports a 4-digit industry code, but only reports a textual description of its products: there is a need to classify products in a more systematic way.

Product codes Manufacturing establishments report a textual description of up to three products, together with all the other accounting variables. This reporting process is not disciplined by the National Bureau of Statistic in any way. The descriptions do not include any code and do not follow any standards: how to describe the final product(s) is entirely up to the establishment manager (or to the establishment representative who is responsible for filling the survey). We rely on a systematic text analysis developed in Imbert et al. (2022) to exploit this undisciplined information and classify products in a similar fashion as in other, more standard establishment data (e.g., Bureau of Labor Statistics Micro-Data).

The procedure follows three steps. In the first step, we collect a standard product classification (the Harmonized Commodity Description and Coding Systems, HS), which comes with (i) a hierarchical code and (ii) a textual description in Chinese. We "tokenize" these descriptions, i.e., we transform both the latter description and the product information provided by establishment managers into lists of relevant words. This step produces two data sets: one containing lists of words that uniquely characterize a HS code at the 6-digit level; and one containing lists of words that summarize the product descriptions provided by establishments. In the second step, we project these sentences, or lists of words, using "word2vec" (Mikolov et al., 2013) trained on the Wikipedia corpus. The third step uses these projections across the two datasets to identify the closest HS code at the 6-digit level for each product description (typically based on a similarity score). The outcome of this three-step procedure is a list of the ten closest HS product categories at the 6-digit level and available for up to three product descriptions provided by each establishment in any given year. We describe next how we exploit this product information to identify possible linkages across establishments.

Measures of concentration The characterization of products in the NBS survey is key in identifying linkages across establishments and the concentration of production within Chinese counties. Consider two establishments (i, j) within a given county and let (p_i, p_j) denote their respective "best-matched" product codes. Assume that we can characterize the proximity between two establishments by a function of their products,

$\alpha(.,.)$, e.g., capturing whether they operate along the same production chain or whether they use similar technologies. The quantity $\alpha(p_i, p_j)$ thus represents the proximity between the previous two establishments.

To construct a measure of product concentration at the county level, we build upon the previous measures and aggregate employment (a measure of firm size) across product categories: $\alpha(p,q)$ represents the proximity between products p and q which needs to be weighted by their respective output shares, s_p and s_q. A measure of concentration is thus,

$$h = \sum_{p,q} \alpha(p,q) s_p s_q.$$

This measure can be best understood as an Herfindahl index. Indeed, let the vector $\mathbf{S} = \left(s_p\right)_p$ denote the output shares in each HS 6-digit product category and the symmetric square matrix $\mathbf{M} = (\alpha(p,q))_{p,q}$ represent the bilateral proximity between product codes. The previous measure can be written as,

$$h_i(\mathbf{M}) = \mathbf{S}_i' \mathbf{M} \mathbf{S}_i.$$

The standard Herfindahl index is typically represented by a matrix $\mathbf{M}$ equal to the identity matrix, $\mathbf{I}$: a pair of establishments is linked if and only if they operate in the same product market. We create other measures of concentration by considering different matrices $\mathbf{M}$ and functions $\alpha(.,.)$. More specifically,

- we consider $\alpha(p,q)$ as the input share of product p into product q to construct a measure of "production-chain" IO concentration;
- we consider $\alpha(p,q)$ as the intensity of (cross-) patent citations in the United States between product codes p and q (Bloom et al., 2013) to construct a measure of "technology" concentration;
- we consider $\alpha(p,q)$ as the language proximity between product codes p and q to construct a measure of "product similarity" concentration, which could better incorporate similarities as induced by the demand side.

We use these measures $h(\mathbf{M})$ in Section 4.1 and Appendix E.4 to better characterize the concentration of economic activity in treated counties, and we directly use the different functions $\alpha(p,q)$ in Section 4 to identify establishments operating in product or technology markets close to MRP(s).

B.5 Measures of factor productivity

The measures of factor productivity used in Section 4 are taken from Imbert et al. (2022). The following discussion briefly describes the production model and its identification; the reader can refer to Imbert et al. (2022) for details of the implemented strategy.

Environment Consider establishments producing a differentiated variety of good using a CES production function with only two factors, labor and capital.

Let Y and P (resp. y_i and p_i) denote the aggregate output and prices within a product market (resp. for establishment i). We assume that there is monopolistic competition such that demand for the product variety i is,

$$\frac{y_i}{Y} = \left(\frac{p_i}{P}\right)^{-\sigma},$$

where σ captures the substitutability between product varieties. An establishment i produces along

$$y_i = A_i \left[\alpha k_i^\rho + \beta l_i^\rho\right]^{\frac{1}{\rho}},$$

where $(\alpha, \beta = 1-\alpha, \rho)$ capture factor intensities and factor complementarity. Wages and returns to capital are taken as given.

Estimation There are three important parameters, (σ, α, ρ), which characterize production at the sector level. These parameters can be identified as follows: (i) a factor cost shifter helps identify the degree of substitutability between factors (ρ), (ii) given the estimate for ρ, α and σ can be retrieved through the observation of aggregate factor shares and profits to revenues within a sector.

We briefly describe the first, crucial step of this procedure. Firm-specific relative factor demand verifies:[15]

$$\ln(k_i/l_i) = \frac{1}{1-\rho}\ln\left(\frac{\alpha}{1-\alpha}\right) + \frac{1}{1-\rho}\ln(w/r) + \varepsilon_i,$$

where ε_i is a noise, possibly capturing measurement error or firm-specific technology. The parameter ρ can be identified, in the previous equation, by leveraging exogenous

[15] One can combine the first-order conditions of the firms and show that the optimal factor use verifies:

$$\begin{cases} (1-1/\sigma)\dfrac{\alpha k_i^\rho}{\alpha k_i^\rho + \beta l_i^\rho} p_i y_i = r k_i \\ (1-1/\sigma)\dfrac{\beta l_i^\rho}{\alpha k_i^\rho + \beta l_i^\rho} p_i y_i = w l_i. \end{cases}$$

variation in relative factor prices across prefectures and across years in order to instrument the relative factor price. Imbert et al. (2022) rely on predicted immigration shocks, constructed from cropping patterns in rural hinterlands. These shocks are exogenous to factor demand in cities, including demand resulting from the presence of MRPs.

Once (σ, α, ρ) are estimated, the main firm-specific measure of productivity used in this paper, Total factor Productivity, is constructed using:

$$A_i = \frac{y_i}{\left[\hat{\alpha} k_i^{\hat{\rho}} + (1-\hat{\alpha}) l_i^{\hat{\rho}}\right]^{\frac{1}{\hat{\rho}}}}.$$

B.6 Registered patents and mark-ups

Patent applications The measures of patenting used in Sections 3 and 4 exploit the bridge constructed by He et al. (2018) to match firms with all patents submitted to the State Intellectual Property Office (SIPO).

There are three categories of patents submitted to SIPO. A patent can be categorized as "design"; this category mostly covers the external appearance of a product. A patent can be categorized as "innovation"; this category covers fundamental innovations either regarding the final product or the means of production. These patents offer significant protection but require to go through a long administrative process. A patent can be categorized as "utility" (utility model patent); this category covers changes in processing, shape, or structure of products. The latter category has no equivalent outside of China; it often acts as a cheap, fast way to protect an idea—possibly with the objective of registering an innovation patent in the longer run.

Measures of markups We measure markups at the firm level using the strategy developed in De Loecker and Warzynski (2012). Intuitively, the markup can be estimated by comparing the growth of a flexible production input to the subsequent growth in output. Consider an establishment i at time t. The establishment uses the following production technology:

$$y = f(x_1, \dots, x_N, k, A),$$

where $\{x_1, \dots, x_N\}$ are variable inputs, k is a dynamic input (i.e., capital) and A is a scalar Hicks-neutral (Total Factor) productivity term. The first-order conditions bring:

$$\varepsilon_i = \frac{\partial f(x_1, \dots, x_N, k, A)}{\partial x_i} \frac{x_i}{y} = \frac{p}{\lambda} \frac{p_i x_i}{py},$$

where ε_i is the output elasticity to variable input i and λ is the marginal cost of production at a given level of output. Consequently, we can define the markup $\mu \equiv \frac{p}{\lambda}$ and write

$$\mu = \varepsilon_i / \alpha_i,$$

where $\alpha_i = \frac{p_i x_i}{p y}$ is the share of expenditures on the variable input i.

We estimate the output elasticity to variable input i, using a control approach. This approach requires two assumptions on function f: (i) that the parameter A enters as a multiplicative term; and (ii) that there is a common set of technology parameters across producers. The estimation is described in De Loecker and Warzynski (2012), and proceeds in two steps. In a first step, we estimate output as a flexible function of inputs (labor, capital, and material). The residual of this estimation maps into the productivity term A. In a second step, we estimate the law of motion for productivity over time.

This procedure allows us to estimate the output elasticity to variable input i, which we transform into a markup by combining it with an estimate $\hat{\alpha}$ for the expenditure share α. This last correction replaces the output by the predicted output thereby cleaning for measurement error in the denominator of the expression for the markup μ.

C Complements to the empirical strategy

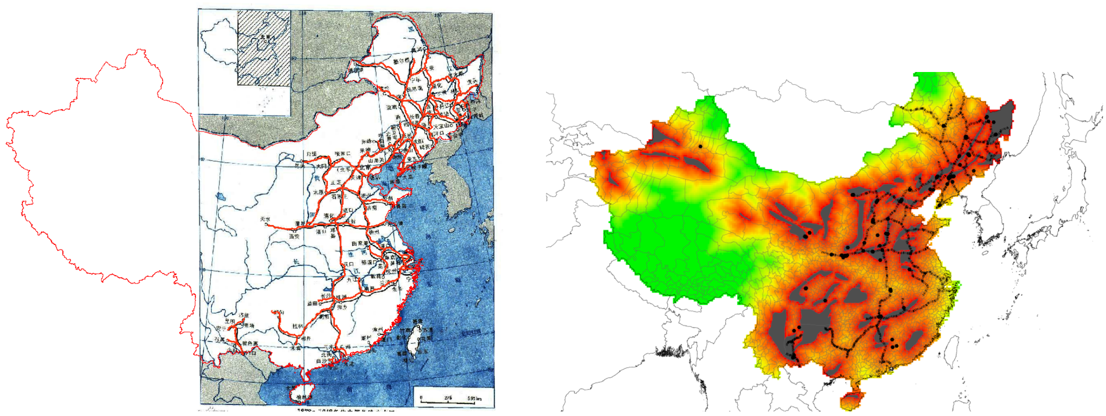
C.1 Matching procedure and complements to the baseline strategy

In this Appendix, we provide a detailed description of the matching procedure used to identify control counties. We first present the variables either used for matching or as controls, and describe how we construct them.[16] We then provide evidence of common support and the balance of covariates subsequent to matching.

Description of matching and control variables To emulate the planners' siting decisions and identify the control group, we need to construct measures of connectedness to the transportation network and of access to natural resources and markets.

First, we reproduce the transportation network in China at the time of the First Five-Year Plan using the existing railroad network in 1948 (see the left panel of Figure C1), and we construct a measure of proximity to a railroad hub to model connectedness.

Figure C1. Transport network in 1948 and access to natural resources.



A. Transport network in 1948. B. Travel cost to natural resources (coal).

Sources: The left panel is a Railroad Map of China (1948, Joint Intelligence Committee). Black lines are from the original source; red lines are inferred poly-lines using current geocoded railroad lines and cities. The right panel represents the minimum travel cost to coal-bearing areas using the railroad and road networks (red: low travel cost, green: high travel cost). Railroads and roads are geo-located from 1948 and 1962 maps, respectively. Factory locations are indicated with black dots, coal-bearing zones are highlighted with gray areas.

Second, we construct measures of access to raw materials used as inputs by the MRPs: coal, mostly, but also ore and coke deposits. We create a fine grid over China, allowing for different costs of crossing a cell depending on the means of transportation available. We derive the cost of transporting goods on roads by exploiting the road structure in 1962 and assuming the same cost ratio as Glaeser and Kohlhase (2004), who estimate

[16] These variables are listed in Table C1.

costs of 28 cents per ton mile for trucks and 3 cents per ton mile for rail in the United States at the end of the 20$^{\text{th}}$ century. The relative cost of transporting goods through cells that lie neither on a road nor on a railroad line is set at twice the transport cost by truck, which is approximately the average between the truck cost and the cost of transporting goods by wagon relative to train in Fogel (1964). Waterways are omitted from the cost-minimization procedure, as only 2.5% of total freight traffic was carried out by barges (Rong, 2012). We then calculate the minimum travel cost from the closest mineral field through the existing transportation network and collapse it at the county level. The spatial distribution of transport costs to coal fields is displayed in panel B of Figure C1.

Table C1. Description of matching and control variables—baseline specification (†) and selected robustness checks.

Variables	Description
Population	
Population (1953, †)	Total population of the county in the First Chinese Population Census (1953).
Access to resources	
Travel cost to coal mines (†)	Travel cost to coal mines following the road and railway network.
Travel cost to ore (†)	Travel cost to ore deposits following the road and railway network.
Travel cost to coke (†)	Travel cost to coke deposits following the road and railway network.
Industrial development	
Industrial firms (1840–1937, †)	Industrial firms over the period 1840–1937 (Du, 2014, 2019).
Industrial capital (1840–1937)	Total industrial capital over the period 1840–1937 (Du, 2014, 2019).
Industrial output (1949/52)	Total provincial industrial output in 1949/1952 (Field et al., 1975).
Topographic controls	
Slope (degrees)	Average slope in the county.
Elevation (meters)	Average/minimum/maximum elevation in the county (in meters).
Market access controls	
Travel cost to ports (†)	Minimum travel cost to a port following navigable waterways.
Travel cost to courier stations	Minimum travel cost to the closest Ming-dynasty courier station.
Travel cost to 1900 city	Minimum travel cost to the closest city as of 1900.
Travel cost to the coast	Minimum travel cost to the coast.
Travel cost to prov. capital (†)	Travel cost to the capital of the province.
Distance to railways	Distance to major railways in 2005.
Distance to high-speed rail.	Distance to high-speed railways in 2016.
Distance to highways	Distance to highways in 2010.
Geomorphic controls	
Lake plain	Share of the county's area that consists of lacustrine plains.
Sand hills	Share of the county's area that consists of sand hills.
Tidal marsh	Share of the county's area that consists of tidal marshes.
Agricultural controls	
Expected yield: rice	Average potential yield (kg/ha) of rice under the high-input scenario (GAEZ model-based).
Expected yield: wheat	Average potential yield (kg/ha) of wheat under the high-input scenario (GAEZ model-based).
Grain output	Actual county-level grain (maize, wheat, and rice) output in tonnes in 2010.
Other geographic controls	
Area (†)	Total land area of the county.
Distance to military airfields (†)	Minimum distance to a Chinese military airfield.
Land supply constraints	Share of non-developable land as induced by local geography around city borders in 2010.

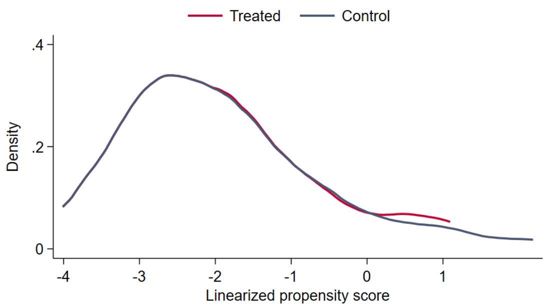
Third, we construct measures of access to markets. We start by mapping the locations of provincial capitals at the time of the First Five-Year Plan using Wikipedia and Baidu Baike. We then use the same cost surface as the one underlying our measures of access to raw materials and calculate the minimum travel cost from each county centroid to the closest provincial capital along the road and railway network.

Fourth, we further include as matching variables (log) county area, (log) population from the 1953 Census, and (log) number of industrial firms over the period 1840–1937 (Du, 2014, 2019).

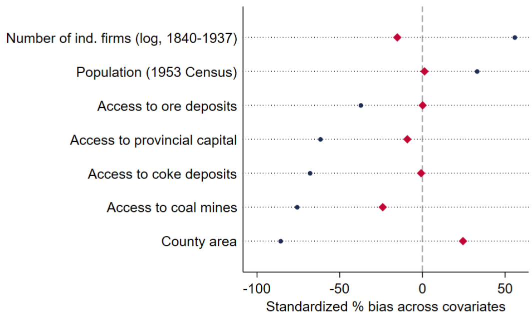
As our instrument for treatment under the "156" program may coincidentally correlate with the geography of later economic performance, we include in our baseline specification additional controls. These are (log) distance to military airfields and (log) travel cost to sea ports. The latter is defined, for each county, as the minimum cost distance to international sea ports (located using the World Port Index data) through the river network.

Common support, balance, and a visual illustration Figure C2 provides an illustration that the matching procedure described in Section 2 indeed: selects a set of control locations $C = \{c_1, \ldots, c_N\}$ with similar propensity to receive a Million-Rouble-Plant; and limits differences across the set of observable factors, $\mathbf{H}_i$, used in the matching process. Panel A shows the distribution of propensity scores in the group of treated counties and the control group; and Panel B shows the balance of matching variables used in the baseline strategy, $\mathbf{H}_i$, within the whole sample and within the selected sample of suitable counties $\{t_1, \ldots, t_N, c_1, \ldots, c_N\}$.

Figure C2. Matching and balance of covariates.



A. Common support (propensity score)

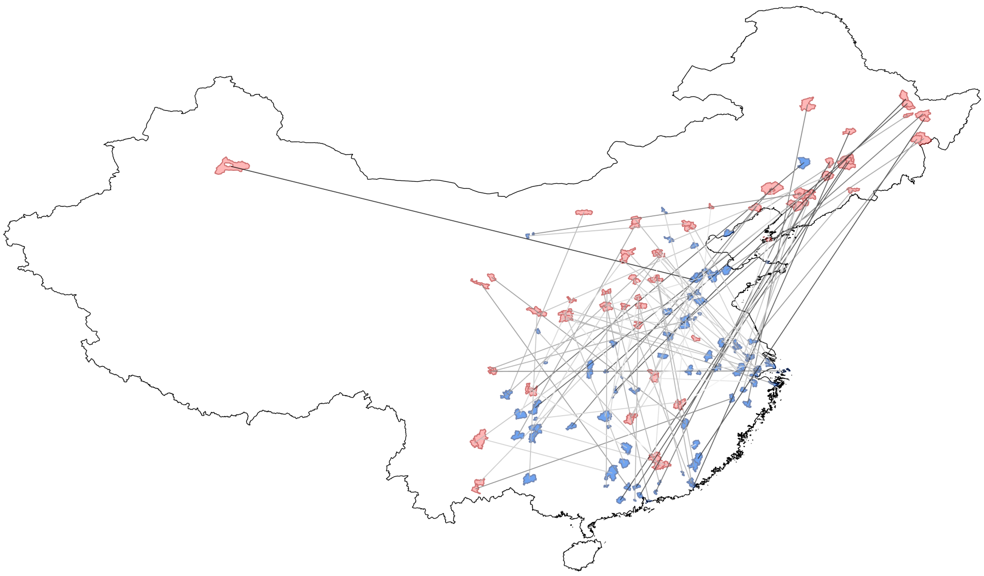


B. Balance of covariates

Sources: The left panel displays the distributions of the propensity score within the set of treated counties (red) and control counties (blue). The right panel shows the bias in covariates in treated counties within the whole sample (blue dots) and the matched sample (red diamonds); all variables are in logarithm.

The matching procedure described in Section 2 does not impose "upward" restrictions on the spatial distance between matched counties. For this reason, matched pairs $\{(t_1, c_1), \ldots, (t_N, c_N)\}$ can be (i) quite distant from one another and (ii) differently close to major ports, e.g., the median difference between the (log) travel time to ports between treated and control counties is about 0.35 (or 42%). In Figure C3, we provide an illustration of these matched pairs of treated counties (red) and control counties (blue).

Figure C3. Matched pairs of treated and control counties $\{(t_1, c_1), \ldots, (t_N, c_N)\}$.

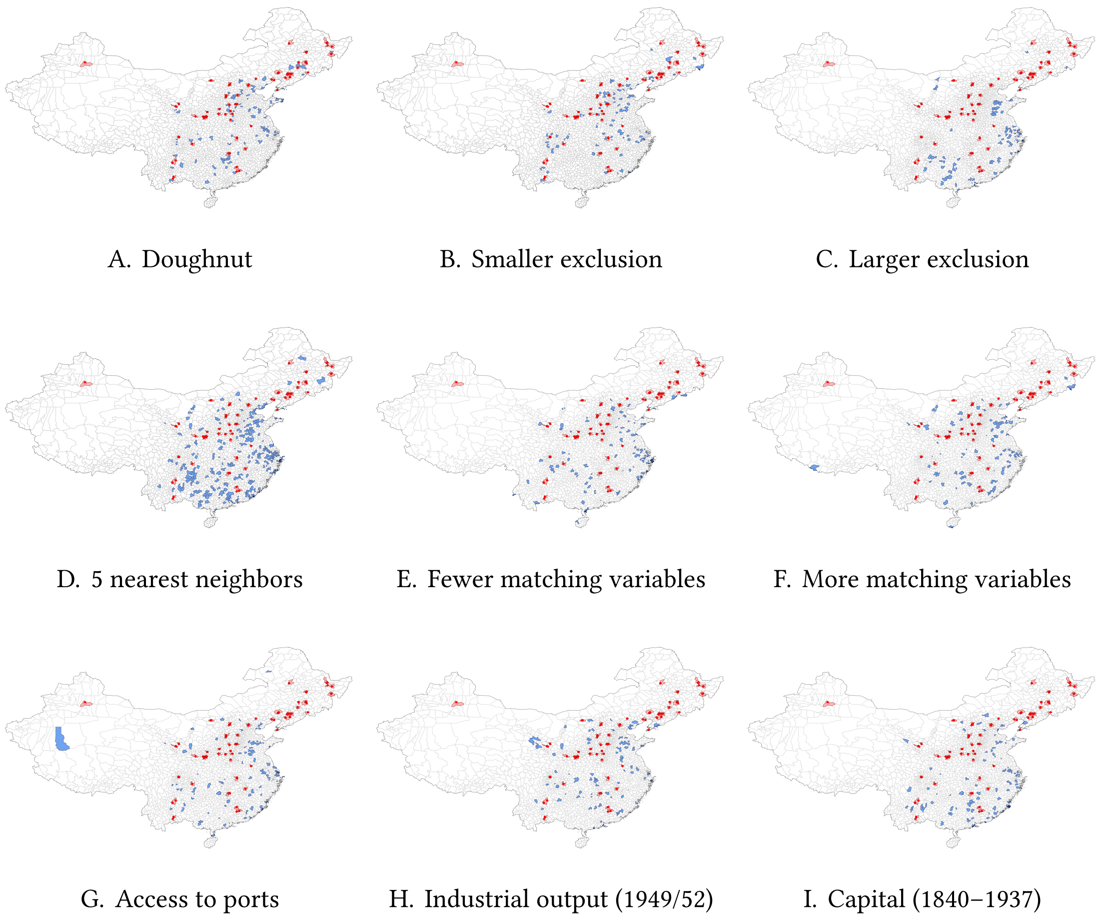


Notes: Treated counties ($\mathcal{T} = \{t_1, \ldots, t_N\}$) are shown in red and matched control counties ($\mathcal{C} = \{c_1, \ldots, c_N\}$) are highlighted in blue. Matched pairs, $\{(t_1, c_1), \ldots, (t_N, c_N)\}$, are materialized by lighter (shorter) to darker (longer) lines.

We probe the importance of these geographical differences between matched counties in several ways: (i) we condition our baseline specification on travel cost to ports; (ii) we consider robustness checks *matching on* travel cost to ports or controlling for travel cost to the coast (among other additional geographic factors); (iii) we consider a "ring" or "doughnut" strategy imposing an upper limit on the spatial distance between matched counties; and (iv) we control more directly for the geography of Chinese growth from 1990 onward in a comprehensive sensitivity analysis.

Alternative matching procedures and exclusion zones In Appendix D, we consider various matching procedures—varying exclusion zones (with: a doughnut zone to select control counties; a smaller exclusion zone; and a larger exclusion zone), the number of control counties (e.g., using a strategy based on 5 nearest neighbors), and the set of matching variables. In each of these alternative procedures, the group of treated counties ($\mathcal{T} = \{t_1, \ldots, t_N\}$) remain the same but control counties ($\mathcal{C} = \{c_1, \ldots, c_N\}$) might change significantly. We report all these alternative geographies of treatment allocation in Figure C4, constructed on the model of Figure 1. Panels A (doughnut) and B (smaller exclusion zone) show how putting more weight on closer pairs shifts the geography of control groups closer to the crescent of treated counties—although these strategies will

Figure C4. Treated counties and the group of control counties—alternative matching strategies.

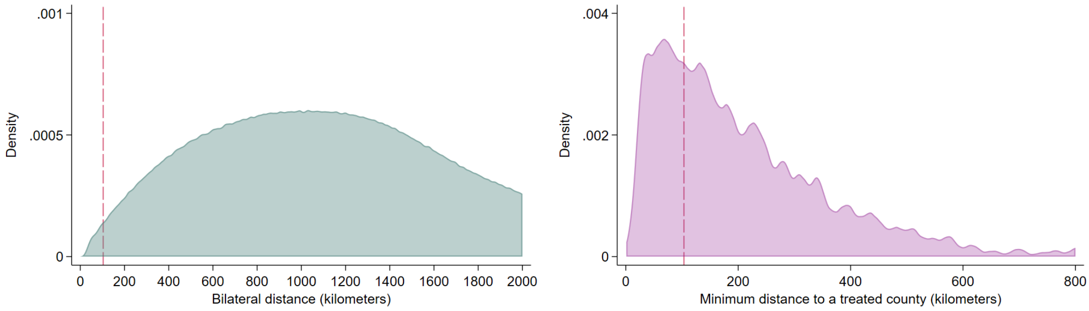


Notes: These maps show the treated group, i.e., counties with at least one "156"-program factory within 25 km of their borders (red), and the control group of counties (blue) in 9 alternative matching strategies. These alternative strategies are: (A) a doughnut zone to select control counties (with estimates reported in Table D5, panel A); (B) a smaller exclusion zone based on $r/5$ (Table D5, panel A); (C) a larger exclusion zone based on $2r$ (Table D5, panel A); (D) a strategy based on 5 nearest neighbors (Table D6, panel A); (E) fewer matching variables (Table D6, panel A); (F) more matching variables including travel cost to major cities in 1900, travel cost to Ming courier stations, distance to military airfields, and travel cost to the main trading ports (Table D6, panel A); (G) adding travel cost to ports as a matching variable (Table D6, panel B); (H) adding industrial output at the province level in 1949 and 1952 as matching variables (Table D6, panel B); and (I) adding industrial capital between 1840–1937 as a matching variable (Table D6, panel B).

deliver very similar treatment estimates. Panels E to I show that changes in matching factors do change the set of control counties ($C = \{c_1, \ldots, c_N\}$), without major overlap across all these alternative sets, even though—again—treatment estimates will remain qualitatively similar (see Appendix D).

Although our results are robust to other exclusion zones (to select control counties), there is some discretion in our baseline choice—excluding counties at a distance of $r = d/2$ of at least one treated county's centroid where $d = 206.96$ kilometers corresponds to the 2.5% percentile in bilateral distance between any pairs of counties. Panel A of Figure C5 illustrates the relative position of this threshold r, with respect to the dis-

Figure C5. Defining the exclusion threshold.



A. Bilateral distance between county pairs

B. Excluded counties

Notes: Panel A displays the distribution of bilateral distances between any county pairs in China. Our baseline specification excludes counties whose centroids lie within $r = d/2$ of at least one treated county's centroid where $d = 206.96$ kilometers corresponds to the 2.5% percentile in bilateral distance between any pairs of counties; the dashed, red line corresponds to this threshold. Panel B displays the minimum distance to a treated county for any non-treated county; counties on the left side of the dashed, red line would be excluded from the baseline matching procedure.

tribution of bilateral distance between any county pairs. Although the threshold is quite low, there are 98 treated counties such that the 98 associated exclusion rings cover almost 30% of all Chinese counties (Panel B of Figure C5)—a number which drastically decreases in the alternative strategy with a smaller exclusion zone ($r/5$, panel B of Figure C4) and markedly increases with a larger exclusion zone ($2r$, panel C of Figure C4).

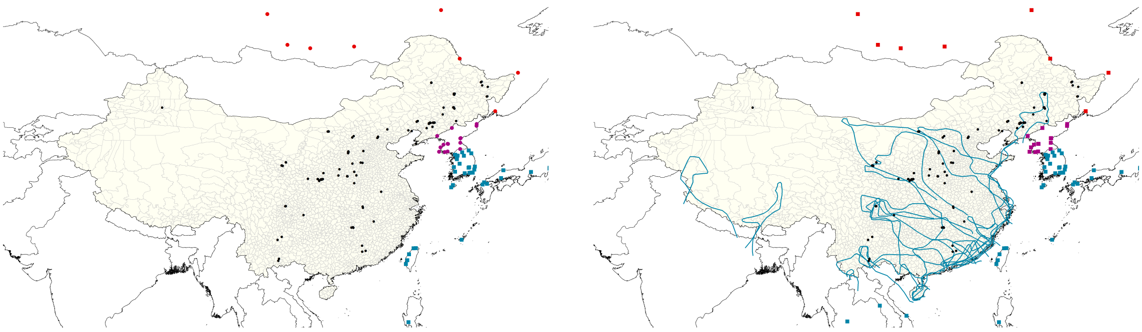
C.2 Vulnerability to air strikes and its induced variation

The key variation used in the empirical strategy is the impermanent vulnerability to aerial attack around the time of siting decisions. We now describe the procedure to construct our measures of vulnerability to enemy air strikes in different time periods.

Allied and enemy air bases over time When the "156" program was being designed, China benefited from the 1950 Treaty of Friendship, Alliance and Mutual Assistance. Not only were the U.S.S.R. and North Korea friendly neighbors; China could count on their possible protection in case of American or Taiwanese aggression, as stipulated by the Treaty. After the Sino-Soviet split, China no longer enjoyed protection from Soviet (and possibly North Korean) air bases against American or Taiwanese attacks. In effect, these formerly allied air bases might have presented a threat.

Our baseline assumptions will be the following. [A1] At the time of siting decisions, U.S. and Taiwanese air bases will be enemy bases, U.S.S.R. and North Korea air bases will provide protection, and Chinese air bases will not play any *direct* role (their proximity will instead appear as a control variable in our baseline specification), as having little credible interception capabilities—a limit explicitly acknowledged by planners (see Appendix A.2). [A2] After the Sino-Soviet split, we consider not only American and Taiwanese bases, but also Soviet and North Korean air bases, as threats—in addition to American air bases that were opened in Vietnam between the beginning of the "156" program and the onset of the Third Front Movement. One issue with these assumptions is that we suppose that North Korean bases have interception or attacking capabilities before or after 1960. An alternative assumption would be that North Korean bases should be treated in a similar manner as Chinese air bases before 1960 (i.e., not dissuasive from the viewpoint of the U.S. army) and should be considered as neutral or not threatening afterward. We consider this alternative specification in a robustness check.

Figure C6. Distribution of enemy and allied air bases.



A. Pre-1960 split B. Post-1960 split

Notes: This map shows the distribution of enemy and allied air bases in 1953 and in 1964. U.S. air bases are indicated with a green rectangle; North Korean air bases are indicated with a purple circle/rectangle; Soviet air bases are indicated with a red circle/rectangle. In the right panel, we add the paths of surveillance flights between 1963 and 1965. The locations of MRPs are indicated with a dark circle.

We display the distribution of enemy and allied air bases over time in Appendix Figure C6. We also display the surveillance flights from U.S. reconnaissance air flights between 1963 and 1965, as provided by declassified CIA technical intelligence studies. We see that these flights deliberately targeted the MRPs (as is clear from lists of targets, also available from the CIA, that were handed to pilots before each flight), even in the—formerly protected—crescent formed by the Second Front of MRPs. This would justify the later geography of place-based policies, targeting a Third Front away from the coasts and from Northern borders.

In the next section, we calibrate a simple model of travel cost to account for the role of allied air bases in shielding some locations in China against aerial attacks.

Flying cost We assume a constant default flying cost over the Chinese territory and model allied air base protection as an additional cost for enemy bombers. This penalty is defined as follows:

$$f(d,d') = \underbrace{(1-e^{-gd'})}_{\text{U.S. adjustment}} \cdot \left(\alpha \frac{e^{a(\bar{x}-d)} - e^{-b(\bar{x}-d)}}{e^{a(\bar{x}-d)} + e^{-b(\bar{x}-d)}} + C \right),$$

where d is distance to the closest allied airbase and d' is distance to enemy air bases, in kilometers. The parameters α and C calibrate the maximum and minimum of the penalty inflicted by allied bases. The dependence of the penalty to distance to allied bases is modeled as a hyperbolic tangent: The penalty vanishes as distance d goes to infinity, increases as d decreases, and reaches a plateau near the airbase. The parameter a (b) disciplines the curvature of the hyperbolic tangent function for low (high) values of d. The inflection point is tied to the value of $\bar{x}$. Finally, the dependence of the penalty to distance to enemy bases is disciplined by g. This parameter determines how the cost paid by enemy bombers for traveling near allied bases is mitigated by the proximity to their own bases. In our baseline specifications, we ignore this U.S. adjustment, but we allow for it in a sensitivity check—see Figure D2.

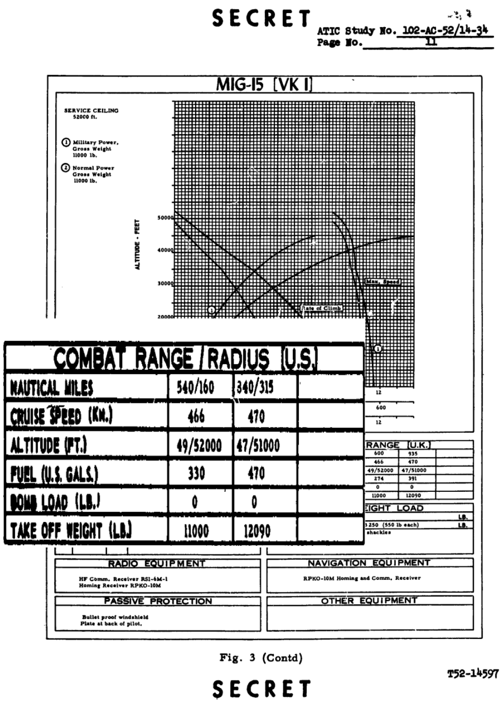
We calibrate the flying cost as follows. First, we set the key parameters based on declassified CIA technical intelligence documents from the early 1950s.[17] American bombers in the 1950s, like the B-52s, could technically reach any point in China without refueling. However, bombers could be neutralized by interceptors, stationed in allied air bases. Declassified CIA documents such as the one reproduced in Appendix Figure C7 provide us with information on the ranges of the main Soviet interceptor (used both in North Korea and the U.S.S.R.), the MiG-15, and the main American jet fighter at the time, the F-86 Sabre. We use the maximum range of the interceptors under "military power" and define $\bar{x}$ as half the maximum range of Soviet interceptors (840 nautical miles or 1,555.68 km—see the table in Figure C7). Note that in addition to the MiG-15, Soviet and North Korean air forces used another interceptor, the Yakovlev. Sources also vary in their accounts of the combat range of the American F-86 Sabre, probably owing to rapid improvements in the aircraft over a short period of time. To take these nuances into account, we test the robustness of our results in Appendix D.2, where we use the different combat ranges available to calibrate the key parameters of the flying cost.

Second, we determine a and b such that 99% of the penalty inflicted by U.S.S.R. and North Korean air bases occurs over the combat range of Soviet interceptors under mili-

[17]Such documents show the information available to U.S. intelligence on Soviet military technology, obtained from spies and through the reverse-engineering of fighter jets downed during the Korean War. We assume perfect information: the Soviet similarly derived information about U.S. military technology, and expected the Americans to know theirs equally well. In keeping with the 1950 Treaty, Soviet military advisers shared their information with their Chinese counterparts, in particular to determine the location of the Million-Rouble plants.

tary power. Similarly, g is set so that 99% of the protection enjoyed by American bombers close to their bases occurs within the combat range of the F-86 Sabre. Finally, α and C are set equal and such that Chinese counties fully protected by Soviet and North Korean air bases are as safe as remote western counties.

Figure C7. Declassified CIA technical intelligence studies—MiG 15.



COMBAT RANGE / RADIUS (U.S.)			
NAUTICAL MILES	540/160	340/315	
CRUISE SPEED (KN.)	466	470	
ALTITUDE (FT.)	49/52000	47/51000	
FUEL (U.S. GALS.)	330	470	
BOMB LOAD (LB.)	0	0	
TAKE OFF WEIGHT (LB.)	11000	12090	

Sources: CIA technical intelligence study No. 102-AC-52/14-34, "Soviet Operational Interceptor Aircraft" (CIA, 1952, , 3 September 1952).

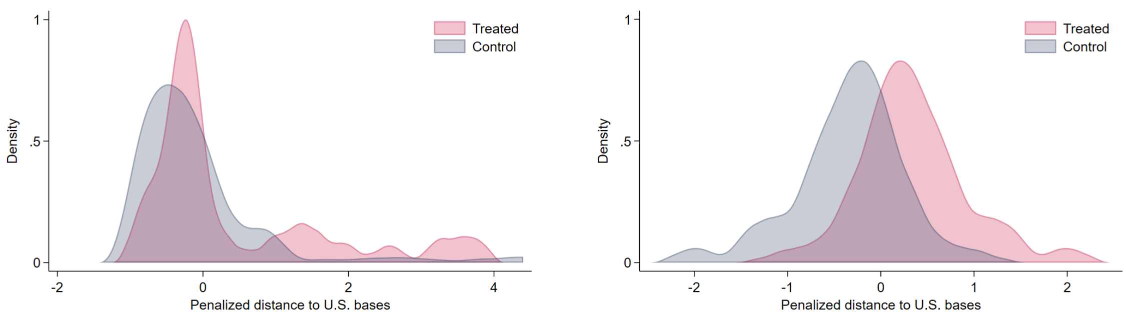
Resulting variation In this section, we briefly describe how the distribution of air bases, combined with the previous parameterization of flying costs, translates into vulnerability maps across Chinese counties.

We define our measure of vulnerability in 1953 as the minimum penalized flying cost to each Chinese county across enemy air bases. For vulnerability after the Sino-Soviet split, we similarly compute minimum travel costs from (all, including U.S.S.R. and North Korean) enemy air bases but without the additional penalty near (formerly) allied air bases. Finally, after 1972 and the U.S.-China *rapprochement*, we consider U.S.S.R. and North Korean air bases as enemies and assume that U.S. air bases are neutral players (since, contrary to the U.S.S.R. between 1950 and 1960, the U.S. never signed a treaty of mutual assistance with China against their common enemy). These different vulnerability measures reflect the changes in geopolitical threats faced by China over the second half of the 20th century.

As shown in Figure 2 (Panel A), vulnerability to aerial attacks in 1953 favors Northern provinces. This vulnerability, combined with the existing transportation network and coal deposits, draws a crescent from Harbin (Northeast) to Xi'an (Shaanxi province). Most MRPs can be found along this crescent, which forms a "Second Front" in the connected hinterlands. A few MRPs are located in Central China, in spite of the high risk of aerial attacks. These few factories however rely on very specific inputs, e.g., tungsten in Jiangxi province, which can only be found in high-risk locations.

In Panel B of Figure 2, we display vulnerability to aerial attacks in 1964 after U.S.S.R. air bases became enemy threats. The set of suitable and protected locations then became small as all counties related to the transportation network were then in the range of enemy bombers. We see, in particular, that some areas that were protected by the Soviet and North Korean allies, such as the Northeast and to a lesser extent counties bordering Mongolia, became extremely vulnerable. Western provinces, removed from both U.S./Taiwanese and Soviet bombing threats, turned out to be the safest. This new vulnerability map rationalizes the Third Front Movement, which targeted interior, remote provinces (see Fan and Zou, 2021).

Figure C8. Vulnerability density within treated and control counties.

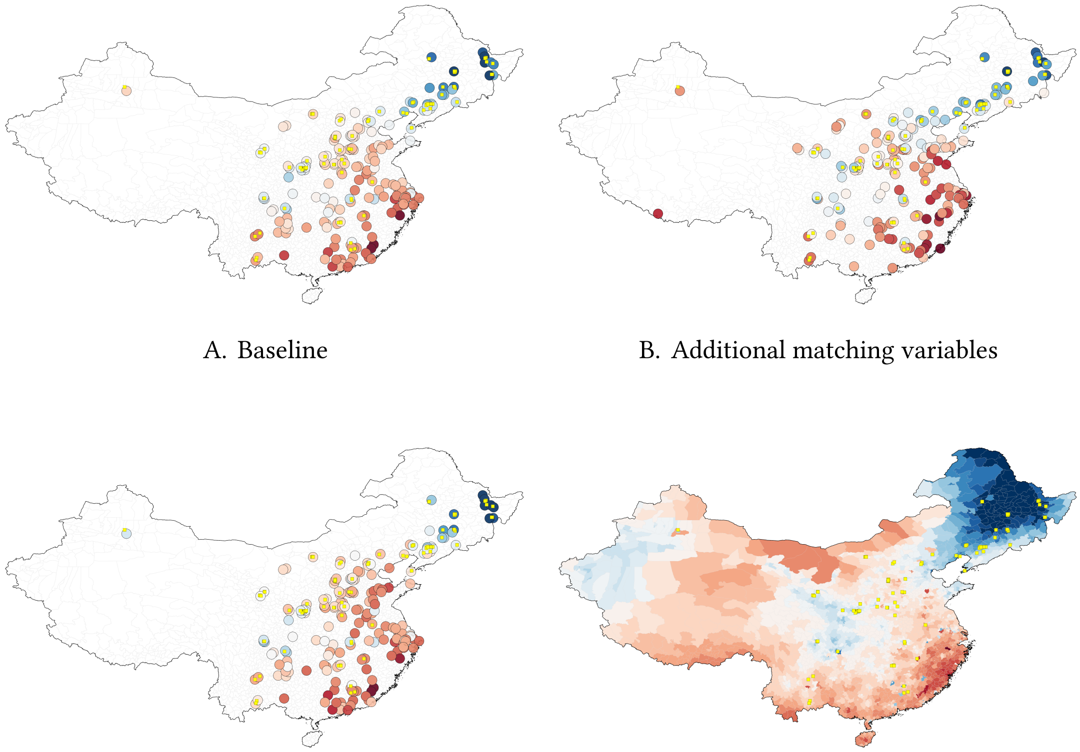


A. Unconditional B. Conditional

Notes: This Figure displays the density of the (unconditional and conditional) vulnerability measure, V_i, labeled here as *Penalized distance to U.S. bases*. This measure is the standardized flying cost to U.S. or Taiwanese military airfields penalized by the proximity to U.S.S.R. and North Korean airfields. Treatment is defined as a dummy equal to 1 if a factory lies within 25 km of a county's borders (i.e., the group of counties $\mathcal{T} = \{t_1, \ldots, t_N\}$) and 0 otherwise (i.e., the group of counties $C = \{c_1, \ldots, c_N\}$). The control group is selected through the matching procedure described earlier, and the controls used in Panel B are those of Table 2, column (3). The distributions in Panel B are symmetric by construction: With matching pair fixed effects, the average for each pair is centered on 0.

Figure C8 shows the relationship between the vulnerability to aerial attacks (in 1953) and factory location choices, both unconditionally (Panel A) and conditioning on the controls from Table 3. We can see that the distribution of flying costs across treated counties has a much fatter right tail than that of the control group, which shows that factories were preferably established at a (penalized) distance from enemy threats.

Figure C9. Residual TSLS variation—baseline and alternative strategies.



A. Baseline

B. Additional matching variables

C. Alternative vulnerability

D. No matching

Notes: Panel A represents the residual TSLS variation used in the baseline empirical strategy, i.e., what is left of the 1953 flying cost from enemy airfields after netting out the effect of the baseline controls, including the post-1964 flying cost (red: low, blue: high; the color gradient corresponds to fixed intervals of 1/4 standard deviations). For visualization purposes, we represent each county as a large colored circle, and treated counties can be identified through the nearby location of MRPs (yellow rectangles). Panel B displays the residual TSLS variation used in the robustness check with additional matching variables including travel cost to major cities in 1900, travel cost to Ming courier stations, distance to military airfields, and travel cost to the main trading ports (second row, Table D6, panel A). Panel C shows the residual TSLS variation when the vulnerability measure is computed assuming that North-Korean airbases are not a dissuasive threat to U.S. bombers. Finally, panel D reports a hypothetical residual for all counties, ignoring the sample selection induced by matching.

We provide a more explicit illustration of the residual TSLS variation in Figure C9, formalizing the previous comparison between Panels A and B of Figure 2. Figure C9 (a) shows the values of the residual instrument ($\widetilde{V}_i$) from blue (low vulnerability) to red (high vulnerability) across all suitable counties $i \in \{t_1, \ldots, t_N, c_1, \ldots, c_N\}$. For visualization purposes, we represent each county as a large colored circle, and treated counties can be identified through the nearby location of MRPs (yellow rectangles). This exercise helps identify that a crescent of treated counties in a "second front", stretching from the Northeast region (closer to the Chinese Rust Belt) to Gansu/Shaanxi, are mostly leveraged for identification. Another notable feature is that a few coastal Southern control counties are very vulnerable. Figure C9 also shows how this residual variation depends on choices underlying the construction of vulnerability measures: panel B displays the residual instrument ($\widetilde{V}_i$), but for a robustness matching procedure with access to the main trading ports added to the matching factors (among other added variables, see second row, Table D6, panel A). One can see that the set of control counties features fewer coastal counties; the previous crescent remains the main source of identifying variation. We also report the residual variation in vulnerability for a scenario where North Korean bases are treated in a similar manner as Chinese air bases before 1960 (panel C) and for a hypothetical exercise using all counties and ignoring the sample selection induced by matching (panel D).

C.3 Identifying treatment heterogeneity

We aim to estimate the externalities exerted by Million-Rouble plants on manufacturing establishments of the same county, through production linkages, factor market linkages, or technological linkages. For this purpose, we develop an empirical strategy to identify treatment spillovers across establishments in the presence of treatment heterogeneity.

Without treatment heterogeneity, spillovers can be estimated as follows. Consider an establishment j located in county i. We would like to estimate the statistical model $E\left[Y_j|T_i, S_j\right]$ where Y_j is the outcome at the establishment level, $T_i \in \{0, 1\}$ is the treatment, and $S_j \in \{0, 1\}$ characterizes the sub-population of firms susceptible to be affected. The previous statistical model can be estimated through a simple difference-in-differences procedure, in which the instrument for treatment T_i would be interacted with the spillover measure S_j. With treatment heterogeneity, however, the latter cannot be constructed in *control* counties, where $T_i = 0$. Indeed, such a measure would crucially depend on the characteristics of the associated *hypothetical* Million-Rouble Plant. Let $T_i^\tau \in \{0, 1\}$ denote the MRP-specific treatment, equal to 1 if county i hosts the MRP indexed by τ, and $T_i = \max_\tau\{T_i^\tau\}$ the county treatment (i.e., hosting at least one MRP). We can define a measure of MRP-specific linkages in all counties, given the characteristics of an establishment and the characteristics of the MRP. We describe next how we attribute hypothetical MRPs to control counties.

Our empirical strategy stratifies control counties by their suitability to host Million-Rouble Plants. We define strata of counties based on the propensity score $P(\mathbf{H}_i)$, as produced by the propensity-score matching procedure described in Section 2 (relying on observable characteristics $\mathbf{H}_i$). In the baseline one-to-one matching, there is one treated county and its associated MRP type in each stratum. We assume that the probability to host any such MRP type τ is the same for the control county in the same stratum. Under this assumption, we can hypothetically allocate the MRPs of the treated county to the matched control county and calculate hypothetical links S_j, using the observed characteristics of establishments in these control counties.

In our specifications relying on hypothetical links S_j, the identification crucially hinges on a weaker version of the Conditional Independence Assumption. The allocation of a certain MRP of type τ needs to be independent of unobserved county characteristics that may directly affect the outcomes of interest, conditional on the propensity score $\tilde{P}(\mathbf{H}_i)$.

D Identification, specification, and alternative outcomes

This Appendix provides support for our baseline empirical strategy. More specifically, the section provides: (i) insights about timing and the relationship between vulnerability to aerial attacks and the placing of key industrial policies (D.1); (ii) focused evidence supporting the exclusion restriction assumption (D.2); (iii) a broader sensitivity analysis to specification choices (D.3); and (iv) additional evidence with alternative measures of economic activity (D.4).

Table D1. Treatment and vulnerability to aerial attacks (1953, 1964, 1972).

	1964	1972	1953			
			Spec. 1	Spec. 2	Spec. 3	N.K. ally
Treatment	(1)	(2)	(3)	(4)	(5)	(6)
Penalized distance	0.223	-0.037	0.330	0.334	0.330	0.394
	(0.104)	(0.140)	(0.030)	(0.027)	(0.030)	(0.049)
Observations	196	196	196	196	196	196

Notes: Standard errors are clustered at the level of 400 × 400-kilometer cells. The unit of observation is a county. *Penalized distance* is the normalized travel cost from enemy military airfields, potentially penalized by proximity to allied airfields. Extended controls include all matching controls, i.e., (log) travel cost to the provincial capital, (log) population in 1953, (log) county area, (log) travel cost to resources (coal, coke, ore), (log) number of industrial firms over the period 1840–1937, and additional controls, i.e., matching-pair fixed effects, (log) travel cost to major ports through the river network, and (log) distance to military airfields. Spec. 0 corresponds to our baseline (not reported here), which uses the combat range of MiG-15 VK-1 aircrafts to determine the reach of U.S.S.R. interceptors and a combat range of 1,485 km for U.S. interceptors. Spec. 1 uses instead the technical characteristics of the Yakovlev Type-28 for Soviet interceptors. Spec. 2 uses instead a combat range of 1,611 km for U.S. interceptors. Spec. 3 uses both the Yakovlev Type-28 combat range for Soviet interceptors and a combat range of 1,611 km for U.S. interceptors.

D.1 Timing and vulnerability to aerial attacks

Later vulnerability to aerial attacks Our empirical strategy relies on the hypothesis that the vulnerability to enemy airstrikes in the 1950s affected the long-run development of Chinese counties only through the location of MRPs. Underlying this hypothesis, there is an argument about the coincidental timing of policies and a short-lived period of military alliance with the Soviet Union. More specifically, the crucial argument supporting the exclusion restriction is that vulnerability to enemy airstrikes at the time of MRP siting decisions reflected the ephemeral context between 1950 and 1960, and that geopolitical concerns presiding over the later strategic decisions induced a different spatial variation across space (one that we can also account for). We shed light on this assumption in the following two exercises building upon counterfactual "first stages." In Table D1, we replace our instrument by penalized distance to enemy air bases in 1964 (column 1)—after the Sino-Soviet split had thoroughly reshuffled international alliances and subsequently transformed the distribution of vulnerability to aerial attacks across Chinese counties—and in 1972 (column 2)—after Nixon's visit to China initiated a *rapprochement* with Mao's China, against the U.S.S.R. as a common enemy, once again transforming the geography of vulnerability to foreign airstrikes. We do not find that the treatment strongly correlates with vulnerability measured in 1972; however, we do find that the vulnerability measure that influenced the reallocation of strategic investments to other areas at the time of the Third Front Movement has explanatory power; hence, we control for vulnerability in 1964 in all our specifications.

Table D1 further shows the relationship between our endogenous treatment and alternative instruments used in subsequent robustness checks. Columns (3)-(5) rely on alternative flying cost specifications, as in Figure D2, while Column (6) treats North Korean interception capabilities in the same way as Chinese interception capabilities, as in Panel C of Table D5.

Table D2. Vulnerability to aerial attacks (1953) and place-based policies (Third-Front and city parks).

	Third-Front	City parks
Penalized distance	0.057	-0.061
	(0.032)	(0.029)
Observations	196	196

Notes: Standard errors are clustered at the level of 400 × 400-kilometer cells. The unit of observation is a county. *Penalized distance* is the normalized travel cost from U.S. and Taiwanese military airfields penalized by proximity to U.S.S.R. and North Korean airfields (V_i). Extended controls include all matching controls, i.e., (log) travel cost to the provincial capital, (log) population in 1953, (log) county area, (log) travel cost to resources (coal, coke, ore), (log) number of industrial firms over the period 1840–1937, and additional controls, i.e., matching-pair fixed effects, (log) travel cost to major ports through the river network, (log) distance to military airfields, and penalized flying cost to enemy airfields in 1964. *Third-Front* is a dummy equal to one if the county is in a province chosen as part of the Third-Front movement (see Fan and Zou, 2021); *City park* is the total number of city parks created between 1980 and 2005 per 10,000 inhabitants (see Zheng et al., 2017).

Later place-based policies In Table D2, we instead look at the relationship between vulnerability to aerial attacks in 1950–1960 and later place-based policies that could explain the differential evolution over time between treated and control counties—as observed in Section 3. We regress (i) a dummy for receiving investment under the Third Front movement in the 1960-70s (column 1) and (ii) the total number of city parks created between 1980 and 2005 per 10,000 inhabitants (column 2) on our baseline instrument. Reassuringly, we do not find that protected counties are *far* more/less likely to receive place-based investments in the more recent period (city parks) or to be in a "Third-Front" province (with possible gains in the longer run, see Fan and Zou, 2021). In light of these correlations, however, we provide a robustness check where we condition our baseline estimates on these place-based investments, and—in the light of Table D1—we conservatively control for 1964 vulnerability in all our exhibits.

D.2 Identification and exclusion restriction

The identifying assumption underlying the empirical strategy is that the 1953-specific vulnerability to aerial attacks has no effect on outcomes of interest other than through the location of the Million-Rouble plants, conditional on the set of controls $\mathbf{X}_i$. Even if this variable had no *direct* influence on the later allocation of resources by planners or entrepreneurs, the exclusion restriction might still be violated if vulnerability to enemy airstrikes across counties were to be (possibly coincidentally) correlated with: (i) first-nature or second-nature characteristics affecting their economic development at later stages; or (ii) later policies that influenced their growth in the later period. We provide below a comprehensive sensitivity analysis divided into: exercises varying the set of control variables, $\mathbf{X}_i$ (Tables D3 and D4); and exercises involving changes in both specification (1) *and* the matching process (Table D5).

Controlling for first- and second-nature geography We first provide more direct evidence that first- or second-nature characteristics are not responsible for the observed relationship between the treatment and economic development across counties. Some first-nature geographical features, e.g., terrain ruggedness, which may have been seen favorably at the time of investment because they offered protection against aerial attacks, may hamper long-run economic development. In Panel A of Table D3, we add the following controls to capture such geographic features: elevation (minimum, mean, and maximum), ruggedness (i.e., average slope in the county), pollution measures (NO2 concentration in 2010, from the TEMIS database), potential—GAEZ model-based—crop yield for rice and wheat, actual grain output in 2010 from county gazetteers, land supply constraints measured as the share of non-developable land induced by local geography around city borders (following Imbert et al., 2023), and land-form characteristics from the SOTER database. Including these measures does not affect our baseline findings.

Geography may however have shaped the fate of treated/control counties through second-nature determinants and the geography of Chinese growth from 1990 onward: Fast-growing regions are indeed largely located along the coast and in the south, i.e., in regions that were extremely vulnerable to aerial attacks in the 1950s and subsequently received few MRPs. In Panel B of Table D3, we control for exposure to the reduction in trade uncertainty following China's accession to the World Trade Organization in 2002 (following Facchini et al., 2019), we control for (log) travel cost to the coast to capture a comparative advantage in an exporting economy, we implement a more stringent test by excluding all counties in coastal provinces, we exclude the 20 (mostly control) counties within the top 5-percentile (342.18 kilometers) in terms of distance to the Pearl River delta, and we finally exclude all counties south of the 28$^{\text{th}}$ parallel. Although point es-

Table D3. Support for the exclusion restriction—controlling for first-nature geography, second-nature geography, and SOEs.

	Population (1982)	GDP p.c. (1982)	Population (2010)	GDP p.c. (2010)
Panel A: Controls for first-nature geography				
Unfavorable environment	0.586	0.774	0.940	-0.463
	(0.166)	(0.181)	(0.217)	(0.229)
	[189]	[189]	[189]	[189]
Panel B: Controls for second-nature geography				
Trade shock	0.224	0.661	0.284	-0.195
	(0.132)	(0.128)	(0.131)	(0.123)
	[196]	[196]	[196]	[196]
Travel cost to the coast	0.112	0.651	0.227	-0.184
	(0.118)	(0.123)	(0.111)	(0.099)
	[196]	[196]	[196]	[196]
Excluding coastal provinces	0.194	0.622	0.319	-0.163
	(0.086)	(0.135)	(0.101)	(0.108)
	[179]	[179]	[179]	[179]
Excluding the Pearl river delta	-0.036	0.417	0.126	-0.164
	(0.123)	(0.103)	(0.133)	(0.082)
	[176]	[176]	[176]	[176]
Excluding the South of China	-0.152	0.558	0.072	-0.181
	(0.152)	(0.131)	(0.157)	(0.112)
	[153]	[153]	[153]	[153]
Panel C: Controls for State-Owned Enterprises				
SOE share (nb. firms, *SYB* 1994)	0.200	0.692	0.265	-0.125
	(0.111)	(0.144)	(0.118)	(0.118)
	[192]	[192]	[192]	[192]
SOE share (V.A., *ASIF* 1998)	-0.015	0.648	-0.001	-0.140
	(0.140)	(0.114)	(0.090)	(0.137)
	[172]	[172]	[172]	[172]
SOE layoffs (*ASIF* 1998–2007)	0.009	0.715	0.112	-0.176
	(0.135)	(0.125)	(0.089)	(0.123)
	[171]	[171]	[171]	[171]

Notes: Each cell is the outcome of a separate regression. Standard errors are clustered at the level of 400 × 400-kilometer cells (reported between parentheses). The unit of observation is a county; the number of observations is reported between square brackets. The instrument is the distance to the main military U.S. and Taiwanese airfields penalized by the proximity to U.S.S.R. and North Korean airfields. All specifications include (i) matching-pair fixed effects, (ii) matching controls (in log), i.e., travel cost to the provincial capital, population in 1953, county area, travel cost to resources (coal, coke, ore), number of industrial firms over the period 1840–1937, and (iii) the additional controls, i.e., (log) travel cost to major ports through the river network, (log) distance to military airfields, and penalized flying cost to enemy airfields in 1964. In Panel C, we additionally condition on the share of SOEs in the number of "above-scale" industrial firms in 1994 (from the *City Statistical Yearbooks*), the share of SOEs in total value added in 1998 (from *ASIF*), and a proxy for layoffs in SOEs.

timates may vary as we restrict the sample, the boom-and-bust pattern that we identify in our baseline results is remarkably robust. To investigate more explicitly the possible confounding role of other, secular dynamics affecting the Chinese Rust Belt (the demise of public enterprises having disproportionately affected Northern regions), we further condition the analysis on the share of State-Owned Enterprises (SOEs) in a county's production before the opening of the economy in Panel C of Table D3. In this exercise, we consider three alternative measures: the share of SOEs in the number of "above-scale" industrial firms in 1994 (from the *City Statistical Yearbooks* or *SYB*); the share of SOEs in total value added in 1998 (from the *Annual Survey of Industrial Firms* or *ASIF*, which constitutes a census of "above-scale" industrial firms); and the change in SOE employment over the 1998–2007 period normalized by total employment at baseline as a proxy for privatization. Our results are left unchanged, suggesting that layoffs in counties where SOEs once dominated the local economy do not drive the rise-and-fall pattern observed in the treated group.

Controlling for place-based policies and factory type The relative fall of treated counties may be due to later place-based policies that favored counties in the comparison group, or to severe disruptions due to pre-transition policy shocks in treatment counties. We control for such policies and events in Panel A of Table D4: the 22 counties of our sample hosting at least one of the 63 plants completed as part of the 2nd Five-Year Plan (FYP), which we hand-collected and geolocated based on archival documents; the 33 counties of our sample directly affected by the Third Front movement (Fan and Zou, 2021), which redirected strategic investments to the Western provinces after the Sino-Soviet split; the Great Famine of 1959-1961 concomitant with the Great Leap Forward, which aimed to decentralize industrial production; the Cultural Revolution, which may have disproportionately affected the most socially and economically advanced urban areas; Special Economic Zones and industry parks (Wang, 2013; Crescenzi et al., 2012; Alder et al., 2016; Zheng et al., 2017)—the main place-based policy of the Reform era; and the massive investments in transport infrastructures recently carried out, which may have targeted areas with few pre-existing (industrial) investments. Beyond these emblematic policies, the regime could have favored certain counties due to their strategic location, and these further investments may correlate with the vulnerability instrument. We already control for the vulnerability to air strikes in 1964; we separately add the vulnerability to Soviet air strikes in 1972 in the last row of Panel A. Neither alternative policies nor alternative measures of vulnerability affect our estimates. Since we do not know of any place-based policy that deliberately compensated control counties for not receiving MRPs, in the Mao era or in the Reform era, these results suggest that the rise-and-fall pattern experienced by treated counties is the effect of the treatment.

Finally, the baseline specification does not account for the evolution of MRPs them-

Table D4. Support for the exclusion restriction—controlling for place-based policies and factory type.

	Population (1982)	GDP p.c. (1982)	Population (2010)	GDP p.c. (2010)
Panel A: Controlling for place-based policies				
2nd Five-Year-Plan plants	0.063	0.567	0.088	-0.221
	(0.110)	(0.115)	(0.092)	(0.098)
	[196]	[196]	[196]	[196]
Third Front Movement	0.101	0.576	0.125	-0.202
	(0.111)	(0.110)	(0.108)	(0.091)
	[196]	[196]	[196]	[196]
Great Famine	0.232	0.577	0.195	-0.289
	(0.108)	(0.139)	(0.138)	(0.128)
	[193]	[193]	[193]	[193]
Cultural Revolution	0.216	0.615	0.236	-0.169
	(0.076)	(0.114)	(0.080)	(0.096)
	[196]	[196]	[196]	[196]
Special Economic Zones	0.074	0.611	0.140	-0.191
	(0.109)	(0.106)	(0.107)	(0.102)
	[196]	[196]	[196]	[196]
Transport infrastructure	0.113	0.613	0.114	-0.193
	(0.118)	(0.134)	(0.098)	(0.103)
	[196]	[196]	[196]	[196]
Penalized distance in 1972	0.007	0.646	0.207	-0.329
	(0.120)	(0.137)	(0.121)	(0.124)
	[196]	[196]	[196]	[196]
Panel B: Controlling for factory type				
Excluding closed factories	0.047	0.555	-0.008	-0.261
	(0.131)	(0.163)	(0.114)	(0.111)
	[176]	[176]	[176]	[176]
Controlling for military factories	0.073	0.706	0.092	-0.398
	(0.145)	(0.148)	(0.124)	(0.096)
	[196]	[196]	[196]	[196]
Controlling for extractive factories	0.310	1.198	0.303	-0.648
	(0.213)	(0.240)	(0.194)	(0.216)
	[196]	[196]	[196]	[196]

Notes: Each cell is the outcome of a separate regression. Standard errors are clustered at the level of 400×400-kilometer cells (reported between parentheses). The unit of observation is a county; the number of observations is reported between square brackets. All specifications include the controls of Table 3. In Panel A, *2nd Five-Year-Plan plants* is an indicator equal to 1 if the county is hosting at least one of the 63 plants completed as part of the 2nd Five-Year Plan; *Third Front Movement* is an indicator equal to 1 if the county is located in a Third-Front province (see Fan and Zou, 2021); *Great Famine* is the standardized cohort loss estimated from a 1% sample of the 1990 Population Census (Meng et al., 2015); *Cultural Revolution* is the share of victims of the Cultural Revolution (Walder and Su, 2003); *Special Economic Zones* refers to the number of industrial parks created between 1990 and 2010 (see Zheng et al., 2017) per 10,000 inhabitants (using the 1953 population); and *Transport infrastructure* controls for (log) distance to major railways in 2005, high-speed railways in 2016, and highways in 2010 (Baum-Snow et al., 2017).

selves. While we already document the healthy condition of MRPs in recent decades (see Appendix A.4 and Giorcelli and Li, 2022), we further check for the robustness of the results in Panel B of Table D4 where we exclude treated counties with either a closed or displaced MRP, and where we control for military or extractive MRPs, which may have declined with the diversification of the Chinese economy and depletion of their natural resource base, respectively. The results show that the main empirical findings are not explained by the evolution of the MRPs. Note that we leverage the variation in MRP characteristics in another exercise, where we estimate treatment heterogeneity, but we leave this analysis to Appendix E.3.

Alternative matching procedures and vulnerability measures We further investigate the importance of the geography induced by our matching procedure or our TSLS specification in Table D5. First, while our baseline strategy does not impose an upper limit on the distance between matched counties, considering a "ring" or "doughnut" strategy would yield similar results. We provide such a robustness check in Panel A, where we force the nearest-neighbor county in terms of propensity score to sit in a ring around their "treated match" of $r = d/2$ (where $d = 206.96$ kilometers corresponds to the 2.5% percentile in bilateral distance between any pairs of counties) and R (the average bilateral distance between any pairs of counties, around $1,300$ kilometers). We also consider a nearest-neighbor matching with a smaller exclusion zone of $r/5$ kilometers and a larger exclusion zone of $2r$ kilometers. Second, Panel B considers alternative matching procedures better accounting for the geography of economic development in China, adding as matching factors: travel cost to ports; total provincial industrial output in 1949 and in 1952 to account for the relative development of Northern provinces before the treatment (Field et al., 1975); and (log) total industrial capital over the period 1840–1937 to further capture early county-level industrial development (Du, 2014, 2019). Finally, we had to make choices in the design of our baseline vulnerability measure. In particular, we did not consider Chinese air bases as having credible interception capabilities, either before the Sino-Soviet split or after, drawing on historical testimonies. A similar point could be made about North Korean bases, which might not have been dissuasive from the viewpoint of the U.S. army. We thus provide a robustness check under these alternate assumptions in Panel C of Table D5, where we treat North Korean interception/attacking capabilities in the same way as Chinese interception capabilities (essentially considering North Korean air bases as neutral throughout the period).

Interpretation and the role of confounding aggregate factors In Section 4.3, we discuss alternative mechanisms behind the deterioration of the local business environ-

Table D5. Support for the exclusion restriction—alternative matching procedures and an alternative measure of vulnerability.

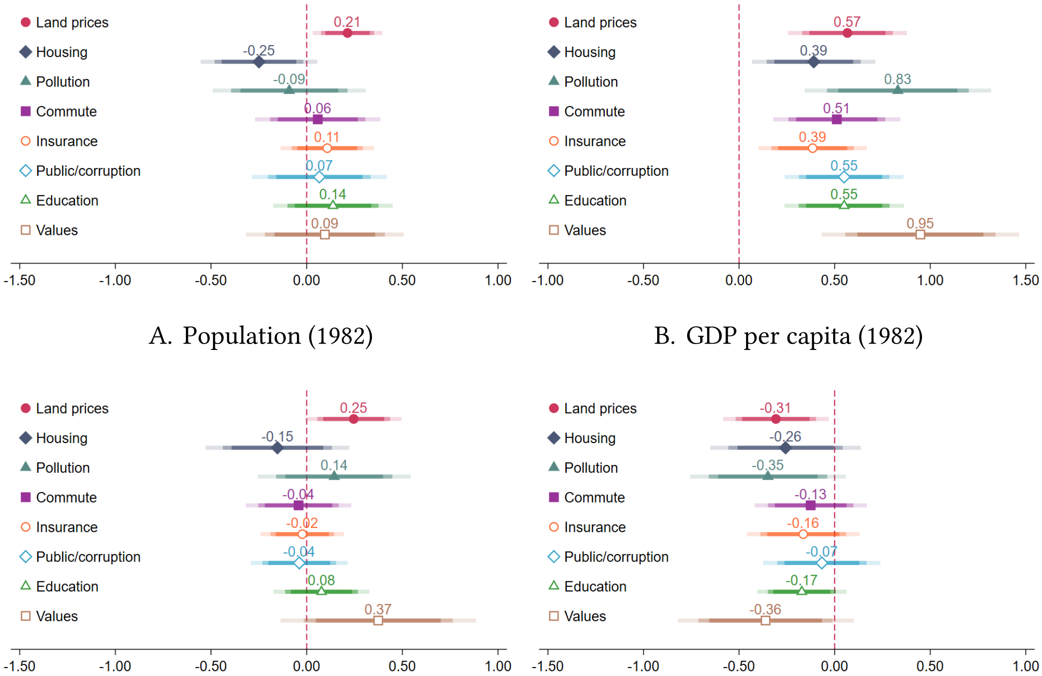
	Population (1982)	GDP p.c. (1982)	Population (2010)	GDP p.c. (2010)
Panel A: Alternative exclusion zones				
Matching within ring	0.476	0.991	0.565	-0.403
	(0.124)	(0.280)	(0.202)	(0.341)
	[156]	[156]	[156]	[156]
Smaller exclusion zone	0.782	1.399	1.064	-0.326
	(0.314)	(0.351)	(0.315)	(0.166)
	[196]	[196]	[196]	[196]
Larger exclusion zone	0.286	0.886	0.521	-0.166
	(0.079)	(0.104)	(0.091)	(0.104)
	[194]	[194]	[194]	[194]
Panel B: Alternative matching factors				
With access to ports	0.218	0.657	0.451	-0.029
	(0.115)	(0.130)	(0.128)	(0.110)
	[196]	[196]	[196]	[196]
With industrial output (1949/52, prov.)	0.401	0.813	0.542	-0.091
	(0.078)	(0.096)	(0.079)	(0.096)
	[194]	[194]	[194]	[194]
With industrial capital (1840–1937)	0.301	0.731	0.375	-0.241
	(0.064)	(0.108)	(0.088)	(0.093)
	[186]	[186]	[186]	[186]
Panel C: Alternative vulnerability to aerial attacks				
Treatment	-0.005	0.554	0.101	-0.240
	(0.133)	(0.121)	(0.100)	(0.107)
	[196]	[196]	[196]	[196]

Notes: Each cell is the outcome of a separate regression. Standard errors are clustered at the level of 400 × 400-kilometer cells (reported between parentheses). The unit of observation is a county; the number of observations is reported between square brackets. The instrument is the minimum distance to military U.S. and Taiwanese airfields penalized by the proximity to U.S.S.R. and North Korean airfields (except in Panel C where we treat North Korean interception capabilities in the same way as Chinese interception capabilities). All specifications include (i) matching-pair fixed effects, (ii) matching controls, and (iii) the additional controls, i.e., (log) travel cost to major ports through the river network, (log) distance to military airfields, and penalized flying cost to enemy airfields in 1964. In Panel A, we force control counties to sit within a ring around their "treated match" of $r = d/2$ (where $d = 206.96$ kilometers corresponds to the 2.5% percentile in bilateral distance between any pairs of counties) and R (the average bilateral distance between any pairs of counties, around $1,300$ kilometers); we consider a smaller exclusion zone of $r/5$ kilometers; and we consider a larger exclusion zone of $2r$ kilometers. In Panel B, we consider additional matching variables: travel cost to ports; total provincial industrial output in 1949 and in 1952; and (log) total industrial capital over the period 1840–1937. In Panel C, we derive vulnerability to aerial attacks as if North Korean bases had no interception nor attacking capabilities before and after 1960; the relationship between our endogenous treatment and this alternative definition of the instrument is displayed in column (6) of Table D1.

ment. These competing channels are: the allocation of factors (labor, credit, land) across production facilities in treated and control counties; the local political environment; and the role of confounding macroeconomic factors.

We show the robustness of our results to controlling for land and housing supply, urban (dis)amenities, corruption, education, and values across treated and control dis-

Figure D1. The mitigating role of housing, amenities, the public sector, education, and values.



A. Population (1982)

B. GDP per capita (1982)

C. Population (2010)

D. GDP per capita (2010)

Notes: All specifications include: (i) matched-pair fixed effects; (ii) matching controls (all in log), i.e., travel cost to resources (coal, coke, ore), access to the provincial capital, population in 1953, county area, and the number of industrial firms over the period 1840–1937; (iii) the additional controls, i.e., (log) travel cost to major ports through the river network, (log) distance to military airfields, and penalized distance to enemy airfields in 1964; and (iv) extended sets of controls. We report the main estimates for 8 sets of extended controls: land prices (residential, industrial, commercial) from the registry of auctioned land (1998–2018); housing characteristics from the 2015 1% Population Survey (share of homeless people, share of residents in dorms, share of the population living in dwellings constructed before 1990, share of subsidized housing, i.e., people renting at a lower than market rate or who purchased affordable housing or former public housing); pollution (average NO2, PM10, PM2.5 concentration, 2014–2020, in logarithm) from the China National Environmental Monitoring Center (CNEMC); average commute time from the 2015 1% Population Survey; shares of workers covered by social insurance and medical insurance from the 2015 1% Population Survey; average ratio of entertainment costs to revenue from the NBS survey (1998–2007); shares of residents with a high-school degree and with a college degree from the 2015 1% Population Survey; and values (coded from 1 to 5: "Hard work is critical for success," "Connection is critical for success," "Network is more important than ability," "Important to become rich," "Inequality is desirable," and "Fair competition is necessary for harmony") and pre- and post-Revolution elites (the percentage of Communist Party members, the percentage of pre-Revolution elites, i.e., individuals whose households were labeled as "landlords," "rich peasants", "capitalists," or "enterprise owners" at the time of the Communist Revolution, and the percentage of post-Revolution elites, i.e., individuals from households with at least one Communist Party member in the 1940–1965 birth cohorts—see Alesina et al., 2021) from the China Family Panel Survey (CFPS).

tricts. Figure D1 shows that indirect effects passing through land markets or through urban (dis)amenities cannot explain our findings: the large and swift decrease in output is observed even when controlling for the price of land, housing characteristics, pollution, or commuting facilities. Conditioning the analysis on the incidence of the state sector in housing supply is also innocuous: our main finding is not explained by derelict, subsidized housing. Finally, human capital, values, and the local political environment (education, "Communist values," or the shares of pre- and post-Revolution elites, from Alesina et al., 2021) do not appear to be a major mitigating factor.

D.3 A general sensitivity analysis

We now test the broader sensitivity of our main results to various specification choices (less directly related to the exclusion assumption). We test the robustness of the findings to (a) alternative matching strategies, (b) alternative imputation, (c) alternative inference, and (d) reasonable variations in the parameterization of the flying cost used to penalize distance to enemy air bases.

Table D6. A general sensitivity analysis—matching, imputation, and inference.

	Population (1982)	GDP p.c. (1982)	Population (2010)	GDP p.c. (2010)
Panel A: Alternative matching				
Local identification	0.183	0.543	0.392	0.118
	(0.044)	(0.081)	(0.062)	(0.074)
	[2408]	[2408]	[2408]	[2408]
More matching variables	0.192	0.549	0.274	-0.119
	(0.071)	(0.121)	(0.078)	(0.125)
	[196]	[196]	[196]	[196]
Fewer matching variables	0.594	1.155	0.830	-0.099
	(0.068)	(0.118)	(0.078)	(0.054)
	[192]	[192]	[192]	[192]
Nearest-neighbor matching	0.470	1.182	0.598	-0.267
	(0.148)	(0.218)	(0.146)	(0.199)
	[387]	[387]	[387]	[387]
Excluding poor matches	0.125	0.616	0.174	-0.218
	(0.101)	(0.109)	(0.102)	(0.103)
	[177]	[177]	[177]	[177]
Panel B: No imputation of missing				
No imputation of missing GDP	0.164	0.631	0.163	-0.088
	(0.097)	(0.115)	(0.098)	(0.112)
	[188]	[188]	[188]	[188]
Panel C: Inference				
Coefficient on Treatment	0.108	0.595	0.140	-0.195
SE 400-km Cluster (baseline)	(0.113)	(0.116)	(0.102)	(0.094)
SE Province Cluster	(0.107)	(0.101)	(0.103)	(0.083)
SE Conley (100-km radius)	(0.099)	(0.111)	(0.096)	(0.096)
SE Conley (200-km radius)	(0.100)	(0.111)	(0.091)	(0.078)
SE Conley (300-km radius)	(0.096)	(0.118)	(0.094)	(0.081)

Notes: Each cell is the outcome of a separate regression. Standard errors are clustered at the level of 400 × 400-kilometer cells (reported between parentheses). The unit of observation is a county; the number of observations is reported between square brackets in Panels A and B. The instrument is the minimum distance to military U.S. and Taiwanese airfields penalized by the proximity to U.S.S.R. and North Korean airfields. All specifications include (i) matching-pair fixed effects (except the first specification which includes province-fixed effects instead), (ii) matching controls, and (iii) the additional controls, i.e., (log) travel cost to major ports through the river network, (log) distance to military airfields, and penalized flying cost to enemy airfields in 1964. In the second row of Panel A, we additionally use (log) travel cost to major cities in 1900, (log) travel cost to Ming stations, (log) distance to military airfields, and (log) travel cost to the main trading ports as matching variables in order to select the group of control counties. In the third row, we only use (log) population in 1953, (log) county area, and (log) travel cost to coal fields as matching variables. In the fourth row, we select 5 nearest neighbors within our baseline specification. In the fifth row, we exclude matches with a propensity score below the 10^{th} percentile from our baseline specification.

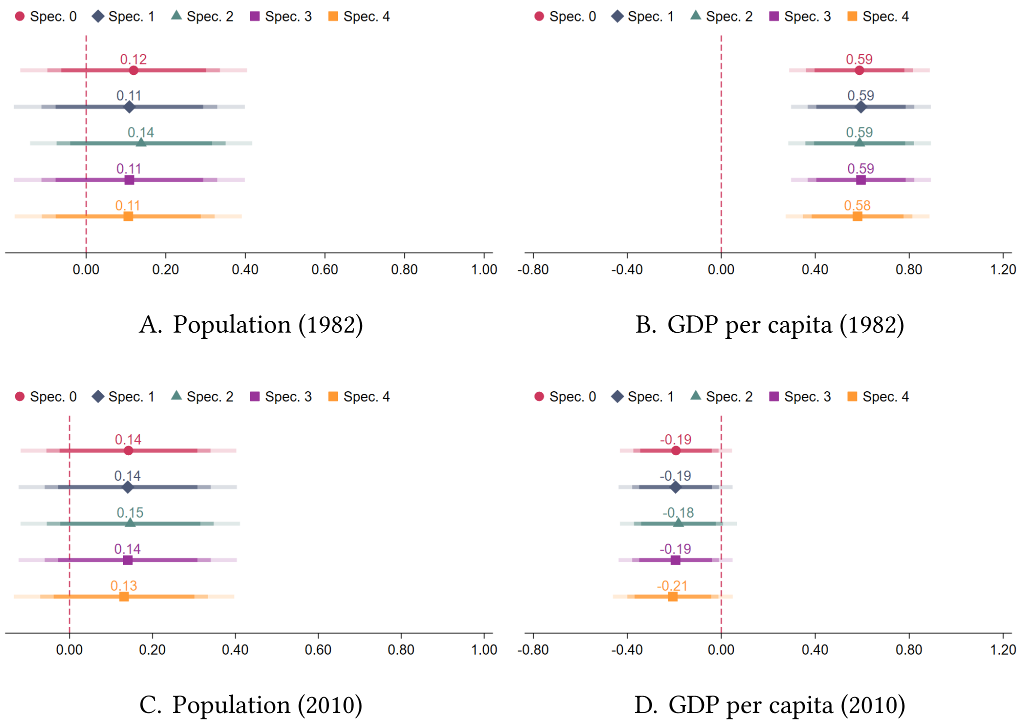
Alternative matching We start by analyzing variation along the baseline specification in Table D6. In Panel A, we run a simple OLS regression with province fixed effects on the whole sample of counties in China.[18] The treatment effects are slightly smaller than in the baseline specification, possibly reflecting spatial spillovers. We then revert to the baseline specification on the sample of counties selected through a matching procedure and: (i) we add travel cost to major cities in 1900, travel cost to Ming courier stations, distance to military airfields, and travel cost to the main trading ports to the matching process; (ii) we restrict the matching process to a small set of variables, i.e., travel cost to coal mines, population in 1953, and county area; (iii) we use a many-to-one matching procedure between treated and control counties within our baseline specification; and (iv) we exclude matches with a propensity score below the 10^{th} percentile from our baseline specification. The main result, i.e., the large difference in GDP per capita in 1982 and the subsequent catch-up, is qualitatively unchanged relatively to the baseline.

Imputation and clustering In the baseline specification, GDP per capita is sometimes imputed in 2010. In Panel B of Table D6, we derive the main estimates without any such imputation and use GDP per capita in 2000, which suffers from fewer missing observations, to capture the long-run effect of the MRPs on local productivity. The less negative coefficient might be explained by the fact that the measure is then extracted in 2000—in line with dynamics shown in Figures 3 and E1. Finally, the baseline inference strategy clusters standard errors at the level of (34) 400×400-kilometer cells. In Panel C of Table D6, we reproduce the baseline results but provide: clustered standard errors at the province level, as well as standard errors with an arbitrary spatial correlation within 100, 200, and 300 km (following Colella et al., 2019). The variation in the precision of the estimates is limited across these alternative inference strategies.

Alternative measure of penalized flying cost Our instrument for hosting a MRP is a measure of penalized flying cost from enemy air bases in the 1950s. As explained in Appendix C.2, we set the key parameters governing this flying cost using declassified CIA technical intelligence documents from the early 1950s. Sources however differ slightly about the characteristics of the American F-86 interceptor, and although the main Soviet interceptor was the MiG-15, another aircraft, the Yakovlev, was sometimes used. This grants us some freedom in choosing the key combat ranges and thus the parameters that they govern. Additionally, we consider an adjustment that allows the flying cost paid by enemy bombers for traveling near allied bases to be mitigated by the proximity to their own bases—see Appendix C.2. We test the robustness of the results to such

[18] The identification thus relies on a comparison of treated counties with their neighbors.

Figure D2. A general sensitivity analysis—flying cost from enemy air bases in the 1950s.



Notes: The instrument is the minimum distance to U.S. and Taiwanese military airfields penalized by the proximity to U.S.S.R. and North Korean airfields under 5 different specifications. Spec. 0 corresponds to our baseline; it uses the combat range of MiG-15 VK-1 aircrafts to determine the reach of U.S.S.R. interceptors and a combat range of 1,485 km for U.S. interceptors. Spec. 1 uses instead the technical characteristics of the Yakovlev Type-28 for Soviet interceptors. Spec. 2 uses instead a combat range of 1,611 km for U.S. interceptors. Spec. 3 uses both the Yakovlev Type-28 combat range for Soviet interceptors and a combat range of 1,611 km for U.S. interceptors. Spec. 4 uses the same combat range parametrization as Spec. 0 but adjusts the flying cost to allow for some protection for U.S. aircrafts at their own airbases—see Appendix C.2. The relationship between our endogenous treatment and the instruments based on these alternative flying cost specifications is displayed in Table D1. All specifications include (i) matched-pair fixed effects, (ii) matching controls, and (iii) the additional controls, i.e., (log) travel cost to major ports through the river network, (log) distance to military airfields, and penalized distance to enemy airfields in 1964. Each dot represents the coefficient on the variable indicated in the panel title, following different parametrization of the flying cost penalty used to construct the instrument.

choices in Figure D2, where we retain the functional form assumption but use different combat ranges to calibrate "free" parameters ($\bar{x}$, a, b, and g, following the notation of Appendix C.2).

D.4 Measurement of economic activity

The baseline specification shows a rise-and-fall pattern in GDP per capita at the county level. We now complement these findings with alternative measures of economic development. In Panel A of Table D7, we extract a few additional variables from the 1982 Census, i.e., the labor force participation, illiteracy rate, and male-to-female ratio. The illiteracy rate is much lower in treated counties (11 percentage points). There are no sharp differences in the male-to-female ratio, which shows that selected immigration, if any, was not strongly tilted toward males.

Table D7. Sensitivity to other measures of economic development.

	Participation	Illiteracy	Gender ratio
Panel A: Additional census variables			
Treatment effect (1982)	-0.032	-0.107	-0.032
	(0.011)	(0.013)	(0.012)
	[196]	[196]	[196]
	Agriculture	**Industry**	**Services**
Panel B: Sectoral decomposition			
Treatment effect (1990)	-0.257	0.146	0.110
	(0.036)	(0.024)	(0.016)
	[196]	[196]	[196]
Treatment effect (2010)	-0.048	-0.057	0.105
	(0.036)	(0.032)	(0.024)
	[196]	[196]	[196]

Notes: Each cell is the outcome of a separate regression. Standard errors are clustered at the level of 400 × 400-kilometer cells (reported between parentheses). The unit of observation is a county; the number of observations is reported between square brackets. The instrument is the minimum distance to U.S. and Taiwanese military airfields penalized by the proximity to U.S.S.R. and North Korean airfields. All specifications include: (i) matching-pair fixed effects; (ii) matching controls; and (iii) the additional controls, i.e., (log) travel cost to major ports through the river network, (log) distance to military airfields, and penalized flying cost to enemy airfields in 1964.

In Panel B, we shed additional light on the nature of the rise-and-fall pattern: we document the allocation of workers across sectors in 1990 and 2010. The observed difference in household registration (see Table 3) does reflect a difference in employment shares across sectors of the local economy: the employment share in agriculture is almost 26 percentage points lower in treated counties. The "released" labor force is almost equally absorbed by industry and services. In particular, a significant share of workers in the service sector are allocated to distribution and transportation (results not shown), two sub-sectors very likely to intervene in the production chain of a MRP. The magnitude of these estimates is large: the local allocation of workers in treated counties resembles the aggregate Chinese economy after the transition. In 2010, however, treated counties are less industry-intensive, a result mostly explained by a higher prevalence of services (distribution and transportation).

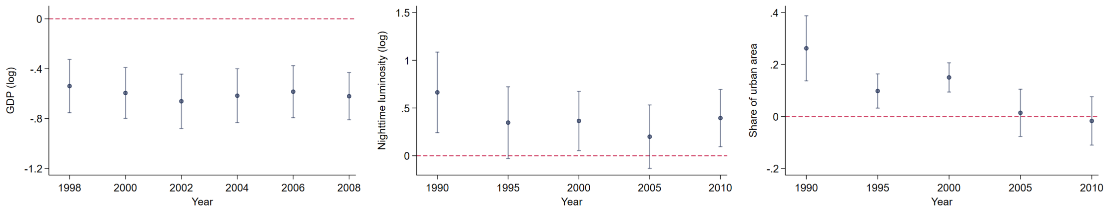
E Structure of production, treatment heterogeneity, and mechanisms

This section gathers complementary evidence on: the structure of production in treated counties (E.1); firm entry and other composition effects (E.2); treatment heterogeneity (E.3); production linkages and the concentration of production (E.4); and entrepreneurs and entrepreneurial values (E.5).

E.1 Structure of production in treated counties

In this section, we provide a sensitivity analysis of our baseline findings on the structure of production in treated counties.

Figure E1. The dynamics of counties hosting MRPs: GDP, nighttime luminosity, and urbanization.



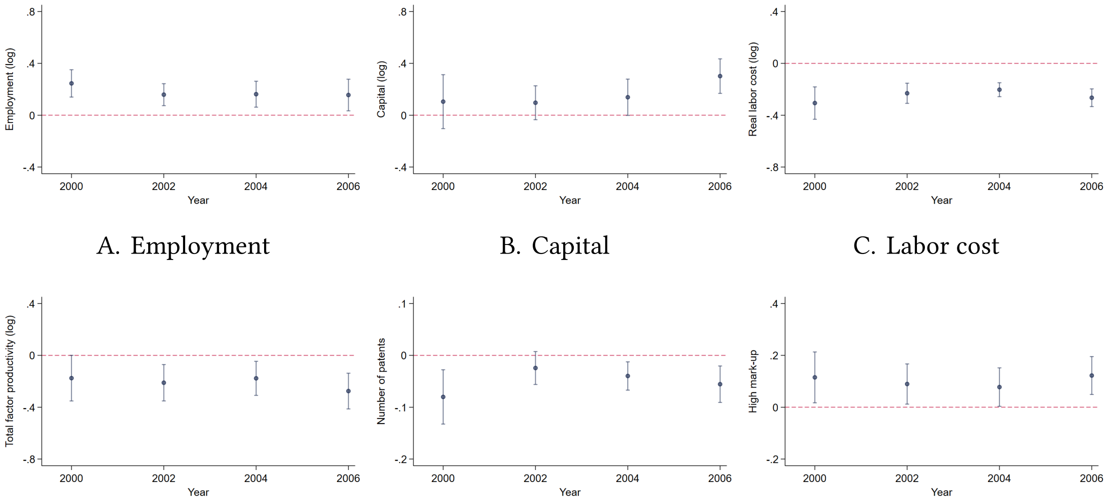
A. GDP B. Nighttime luminosity C. Urban extent

Notes: Panel A reports the "bi-yearly" treatment effect for (log) GDP (1997–2010); where county-level measures of GDP are extracted from Michigan University's China Data Center. For visualization purposes, we consider separate treatment estimates for 1997–1998, labeled as 1998, 1999–2000, labeled as 2000, etc. In Panels B and C, we show the treatment effect on: the (log) average nighttime luminosity in 1990, 1995, 2000, 2005, and 2010; and the average share of urban land in 1990, 1995, 2000, 2005, and 2010, as computed using impervious surface recognition. To limit the noise induced by satellite imagery, the previous measures take median values over a 5-year interval (Panels B and C). For instance, average nighttime luminosity in 2000 is the median value of average nighttime luminosity in 1998, 1999, 2000, 2001, and 2002.

Dynamic treatment effects In a first step, we study the *dynamic* treatment effects at the "aggregate level." A limit of this exercise is the lack of coherent data at the county level over time. First, consistent firm-level data—from which we could aggregate to the county level—only cover manufacturing and are mostly available for the period 1998–2007: earlier or later observations tend to be subject to attrition. Second, aggregate statistics are not frequently available at this (administrative) level; they would typically be better documented one echelon higher. In this Appendix, we use a measure of county output or (log) GDP, as extracted from Michigan University's China Data Center. Even then, (i) this measure is not normalized by population because actual population within a county at a yearly level is hard to measure precisely, and (ii) there is poor pre-1997 coverage and a high geographical clustering of non-missing values. Keeping these limitations in mind, we show the dynamic evolution of this proxy in panel A of Appendix Figure E1 for the period 1997–2010: we find that GDP is lower in treated counties, with a slow widening of the gap over the period. We conduct a similar exercise with data extracted from satellite imagery in panels B and C of Appendix Figure E1: nighttime luminosity and the share of urban land use within the country.

In a second step, we study the dynamic treatment effects for other establishments than MRPs at the firm level. More precisely, we estimate the treatment effect using Specification (1) at the establishment level in different years, and we report the results in Figure E2. These results are obtained with the full set of fixed effects used in Table 4 to control for the slow demise of public enterprises and time variation in sectoral returns. As apparent from Figure E2, the average other establishment remains larger in treated counties over the period, and labor cost remains quite stable, as do productivity, patenting behavior and markup (Panels C, D, E, and F).

Figure E2. The dynamics of other establishments in counties hosting MRPs.



A. Employment   B. Capital   C. Labor cost

D. Total Factor Productivity   E. Patents   F. Markup

Notes: Panels A-F display the treatment effect for the main outcomes of Table 4: employment; real capital; real labor cost; a measure of total factor productivity at the establishment level, identified using an exogenous labor supply shifter (see Imbert et al., 2022, and Appendix B.5); registered patents (He et al., 2018); and markups computed following De Loecker and Warzynski (2012). We estimate Specification (1) at the establishment-level, separately for each consecutive 2-year period between 2000 and 2007, and report the "period" treatment effect.

Structure of firm production (detail) Our baseline firm analysis focuses on a few outcomes. In this section, we provide a comprehensive analysis of factor use, factor productivity, firm characteristics, patenting behavior, investment, and subsidies in the average establishment. We report in Table E1 the average treatment effect on factor productivity (Panel A), firm type and characteristics of the workforce (Panel B), liabilities, subsidies, and investment (Panel C), factor intensity (Panel D), patenting (Panel E), markups (Panel F), and firm expenditures usually related to corruption (Panel G; see Cai et al., 2011). The first and last columns of Panel A are already discussed in the main text. In addition, we find that labor productivity and capital productivity are also about 25% lower than in control counties. Next, we characterize the establishment "type" in treated counties, specifically whether the average establishment is more likely to be publicly owned, older, and biased towards a more educated workforce. Panel B of Table E1 shows that manufacturing establishments are more likely to be publicly-owned, and more likely to be older than three years; these effects are however small. The composition of the workforce markedly differs between treated and control counties: the average employee in treated counties is *much* more likely to be a skilled worker. In view of this observation, our finding that wages are lower in treated counties could be puzzling, and this finding is inconsistent with an explanation based on under-investment in human capital (Franck and Galor, 2021). The average employee is however less likely to occupy a "senior" position within the firm—the effect is to be compared with the average 28 percentage points share of senior workers.

We describe the financing structure of establishments in treated counties, their investment, and the expenditures devoted to R&D in Panel C. The patterns from this analysis do not support a story based on political favoritism (Chen et al., 2017; Fang et al., 2023): public subsidies appear to be only slightly more frequent in treated counties (see column 1). The results are inconsistent with privileged access to resources (Harrison et al., 2019): total liabilities are not higher than in control counties (column 2); long-term investment is not lower (see column 3). The financing structure in the average (other) establishment in treated counties appears to be quite similar to that of control counties.

We characterize production in treated counties using product codes at the 6-digit level in Panel D. We regress the (log) factor intensity, as predicted by the 6-digit product code (following the classification of Shirotori et al., 2010), on the treatment T_i, instrumented by V_i. In this specification, we omit year interacted with 4-digit industry and product fixed-effects. Our findings point toward some specialization of treated counties in capital- and land-intensive production, but the extent of such specialization remains moderate.

We turn to the more direct analysis of technological innovation through the analysis of patent applications across establishments (Panel E). We distinguish three categories: design, innovation, and utility. We find that establishments in treated counties produce fewer patents across all categories: -0.029 (design), -0.020 (invention), and -0.011 (utility).

We now turn to the analysis of markups across establishments. We rely on a trans-log specification for the production function and consider two main strategies: A (without inputs in the control function) and B (using direct materials as inputs in the control function). For both strategies, we construct two measures for markups: a dummy equal

Table E1. Structure of firm production in the other establishment (detail).

	Labor cost	MPL	MPK	TFP
	(1)	(2)	(3)	(4)
Panel A: Factor productivity				
Treatment	-0.256	-0.225	-0.275	-0.257
	(0.033)	(0.078)	(0.061)	(0.063)
Observations	348,632	348,632	348,632	348,632
	Public	Young	Emp. (skilled)	Emp. (senior)
	(1)	(2)	(3)	(4)
Panel B: Firm characteristics (public ownership, age, employment structure)				
Treatment	0.040	0.004	0.111	-0.064
	(0.018)	(0.016)	(0.016)	(0.020)
Observations	348,796	348,796	31,668	17,124
	Subsidies	Liabilities	Investment LT	R&D expenses
	(1)	(2)	(3)	(4)
Panel C: Financing, Investment, R&D and technology				
Treatment	0.030	0.004	-0.003	-0.024
	(0.022)	(0.003)	(0.007)	(0.018)
Observations	253,237	253,237	210,561	210,561
	Human capital	Physical capital	Land	
	(1)	(2)	(3)	
Panel D: Factor intensity				
Treatment	0.018	0.065	0.084	
	(0.009)	(0.026)	(0.012)	
Observations	321,672	321,672	321,672	
	Design	Utility	Invention	All
	(1)	(2)	(3)	(4)
Panel E: Patents				
Treatment	-0.029	-0.020	-0.011	-0.051
	(0.008)	(0.007)	(0.004)	(0.013)
Observations	348,632	348,632	348,632	348,632
	Markup (A,m)	Markup (A,l)	Markup (B,m)	Markup (B,l)
	(1)	(2)	(3)	(4)
Panel F: Markups				
Treatment	0.111	0.077	0.082	0.095
	(0.034)	(0.039)	(0.044)	(0.046)
Observations	223,341	175,068	183,108	143,021
	ETC (level)	ETC (standardized)	ETC (log)	ETC (any)
	(1)	(2)	(3)	
Panel G: Entertainment and travel costs as share of revenue				
Treatment	-0.063	-0.016	-0.013	0.000
	(0.070)	(0.018)	(0.079)	(0.025)
Observations	42,672	42,672	33,602	42,672

Notes: Standard errors are clustered at the level of 400 × 400-kilometer cells. All specifications include the baseline controls of Table 4 (except Panels B and D, in which we omit firm type/age × year fixed effects and 4-digit industry/6-digit product × year fixed effects, respectively). *Labor cost* is the logarithm of total compensation per employee; *MPL* (resp. *MPK*, *TFP*) is the logarithm of firm-specific labor productivity (resp. capital, total factor productivity) as computed in Imbert et al. (2022). *Public* and *Young* are dummies equal to 1 if the firm is a state-owned enterprise, and is younger than 3 years. All variables of Panel C are dummies equal to 1 if the associated accounting variable is positive. Factor intensities are the (log) factor intensities, as predicted by the 6-digit product code (following the classification of Shirotori et al., 2010). *Markup* (m) (resp. l) is a dummy equal to one if the markup is above the median within a 4-digit industry × year cell (resp. the log. markup), computed following De Loecker and Warzynski (2012). Panel G displays the "entertainment and travel costs" used by managers (ETC) as a percentage of total revenue in column (1). We standardize this variable in column (2), take its logarithm in column (3), and discretize it in column (4); information on ETC is only available in 2004.

to one if the markup is above the median within a 4-digit industry × year cell (m) and the (log) markup (l). As shown in Panel F, markups are higher in treated counties across these different specifications.

Finally, we explore in Panel G possible differences in "entertainment and travel costs" (ETC) across counties, as a proxy for the local incidence of corruption (Cai et al., 2011). We use different measures to normalize these ETC, without finding any positive treatment effects. If anything, entertainment and travel costs are lower in treated counties.

Table E2. Firm entry and other composition effects—incumbents and non-incumbents.

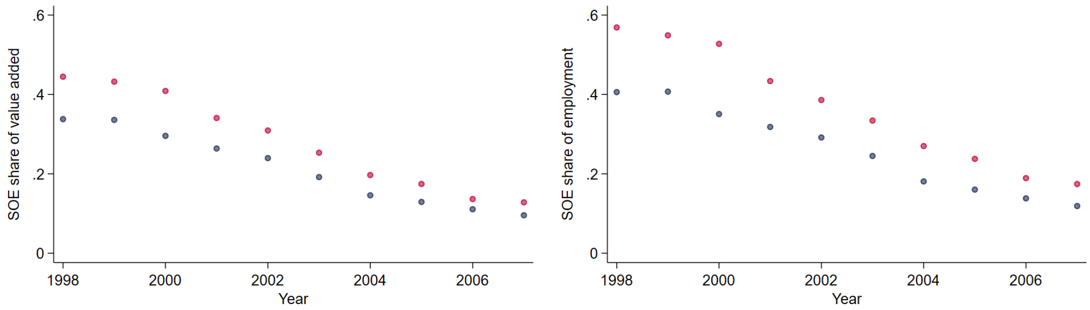
	Labor	Capital	Wage	TFP	Patents	Markup
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Incumbents						
Treatment	-0.110	-0.427	-0.168	0.003	-0.017	0.032
	(0.084)	(0.087)	(0.050)	(0.074)	(0.091)	(0.027)
Obs.	18,516	18,516	18,516	18,516	18,516	11,861
Panel B: Non-incumbents						
Treatment	0.188	0.256	-0.256	-0.268	-0.044	0.117
	(0.054)	(0.060)	(0.032)	(0.067)	(0.013)	(0.034)
Obs.	328,544	328,544	328,544	328,544	328,544	209,968
Sector	Agri.	Mineral	Che./met.	Manuf.	Ma./Tran.	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Panel C: Non-incumbents' industries						
Treatment	0.076	-0.018	0.002	-0.092	0.019	-0.001
	(0.018)	(0.018)	(0.025)	(0.017)	(0.021)	(0.003)
Obs.	329,255	329,255	329,255	329,255	329,255	329,255

Notes: Standard errors are clustered at the level of 400 × 400-kilometer cells. The unit of observation is an establishment × year. We exclude the MRPs from the sample. All specifications include the extended controls of Table 4 (including matching-pair fixed effects interacted with year fixed effects), 4-digit industry × year fixed effects, 6-digit product × year fixed effects, age × year fixed effects, and firm type × year fixed effects. Incumbents and non-incumbents are defined based on their date of creation (i.e., before and after 1982). In Panels A and B, *Labor* is the logarithm of the number of workers; *Capital* is the logarithm of real capital; *Labor cost* is the logarithm of total compensation per employee; *TFP* is the logarithm of firm-specific total factor productivity as computed in Imbert et al. (2022); *Patents* is the number of patent applications registered by the firm; *Markup* is a dummy equal to one if the markup is above the median within a 4-digit industry × year cell, computed following De Loecker and Warzynski (2012). In Panel C, the dependent variables are dummies for being in the following large industrial categories: Agriculture, Food; Mineral products; Chemicals, Metals; Manufactured goods; Machines, Transport; Other.

E.2 Firm entry and other composition effects

Incumbents and non-incumbents We first shed light on composition effects in Table E2, where we estimate the "treatment effect": on the characteristics of incumbent, older firms (panel A); on the characteristics of younger firms (panel B); and on the allocation of the latter across industries—an exercise in which we classify firm industries across rough industrial categories (panel C). Incumbents and non-incumbents are defined based on their date of creation (i.e., before and after 1982). We find that the effect of the MRPs on the structure of production is generally driven by younger firms created after 1982, which are less productive, innovative, and competitive. These non-incumbents in treated counties are less likely to operate in the broad "Manufactured Goods" category, which largely corresponds to the light industry and the production of consumer goods. This finding is consistent with the MRPs primarily leading to the development of "support" industries.[19]

Figure E3. Share of economic activity due to SOEs (1998–2007).



A. Value added   B. Employment

Notes: In Panel A, the red (respectively, blue) dots show the average share of total value added due to SOEs in treated (respectively, control) counties in a given year. Panel B is instead based on employment shares. Source: *Annual Survey of Industrial Firms* (ASIF, 1998–2007).

Firm types in treated/control counties Our baseline analysis does not directly control for the general equilibrium effect of the State-Owned Enterprises (SOEs) reforms of the late 1990s and early 2000s—a robustness check that we consider in Table D3 of this online Appendix. We report the share of total value added due to SOEs in treated and control counties in Figure E3, where we find that this share is around 0.35-0.42 in 1998 and drops to 0.10-13 in 2007. There is a systematic difference of around 3-7 percentage points between treated and control counties at any point in time; in other words, the two series exhibit a similar declining trend. These moderate differences justify: our previous

[19]Note that the 156 program spearheaded industrial development in China; as a consequence, very few firms in the data are older than the MRPs. For this reason, we use 1982 as the cutoff between "incumbent" and "non-incumbents" firms, consistently with the delineation of the treatment period in the paper. However, we can also define incumbents as establishments founded before the beginning of the 156 program in 1953; this alternative specification yields similar, yet much noisier, results.

exercise in Panel C of Table D3, where we condition the analysis on the share of State-Owned Enterprises (SOEs) in a county's production before the opening of the economy and their later downsizing; or our previous exercise in Panel B of Table E1 where we estimate the treatment estimates on the average firm characteristics in treated and control counties (e.g., public ownership, age, employment structure). We find that our results are left unchanged when conditioning on the incidence of SOEs, suggesting that layoffs in counties where SOEs once dominated the local economy do not drive the rise-and-fall pattern observed in the treated group. We also find limited, yet not insignificant, differences in firm composition across counties.

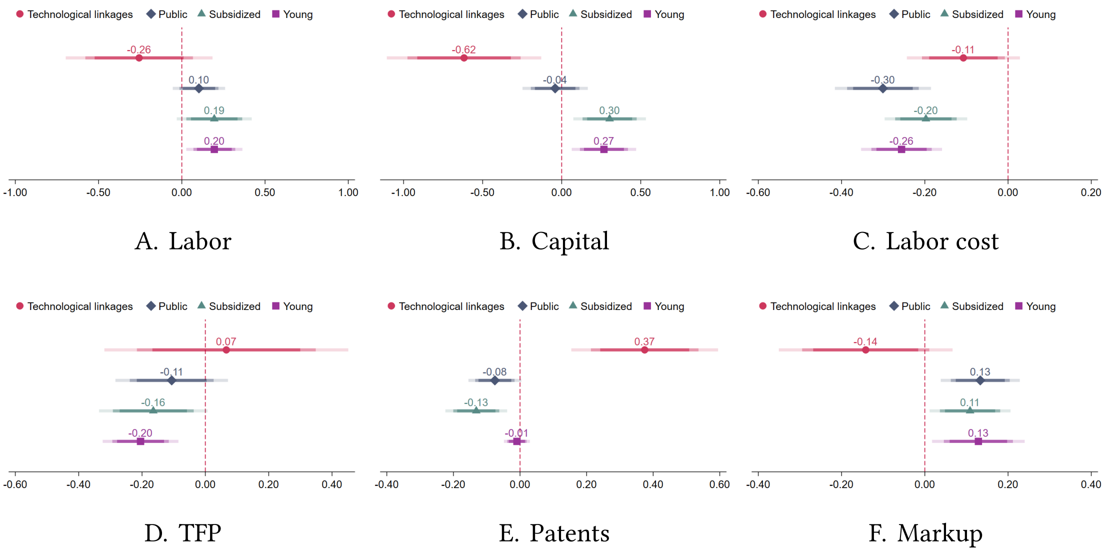
Table E3. Characteristics of establishments along the production chain of MRPs.

	Public	Subsidized	Young	Entry	Exit
	(1)	(2)	(3)	(4)	(5)
Panel A: All firms					
Treatment	0.040	0.016	0.004	0.037	-0.002
	(0.018)	(0.028)	(0.016)	(0.007)	(0.006)
Obs.	348,796	348,796	348,796	348,796	348,796
Panel B: Production links					
Treatment	0.095	-0.077	-0.013	0.053	-0.007
	(0.031)	(0.045)	(0.043)	(0.024)	(0.012)
Obs.	28,385	28,385	28,385	28,385	28,385

Notes: Standard errors are clustered at the level of 400 × 400-kilometer cells. The unit of observation is an establishment × year. We exclude the MRPs from the sample. All specifications include the baseline controls (Table 4, including matched-pair fixed effects interacted with year fixed effects), 4-digit industry × year fixed effects, and 6-digit product × year fixed effects. *Production links* is the sample of firms operating along the production chain of local MRP(s).

We group additional evidence on business dynamics and the role of the state in production in Table E3. More specifically, we document the prevalence of public firms, subsidized firms, young firms, firm entry, and firm exit in treated counties by running the baseline specification of Table 4 with respective dummies as dependent variables (and no fixed effects for the different firm types and firm age). We find that the average other establishment in treated counties is different from the average establishment in control counties: these firms are more likely to be public. By contrast, the average treatment effect on firm age or exit is small. Panel B of Table E3 provides a more subtle insight into the (slow) dynamics of production in treated counties by looking at the (heterogeneous) effects through the production chain of MRPs. To do so, we restrict the sample to establishments operating downstream of, operating upstream of, or operating in the same 4-digit industry as local MRP(s) (hypothetically so in control counties—see Appendix C.3). We find that the production chain of MRPs is more likely to be public, but not older or subsidized by the state.

Figure E4. Productivity, innovation, and pricing across specific establishments.

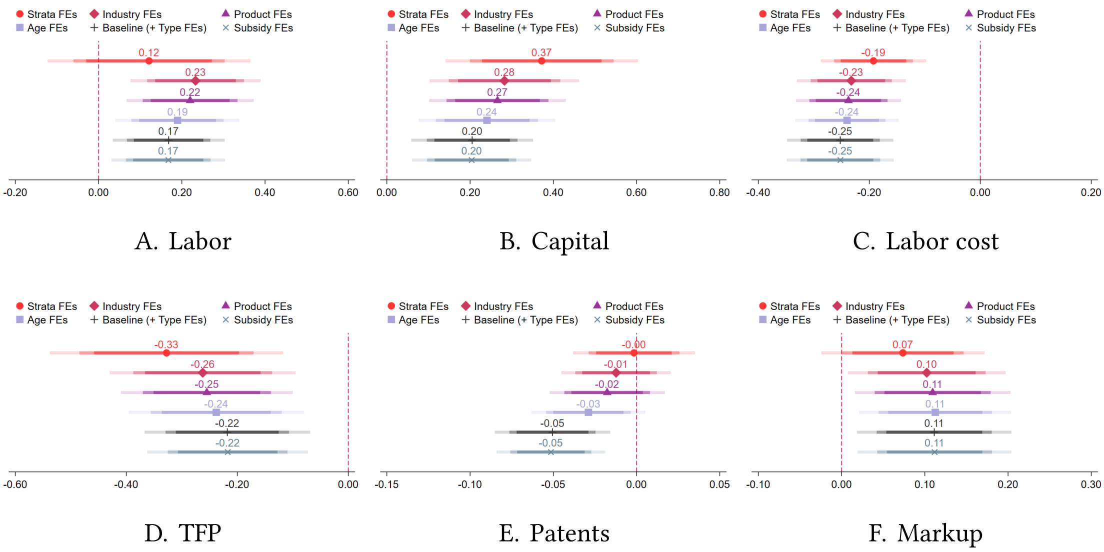


Notes: This Figure displays the treatment estimates for the following outcomes: *Labor* is the logarithm of the number of workers; *Capital* is the logarithm of real capital; *Labor cost* is the logarithm of total compensation per employee; *TFP* is the logarithm of firm-specific total factor productivity as computed in Imbert et al. (2022); *Patents* is the number of patent applications registered by the firm; *Markup* is a dummy equal to one if the markup is above-median within a 4-digit industry × year cell, computed following De Loecker and Warzynski (2012). The unit of observation is an establishment × year, we exclude the MRPs from the sample, and standard errors are clustered at the level of 400 × 400-kilometer cells. All specifications include the extended controls of Table 4. In each panel, we report four estimates: one obtained using the sample of firms linked through technology (*Technological linkages*); one obtained using the sample of public firms (*Public*); one obtained using the sample of subsidized firms (*Subsidized*); and one obtained using the sample of firms that are younger than 3 years old (*Young*).

We finally quantify whether the previous composition effects may explain the different production structure observed across the average establishment(s) of treated and control counties. To do so, we look at treatment effects within subsamples of public, subsidized, and young firms and report the estimates in Figure E4. We find that treatment effects on our main outcomes are quite comparable across the latter categories of production units (public, subsidized, or young firms). These findings, coupled with the analysis described in Section 4.3 and Appendix E.1, show that the rise and the fall of treated counties cannot be driven by the demise of the public sector or a misallocation of public subsidies. We do however find differences for firms that are technologically linked to MRPs: these firms tend to be small but very active in patenting; they nonetheless represent too small a fraction of total innovation to matter in the local economy.

Robustness to composition and the role of fixed effects In a last exercise, we look at the role of composition effects (and the choice of fixed effects) in explaining the estimates provided in Table 4. In Figure E5, we include the extended controls of Table 4 in succession: match-strata fixed-effects in the first specification; then adding industry fixed effects [all interacted with year dummies]; then adding product fixed effects; then

Figure E5. Structure of firm production in the average other establishment—robustness to composition.



Notes: This Figure displays the treatment estimates for the outcomes of Table 4. *Labor* is the logarithm of the number of workers; *Capital* is the logarithm of real capital; *Labor cost* is the logarithm of total compensation per employee; *TFP* is the logarithm of firm-specific total factor productivity as computed in Imbert et al. (2022); *Patents* is the number of patent applications registered by the firm; *Markup* is a dummy equal to one if the markup is above-median within a 4-digit industry × year cell, computed following De Loecker and Warzynski (2012). The unit of observation is an establishment × year, we exclude the MRPs from the sample, and standard errors are clustered at the level of 400 × 400-kilometer cells. The different specifications include the extended controls of Table 4 in succession: match-strata fixed-effects in the first specification; then adding industry fixed effects [all interacted with year]; then adding product fixed effects; then adding age fixed effects; then adding firm type fixed effects (corresponding to Table 4); then adding a dummy for receiving public subsidies.

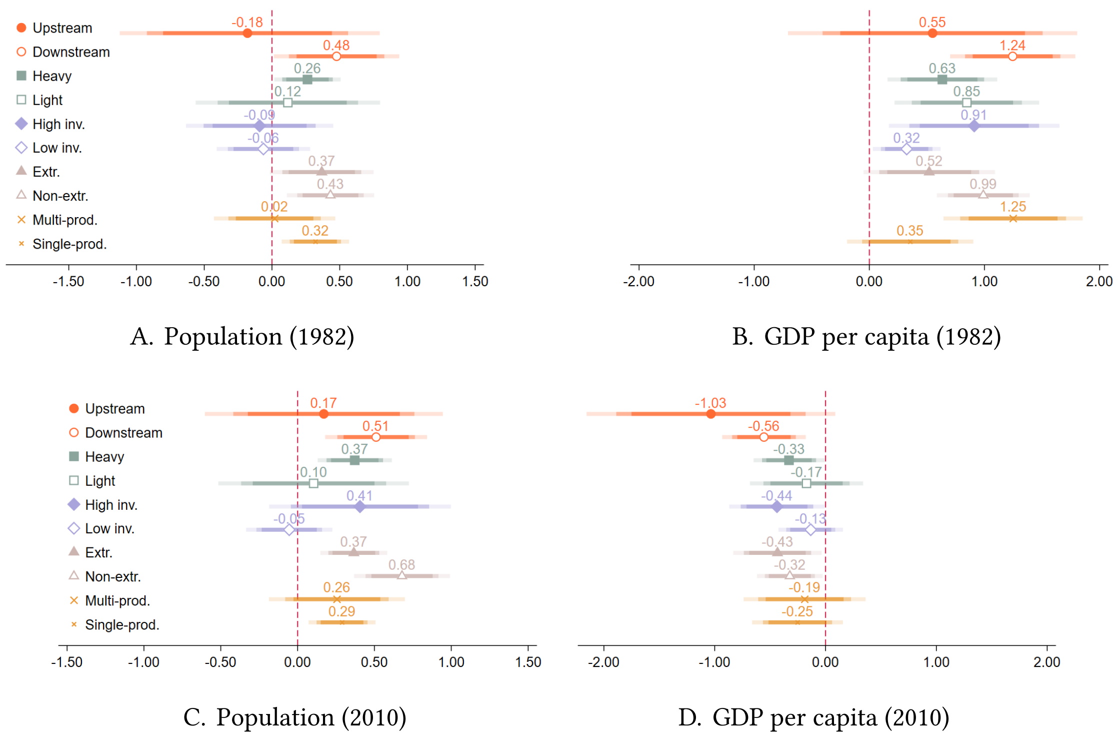
adding age fixed effects; then adding firm type fixed effects (corresponding to our baseline regression of Table 4); then adding a dummy for receiving public subsidies. We find that the treatment effects are mostly robust to controlling (or not) for: (i) the industrial fabric in treated counties (industry and product), (ii) the life-cycle of firms (age), and (iii) the demise of public establishments in China (firm type).

E.3 Treatment heterogeneity in MRP characteristics

In this section, we discuss treatment heterogeneity in MRP characteristics at the county and firm level.

The nature of MRP production We first estimate treatment heterogeneity in the nature of local MRP production. In Figure E6, we focus on aggregate county outcomes and display treatment effects associated with: (i) MRPs operating upstream/downstream (orange circles; upstream MRPs are those with a relative intensity of downward linkages versus upward linkages above median); (ii) heavy/light-industry MRPs (teal squares); (iii) high/low-investment industry MRP (lavender diamonds; high-investment MRPs are

Figure E6. Treatment heterogeneity in MRP characteristics—county results (1/2, the nature of MRP production).



A. Population (1982)

B. GDP per capita (1982)

C. Population (2010)

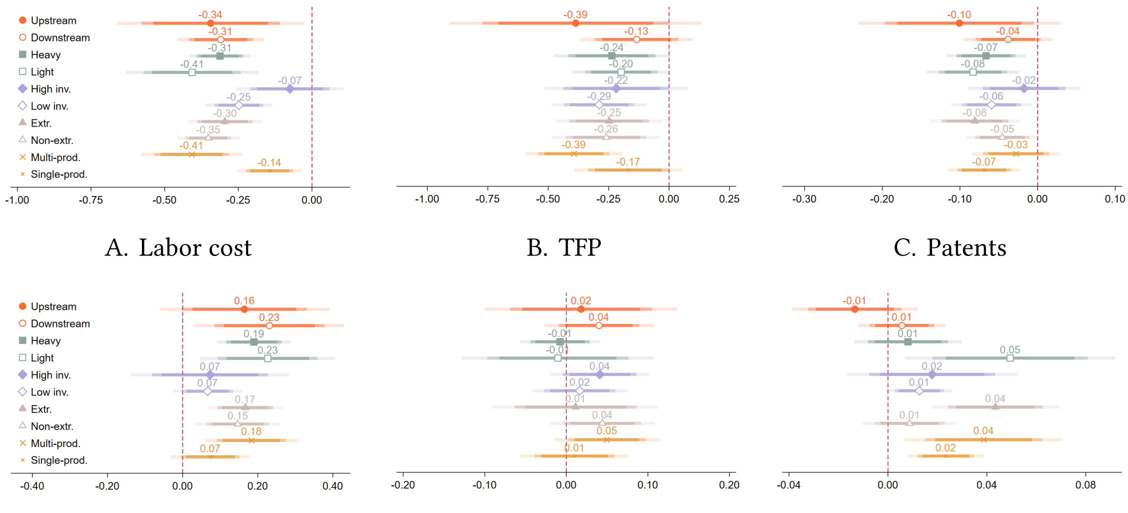
D. GDP per capita (2010)

Note: This Figure displays the treatment estimates for the baseline county outcomes. The unit of observation is a county. All specifications include the extended controls of Table 3. In each panel, we report five sets of estimates, obtained using treated and control counties associated with: a MRP operating upstream/downstream as orange circles [*Upstream/Downstream*]; a heavy/light-industry MRP as green rectangles [*Heavy/Light*]; a high/low-investment MRP as purple diamonds [*High-inv./Low-inv.*]; an extractive/non-extractive MRP as beige triangles [*Extr./Non-extr.*]; and single-/multi-product MRPs as yellow crosses [*Multi-prod./Single-prod.*].

those with top-quartile initial investment); (iv) extractive/non-extractive MRPs (gray triangles); and (v) single-/multi-product MRPs (yellow crosses). We report the following outcomes: county-level population in 1982 and 2010 (Panels A and B); and county-level GDP per capita in 1982 and 2010 (Panels C and D). Our main finding is that the rise *and* fall is less pronounced for low-investment MRPs.

We then report the same analysis of treatment heterogeneity using establishment-level data in Figure E7. We report these estimates for six main outcomes: labor cost (Panel A); Total Factor Productivity (Panel B); patents (Panel C); markup (Panel D); the incidence of production links (aggregating downstream, upstream, and "horizontal" linkages, see Panel E); and the incidence of technological links (see Panel F). Among these dimensions of treatment heterogeneity, the position of MRPs in production chains does seem to matter the most. The effect of having upstream MRP(s) on productivity and innovation is more negative than receiving downstream MRP(s). There are also a few differences in the treatment impact of hosting light-industry versus heavy-

Figure E7. Treatment heterogeneity in MRP characteristics—firm results (1/2, the nature of MRP production).



A. Labor cost B. TFP C. Patents

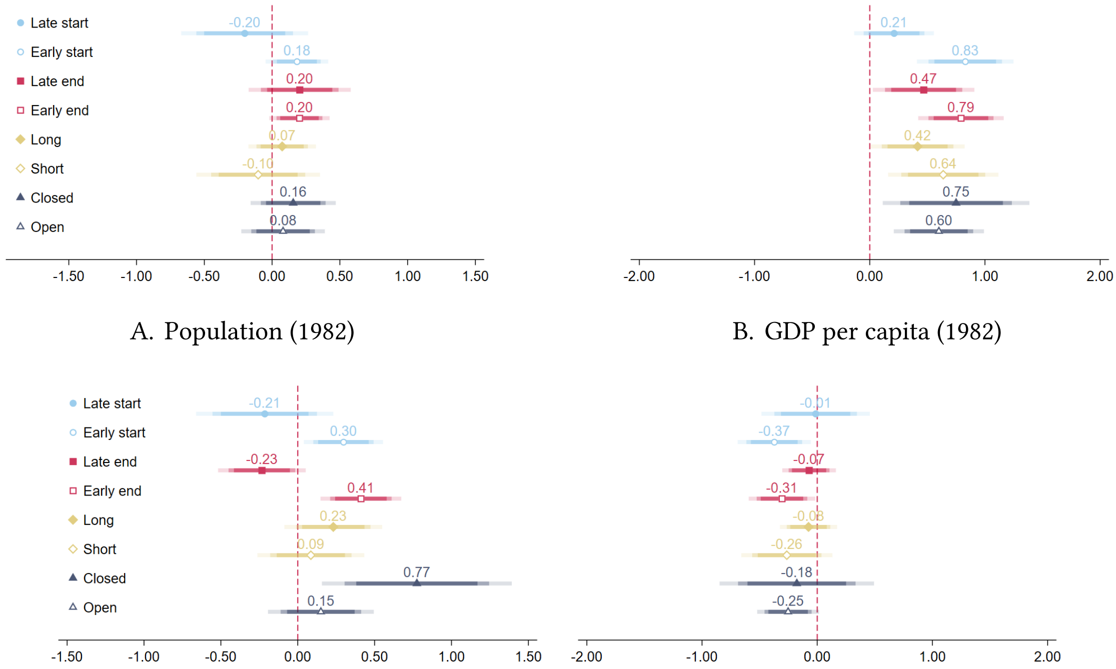
D. Mark-up E. Production links F. Technological links

Note: This Figure displays the treatment estimates for the following outcomes: *Labor cost* is the logarithm of total compensation per employee; *TFP* is the logarithm of firm-specific total factor productivity as computed in Imbert et al. (2022); *Patents* is the number of patent applications registered by the firm; *Markup* is a dummy equal to one if the markup is above-median within a 4-digit industry × year cell, computed following De Loecker and Warzynski (2012)—see Appendix B; *Production links* is a dummy equal to one if the firm operates along the production chain of local MRP(s); *Technological links* is a dummy equal to one if sectors in which the establishment and the MRP(s) operate are linked through patent applications. The unit of observation is an establishment × year, we exclude the MRPs from the sample, and standard errors are clustered at the level of 400 × 400-kilometer cells. All specifications include the extended controls of Table 4. In each panel, we report five sets of estimates: one obtained using treated and control counties associated with a MRP operating upstream/downstream [*Upstream/Downstream*]; one obtained using treated and control counties associated with a heavy/light-industry MRP [*Heavy/Light*]; one obtained using treated and control counties associated with a high/low-investment MRP [*High-inv./Low-inv.*]; one obtained using treated and control counties associated with extractive/non-extractive MRP [*Extr./Non-extr.*]; and single-/multi-product MRPs [*Multi-prod./Single-prod.*].

industry MRP(s), with light industries generating more technological spillovers than heavy-industry MRP(s).

Other MRP characteristics Figures E8 and E9 further explore treatment heterogeneity by investigating other MRP characteristics. More specifically, we divide the sample of counties depending on: (i) whether the time at which the construction of the MRP(s) was started is before/after 1954 [*Late start/Early start*]; (ii) whether the time at which the construction of the MRP(s) was completed is before/after 1960 [*Late end/Early end*]; (iii) whether the time spent to construct the MRP(s) is above/below the median [*Long/Short*], (iv) and whether the MRP is still operating at the same location [*Closed/Open*]. One can think of the first three dichotomies as replicating the strategy considered in Giorcelli and Li (2022), looking at whether "imperfectly finished" MRPs have an impact on their spillovers at the county level. The fourth dichotomy looks at whether the fate of MRPs could explain their long-run effect on counties (e.g., through early closure). Interestingly, early projects do seem to have a more positive effect on GDP per capita in 1982, but also

Figure E8. Treatment heterogeneity in MRP characteristics—county results (2/2, other MRP characteristics).



A. Population (1982)

B. GDP per capita (1982)

C. Population (2010)

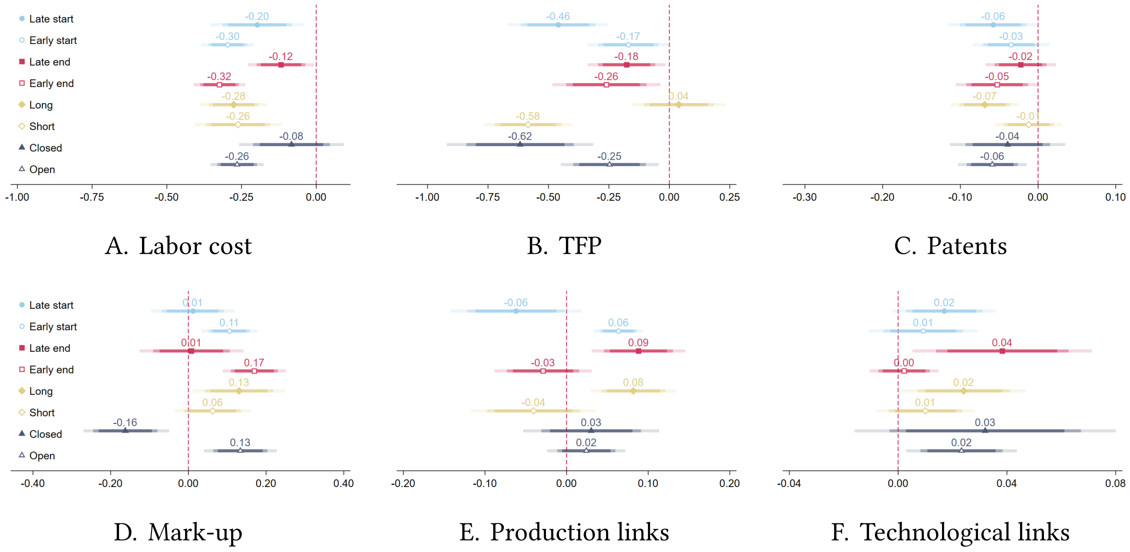
D. GDP per capita (2010)

Note: This Figure displays the treatment estimates for the baseline county outcomes. The unit of observation is a county. All specifications include the extended controls of Table 3. In each panel, we report four sets of estimates, obtained using treated and control counties associated with: (i) whether the time at which the construction of the MRP(s) was started is before/after 1954 [*Late start*/*Early start*]; (ii) whether the time at which the construction of the MRP(s) was completed is before/after 1960 [*Late end*/*Early end*]; (iii) whether the time spent to construct the MRP(s) is above/below the median [*Long*/*Short*], and (iv) whether the MRP is still operating at the same location [*Closed*/*Open*].

a more negative effect on later output (in 2010). The same can be said in counties where local MRP(s) were closed: we find that counties associated with closed MRP(s) tend to perform slightly better, if anything, than those with operating MRP(s). These findings show that the findings of Giorcelli and Li (2022)—that the completeness of MRPs matter for their own long-run success and for the success of connected firms—do not aggregate up to the county level: MRPs end up exerting negative spillovers irrespective of their "initial completeness."

In Figure E9, we rather focus on the firm-level outcomes. There are a couple of key take-aways from this analysis. First, the negative impact of MRP(s) on the other establishments is observed in counties where MRP(s) are still active and not only where the plants were closed. In some respects, these latter counties might appear to fare better than the others. Second, the timing and duration of construction do matter (as discussed in Giorcelli and Li, 2022, later investments may have suffered from the unexpected Sino-Soviet split) but not markedly so.

Figure E9. Treatment heterogeneity in MRP characteristics—firm results (2/2, other MRP characteristics).



Notes: This Figure displays the treatment estimates for the following outcomes: *Labor cost* is the logarithm of total compensation per employee; *TFP* is the logarithm of firm-specific total factor productivity as computed in Imbert et al. (2022); *Patents* is the number of patent applications registered by the firm; *Markup* is a dummy equal to one if the markup is above-median within a 4-digit industry × year cell, computed following De Loecker and Warzynski (2012)—see Appendix B; *Production links* is a dummy equal to one if the firm operates along the production chain of local MRP(s); *Technological links* is a dummy equal to one if sectors in which the establishment and the MRP(s) operate are linked through patent applications. The unit of observation is an establishment × year, we exclude the MRPs from the sample, and standard errors are clustered at the level of 400 × 400-kilometer cells. In each panel, we report four sets of estimates, focusing on: (i) whether the time at which the construction of the MRP(s) was started is before/after 1954 [*Late start*/*Early start*]; (ii) whether the time at which the construction of the MRP(s) was completed is before/after 1960 [*Late end*/*Early end*]; (iii) whether the time spent to construct the MRP(s) is above/below the median [*Long*/*Short*], and (iv) whether the MRP is still operating at the same location [*Closed*/*Open*].

E.4 Complements on production linkages and concentration

This section provides complements to the main analysis on production linkages and concentration.

Product concentration around MRPs In Table 5 of the paper, we measure the extent of linkages to MRPs within treated counties—an exercise in which we focus on the probability for a unit of *output* to be tied to the local MRPs. We reproduce this exercise in Table E4 but consider employment weights, thus measuring the probability for a *worker* to be tied to MRPs.

Product concentration at the county level In this subsection, we study the relationship between treatment and product concentration at the county level. This exercise explores various aspects of the tangle of economic interactions between establishments.

Figure E10 provides a sensitivity analysis for Figure 5. In the baseline analysis, we rely on standard Herfindahl indices and Herfindahl indices with input/output weights

Table E4. Production linkages with the MRPs—employment-weighted measures.

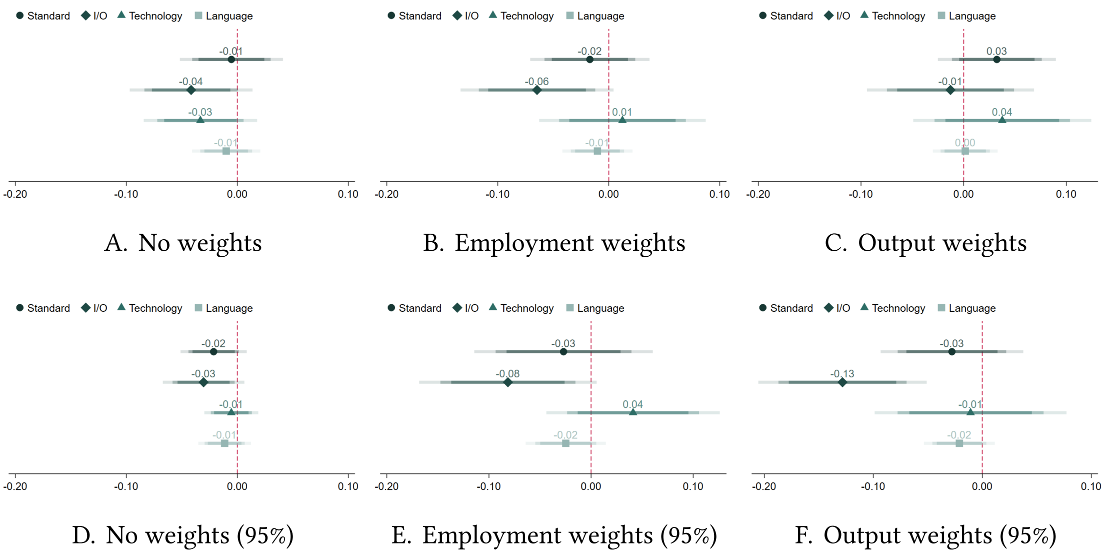
	Downstream	Upstream	Same industry
Panel A: Production linkages	(1)	(2)	(3)
Treatment	0.013	0.009	0.017
	(0.011)	(0.009)	(0.005)
	[348,632]	[348,632]	[348,632]
	More H-intensive	More K-intensive	More T-intensive
Panel B: Factor demand	(1)	(2)	(3)
Treatment	-0.010	-0.011	-0.012
	(0.013)	(0.014)	(0.012)
	[257,175]	[257,175]	[257,175]
	Tech. clos.	Tech. clos. (Mah.)	
Panel C: Technology closeness	(1)	(2)	
Treatment	0.011	0.010	
	(0.005)	(0.005)	
	[348,632]	[348,632]	

Notes: The unit of observation is a firm × year, we exclude the MRPs from the sample, and standard errors are clustered at the level of 400 × 400-kilometer cells. All specifications include the baseline controls of Table 4. *Downstream* (resp. *Upstream*) is a dummy equal to one if the firm is down (resp. up) the supply chain with respect to one of the MRPs; *Same industry* is a dummy equal to one if the firm operates in the same 4-digit industry as one of the MRPs. *More F-intensive* is a dummy equal to 1 if the revealed factor intensity of factor *F* (using product codes) is higher than that of the average associated MRP. *Tech. clos.* (*Tech. clos. (Mah.)*) is a dummy equal to one if sectors in which the establishment and the MRP(s) operate are linked through patent applications (based on Mahalanobis distance). Compared to Table 5, the estimates are weighed by employment at the firm level.

better accounting for the proximity of products through production chains, i.e., each firm enters their calculation with a weight equal to its output. In Figure E10, we use alternative weights (uniform across firms in panels A/D, employment-weighted in panels B/E, and output-weighted in panels C/F) and different linkages matrices. In particular, we use matrices based on technological linkages or product similarity as proxied by language similarity. We find that treated counties tend to be less concentrated in production than control counties, irrespective of the exact specification for Herfindahl indices but for one exception, i.e., when linkages are calculated using the sparse matrix of technological linkages.

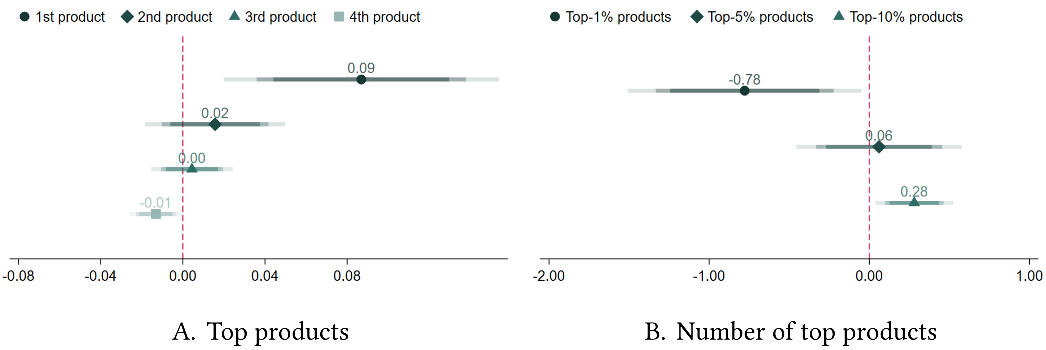
Figure E11 provides further support for the observation that treated counties are less concentrated in production than control counties outside the presence of MRPs. More specifically, we compare across counties: (i) the output shares of the top-4 products (panel A); and (ii) the number of products whose output-weighted share is in the top 1, 5, and 10% across county/product code observations. We find that the largest product has

Figure E10. Production clusters in treated/control counties—robustness checks with alternative weights and indices.



Note: This Figure displays the treatment estimates for different Herfindahl indices. In panels A/D, these indices are created without weights, i.e., each production establishment is weighted uniformly. In panels B/E, these indices are created with employment weights; and in panels C/F, these indices are created with output weights—as in Figure 5. The top panels use the full sample, while the bottom panels drop the top-5% county/product-code shares. Within each panel, we report four estimates using the following matrices: **I** as in the standard Herfindahl index, a matrix based on input/output linkages (I/O), a matrix based on technological linkages, and a matrix based on product similarity as proxied by language similarity. In each specification, the unit of observation is a county, standard errors are clustered at the level of 400 × 400-kilometer cells, and we include the extended controls of Table 3. See Section 4.1 and Appendix B.4 for the construction of these indices.

Figure E11. Production clusters in treated/control counties—top products.



Note: This Figure displays the treatment estimates for (i) the output share of the top-4 products (panel A) and (ii) the number of products whose output-weighted share is in the top-1, 5, and 10% across county/product code observations. In each specification, the unit of observation is a county, standard errors are clustered at the level of 400 × 400-kilometer cells, and we include the extended controls of Table 3.

a higher share in treated counties, but the subsequent clusters are not. Along the same lines, the number of top product codes is smaller in treated counties.

Table E5. Production linkages with the MRPs—sensitivity analysis.

	Downstream		Upstream		Same industry
	(1)	(2)	(3)	(4)	(5)
Treatment (unweighted)	0.043	0.031	0.115	0.076	0.059
	(0.018)	(0.023)	(0.024)	(0.015)	(0.013)
Obs.	348,506	348,506	348,506	348,506	348,506

Notes: The unit of observation is an establishment × year, we exclude the MRPs from the sample, and standard errors are clustered at the level of 400 × 400-kilometer cells. All specifications include the baseline controls of Table 4. *Downstream* (resp. *Upstream*) is a dummy equal to one if the firm is down (resp. up) the supply chain with respect to one of the 156 factories; *Same industry* is a dummy equal to one if the firm is in the same 2-digit industry as one of the 156 factories (see Section 4 for a description of the empirical strategy and the definition of these dummies in control counties). In columns (1) and (3), a link between the firm and the local MRP(s) is detected if the input/output intensity between the two product categories is in the top quartile; in columns (2) and (4), a link between the firm and the local MRP(s) is detected if the input/output intensity between the two product categories is in the top decile (we select a 5% threshold in the baseline specification—see Table 5). In column (5), we define a horizontal link if the firm and the MRP belong to the same 2-digit industry (we define industries at the 4-digit level to create the *Same industry* indicator variable in the baseline specification—see Table 5).

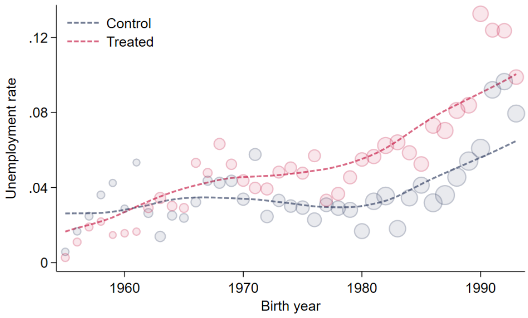
Product linkages at the firm level We finally produce a robustness check for Panel A of Table 5. In our baseline analysis, a link between the firm and the local MRP(s) is detected if the input/output intensity between the two product categories is in the top 5% or if a firm operates in the same 4-digit industry as the MRP(s). In Table E5, we look at the incidence of production linkages when a link between the firm and the local MRP(s) is detected if the input/output intensity is in the top quartile—columns (1) and (3)—or in the top decile—columns (2) and (4). We further define a horizontal link if the firm and the MRP belong to the same 2-digit industry—see column (5). We find a large clustering around local MRP(s), e.g., the probability to operate within the same 2-digit industry is 6 percentage points higher in treated counties.

E.5 Entrepreneurs and entrepreneurial values

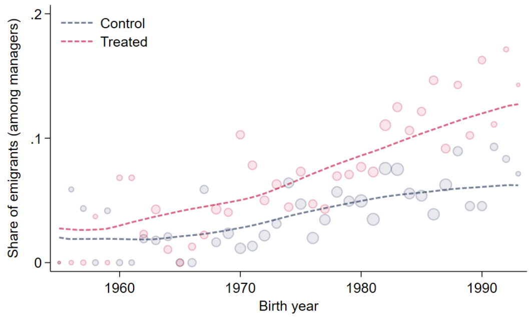
The missing entrepreneurs This section provides complements to Section 4.2. More specifically, we show that our findings about the allocation of college graduates to top managerial positions are not explained by the failure of treated counties to produce elites or their capture by the public sector. Before that, we provide complements to Figure 6 in Figure E12, where we show: the unemployment rate across cohorts of college graduates in treated and control counties (Panel A); and the emigration rate among managers born in treated and control counties (Panel B).

In Table E6, we rely on our baseline TSLS specification and show that the incidence of college education is 0.09 higher in treated counties (column 1), and that: college-educated individuals are slightly more likely to work in a governmental, health, or education job in treated counties (column 2); and they are about as likely to work in hospitality (column 3)

Figure E12. The missing entrepreneurs—complements.



A. Unemployment



B. Emigrants (among managers)

Note: Panel A displays the unemployment rate among working-age individuals—between 22 and 60 years old—with a college education in control counties (blue dashed line) and in treated counties (red dashed line). Treatment is defined at the location of residence. The lines are local polynomial approximations as a function of the year of birth. Panel B displays the share of emigrants among working-age individuals—between 22 and 60 years old—with a college education and in a managerial occupation in control counties (blue dashed line) and in treated counties (red dashed line). Treatment is then defined at the location of registration, and emigrants need to live outside of their *province* of origin.

or work as professionals (engineering, accounting, and finance, column 4). Overall, Figure E12 and Table E6 illustrate that treated counties are not failing in producing elites; instead, the business environment does not seem to offer them adequate entrepreneurial possibilities.

Table E6. The missing entrepreneurs—complements.

	College (1)	Public (2)	Hospitality (3)	Professional (4)
Treatment	0.090	0.033	0.002	0.013
	(0.020)	(0.010)	(0.004)	(0.011)
Observations	180,108	43,039	43,039	43,039
Mean	*0.3322*	*0.1361*	*0.0330*	*0.1550*

Notes: Standard errors are clustered at the level of 400 × 400-kilometer cells. The unit of observation is a working-age individual (22–60 years old) in the 2015 1% Population Survey; and all regressions are weighted such that each county contributes the same as in Table 3. In columns (2)-(4), we further restrict the sample to employed individuals with a college degree. All specifications are TSLS specifications and include the extended controls of Table 3 as well as “cohort” dummies for the year of birth. *College* is a dummy equal to 1 if the individual has a college degree; *Public* is a dummy equal to 1 if the individual reports working in a government/health/education job; *Hospitality* is a dummy equal to 1 if the individual works in the hospitality sector; *Professional* is a dummy equal to 1 if the individual is a professional in engineering, accounting, or finance. The treatment and control variables are nested at the place of residence.

Entrepreneurial values Large factories might discourage entrepreneurial spirit. We investigate this possible effect using the China Family Panel Studies (CFPS) survey and its module on values and aspirations. The CFPS survey is a nationally representative survey of households carried out by the Institute of Social Science Survey at Peking

University.[20] CFPS contains modules on aspirations and world outlook, in particular on effort and individualism, along with socioeconomic data. These modules provide us with rare information on entrepreneurial spirit.[21]

Table E7. Values and aspirations in treated and control counties.

	Master's degree	No schooling necessary	Highly esteemed position
Panel A: Aspirations			
Treatment	-0.151	-0.000	0.019
	(0.019)	(0.004)	(0.040)
Observations	1,393	1,393	946
	Hard work	Family connections	Talent
Panel B: Values (... is/are important for success)			
Treatment	0.174	-0.246	-1.052
	(0.136)	(0.233)	(0.223)
Observations	1,101	1,100	1,097

Notes: Standard errors are clustered at the level of 400 × 400-kilometer cells. The unit of observation is an individual. All specifications include the extended controls of Table 3, and individual and household controls: respondent's age and gender, and household mean income and education (shares of household members at each level of education). The dependent variables are dummy-coded, except "Talent is important for success," which is expressed on a 0–10 scale. Some outcomes are only available for subsamples.

Table E7 presents the estimates of specification (1), at the individual level and controlling for respondent and household characteristics.[22] In Panel A of Table E7, we analyze aspirations, focusing on education and job prestige. The population in treated counties is less likely to aspire to tertiary education: Treated respondents are 15 percentage points less likely to aspire to a master's degree (for themselves or for their children). Respondents in treated counties are, however, not more likely to report that no schooling is necessary or that job prestige is important.

We investigate the treatment effect on values in Panel B of Table E7. We use the following survey question from CFPS: "How would you rate the importance of the following factors in affecting a child's future success?", focusing on the following factors:

[20] CFPS is representative of 95% of the Chinese population—Inner Mongolia, Hainan, Ningxia, Qinghai, Tibet, and Xinjiang are not covered. CFPS consists of five waves: a baseline in 2010, and four follow-up surveys in 2012, 2014, 2016, and 2018; we focus on 2012 and 2014, when our modules of interest are included. Please refer to `https://www.isss.pku.edu.cn/cfps/en/` for further information about CFPS.

[21] A lack of entrepreneurial spirit may result from a composition effect—large industrial investments attract factory workers and lead to an emigration of entrepreneurs, as shown before. This mechanism was hypothesized by Chinitz (1961) to explain the demise of the Rust Belt.

[22] We control for the age of the respondent in 2014, her gender, household-level education, household-level income, and urban status. The aspiration module applies to households with children aged 0–15, and answers are collected from parents. The values module applies to children aged 12–15.

“how hard she works”, “family connections”, and “talent”. Our key finding is that individuals in treated counties are far less likely to think that talent is important for success, which is consistent with a decline in entrepreneurship. This may either reflect (i) a composition effect, as the presence of MRPs leads to a selected emigration of entrepreneurs and managers (Section 4.2), and/or (ii) a direct treatment effect on the local culture of individuals.

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